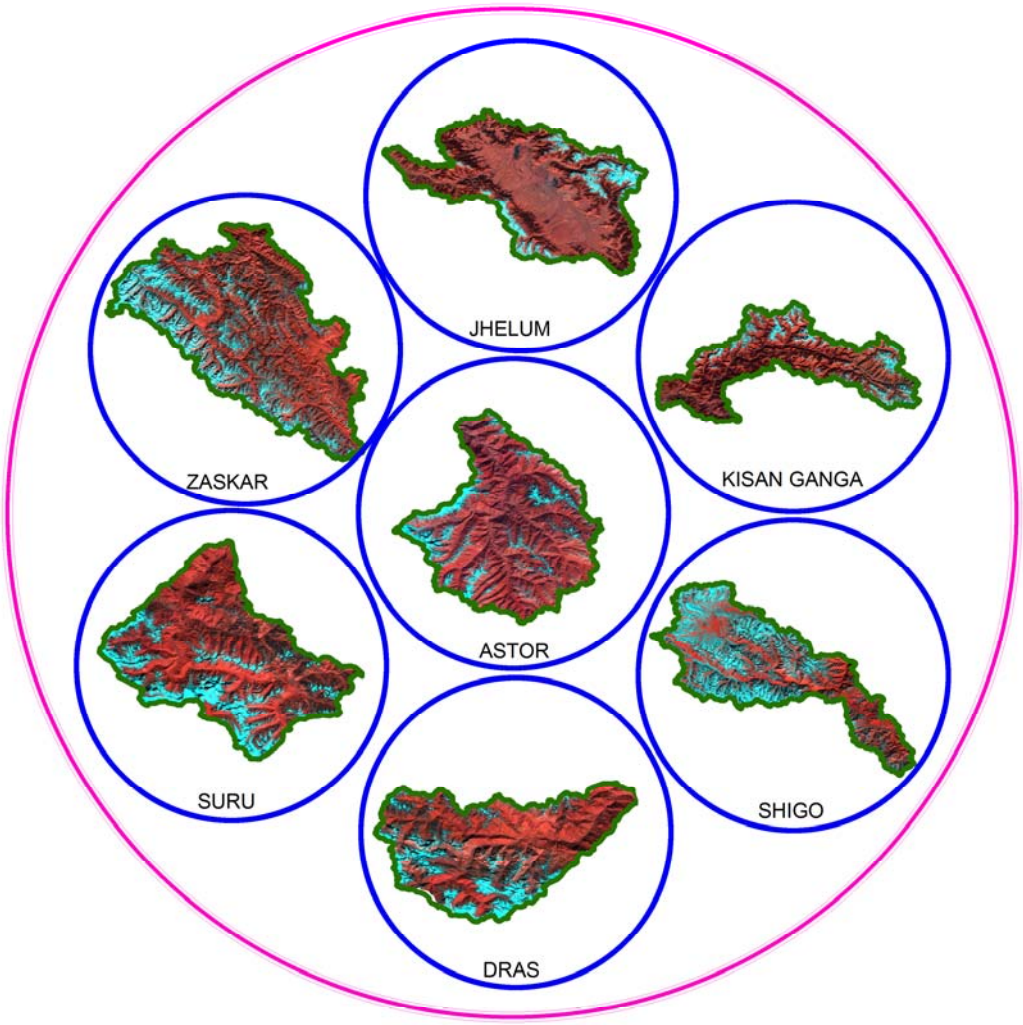
SNOW COVER ATLAS OF THE INDUS BASIN

Sub basins

Jhelum, Kisan Ganga, Astor, Shigo, Dras, Suru and Zaskar.

(A Joint Project of Indian Space Research Organization and Ministry of Environment and Forests, Govt. of India)

Year 2010 -11



Space Applications Centre (ISRO)
Ahmedabad - 380015

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Originating Unit	Geo Sciences Division, Marine, Geo and Planetary Sciences Group, Earth, Ocean, Atmosphere, Planetary Sciences and Applications area, Space Applications Centre (ISRO), Ahmedabad-15
Abstract	This atlas gives subbasin-wise distribution of snow cover in the Indus basin from October 2010 to June 2011. The subbasins included in this report are Jhelum, Kisan ganga, Astor, Shigo, Dras, Suru and Zaskar. The areal extent of snow cover was estimated in fully automatic mode using Normalized Difference Snow Index (NDSI) based algorithm. For this purpose AWiFS sensor of Resourcesat satellite was used. This atlas gives snow cover products, statistics and seasonal snow depletion curve. It is expected that this data will be useful for hydrological and climatological applications.
Key words	Snow cover, NDSI, AWiFS, depletion curve, Jhelum, Kisan ganga, Astor, Shigo, Dras, Suru and Zaskar basins.
Security Classification	Unrestricted
Distribution	Among concerned

CONTENTS

1. **Introduction**

Snow covers almost 40 per cent of the Earth's land surface during Northern Hemisphere winter. This makes albedo and areal extent of snow as important component of the Earth's radiation balance (Foster and Chang, 1993). In addition, large areas in the Himalayas are also covered by snow during winter. Area of snow can change significantly during winter and spring. This can affect stream flow for rivers originating in the higher Himalayas. All the rivers originating from higher Himalayas receive almost 30-50 % of annual flow from snow and glacier melt run off (Agarwal et al., 1983). In addition, snow pack ablation is highly sensitive to climatic variation. Increase in atmospheric temperature can influence snowmelt and stream runoff pattern (Kulkarni et al., 2002). Therefore, mapping of the areal extent and reflectance of snow are important parameter for various climatological and hydrological applications. In addition, extent of snow cover can also be used as input for numerous other applications.

Mapping and monitoring of seasonal snow cover using field methods are normally very difficult in a mountainous terrain, like the Himalayas. Therefore, remote sensing techniques have been extensively used for snow cover monitoring. Snow cover monitoring using satellite images were started by using the TIROS-1 satellite from April 1960 (Singer and Popham 1963). Since then, the potential for operational satellite-based mapping has been enhanced by the development of higher temporal frequency and satellite sensors with higher spatial resolution. In addition, satellites with better radiometric resolutions, such as NOAA have been used successfully for snow mapping (Hall et al., 1995). This is possibly due to the distinct spectral reflectance characteristics of snow in visible and near infrared regions. India has launched series of Indian Remote Sensing satellite (IRS) to study the different earth resources. Previously launched satellites have flown with many sensors having different spatial, temporal and spectral resolutions. Recently launched RESOURCESAT-1 satellite has three different sensors namely LISS III, LISS IV & AWiFS with different spatial, temporal and spectral resolutions as desired for different applications. AWiFS (Advanced Wide Field Sensor) is an advanced version of earlier Indian satellite sensor WiFS (Wide Field Sensor) with improved spectral and spatial resolutions maintaining the same repetivity. There are a series of other polar orbiting satellites, like Landsat, NOAA and MODIS etc., which have provided information on different aspects of

snow. Geo-stationary satellites also proved their utility in mapping/monitoring the snow-covered regions. Information generated from satellite observations has been extensively used for snowmelt runoff modeling (Kulkarni et al., 1997).

2. Study Area:

This Atlas gives distribution of snow cover in seven subbasins of the Indus basin. These are Jhelum, Kisan ganga , Astor, Shigo, Dras, Suru and Zaskar sub basins. Locations of these basins are shown in Figure 1.

3. Data used:

AWiFS data from October 2010 to June 2011 were used in this study.

4. Normalised Difference Snow Index (NDSI):

In general, the reflectance of snow is high at the red end of the visible spectrum. It tends to decline in the near-infrared region until 1090 nm, where slight gain in reflectance occurs and gives a minor peak at approximately 1090 to 1100 nm. One of the important difficulties in snow cover monitoring is the presence of cloud cover. Cloud has strong reflectivity in visible, NIR and SWIR regions while snow absorbs in SWIR, and this difference can be utilized for snow/cloud discrimination. Normalized Difference Snow Index (NDSI) utilize the normalized ratio of green and SWIR and is used as an automated approach for snow mapping addressing the shadow and cloud problems in snow bound areas.

Normalized Difference Snow Index was calculated using the ratio of green wavelength (band 2) and SWIR (band 5) of AWiFS sensor:

$$Normalized\ Difference\ Snow\ Index(NDSI) = (band2 - band5)/(band2 + band5) \quad ..(1)$$

To estimate NDSI, DN numbers were converted into reflectance. This involves conversion of digital numbers into the radiance values, known as sensor calibration, and then estimation of reflectance from these radiance values. Various parameters needed for estimating spectral reflectance are maximum and minimum radiances and mean solar exo-atmospheric spectral irradiances in the satellite sensor bands, satellite data acquisition time, solar declination, solar zenith and solar azimuth angles, mean Earth-Sun distance etc. (Markham and Barker, 1987; Srinivasulu and Kulkarni, 2004).

5. Snow cover monitoring algorithm

An algorithm is developed to provide changes in the areal extent of snow (Kulkarni et. al., 2006). Snow extent is estimated at an interval of 5-days and 10-days, depending upon availabilities of AWiFS data. In 5-daily product, snow extent is generated scene-wise. In this product, snow and cloud extents are given. Estimate of cloud is important because, at times, snow is covered by cloud and this may be classified as non-snow area, leading to erroneous conclusions. In 10-daily product, three scenes are analyzed, if available. For example, 10 March product data of 5, 10 and 15 March was used. If any pixel is identified as snow on any one date then this pixel will be classified as snow on final product. This provides snow cover at an interval of 10 days, an important requirement in hydrological applications. Therefore, this product is generated basin-wise. Since this product is using three scenes, probability becomes high that at least in one scene, pixel may be cloud-free and this helps in overcoming problem associated with snow under cloud cover. If three consecutive scenes are not available, then all available scenes in 10 days window was used in the analysis. Differentiation between water and snow is difficult using NDSI image. In addition, separation of snow and water pixels is also difficult based on reflectance due to mountain shadow. Therefore, in the present algorithm, water bodies are marked in pre-winter

season and are masked in the final products during winter. Flow diagram of the algorithm is given in Figure 2.

6. Results and discussions

In this atlas, basin-wise snow cover statistics, maps, and seasonal depletion curves have been provided from October 2010 to June 2011. Snow ablation pattern varies from basin to basin, depending on area altitude distribution in the basins. Accumulation and ablation pattern in Dras, Shigo and Suru river sub-basin and Zaskar, Astor & Kisanganga river sub-basin is almost same and significant amount of melting was observed in early part of winter. From February to mid of April almost entire basin is covered by snow and ablation starts from the end of April. In case of Jhelum sub-basin continuous accumulation and ablation was observed throughout the season.

Acknowledgements

This investigation was carried out under Snow and Glacier Studies Project, a joint initiative of Ministry of Environment and Forest (MoEF) and Department of Space (DOS). The authors are grateful to Dr. R. R. Navalgund, Director, Space Applications Centre, Ahmedabad for continuous guidance and encouragement during the investigation. Authors would like to thank Dr. J. S. Parihar, DD, EPSA/SAC for their suggestions and comments on the manuscript.

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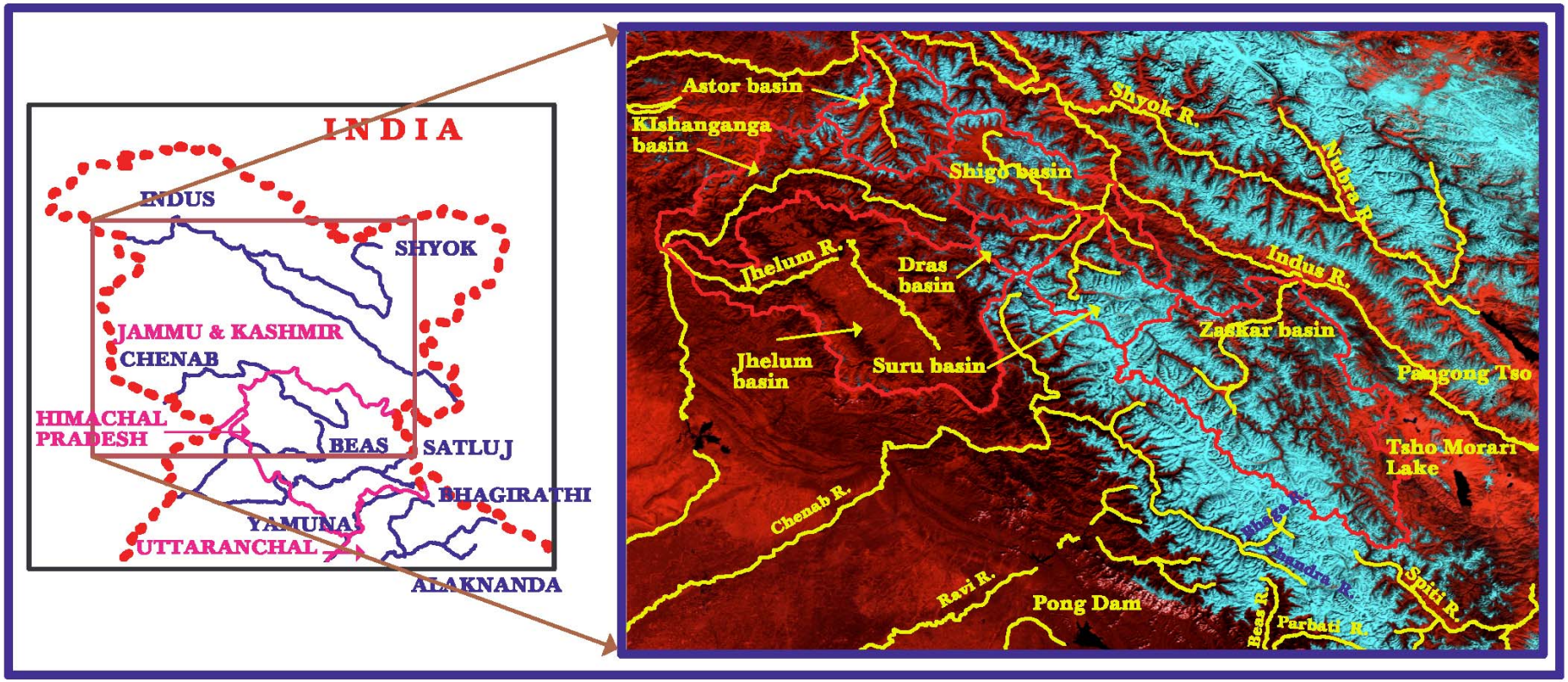


Figure 1: Location map of Jhelum, Kisan ganga, Astor, Shigo, Dras, Suru and Zaskar sub-basins (Part of Indus basin)

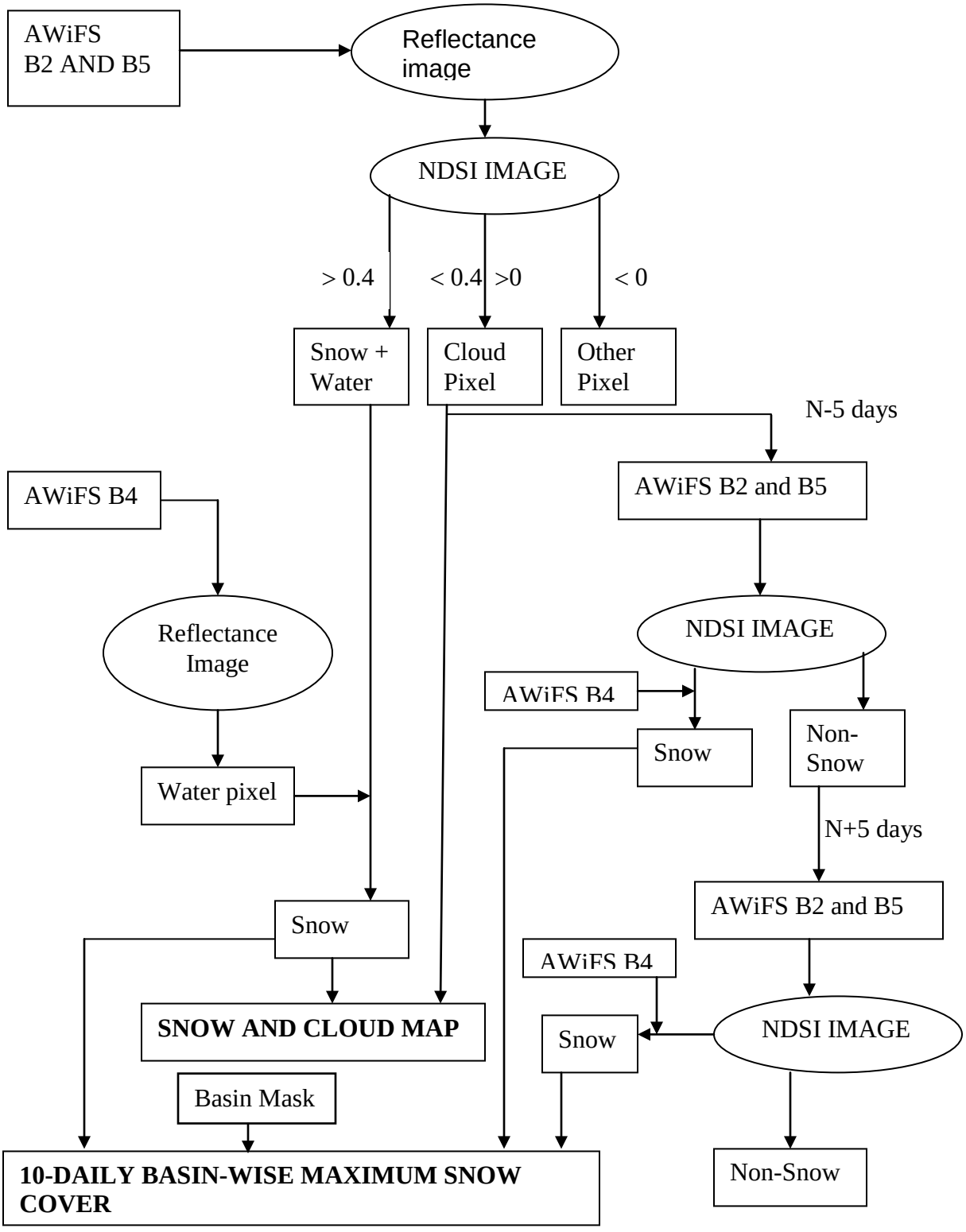


Figure 2: Algorithm for snow cover mapping using AWiFS data

JHELUM BASIN

AREAL EXTENT OF SNOW (5 DAILY)

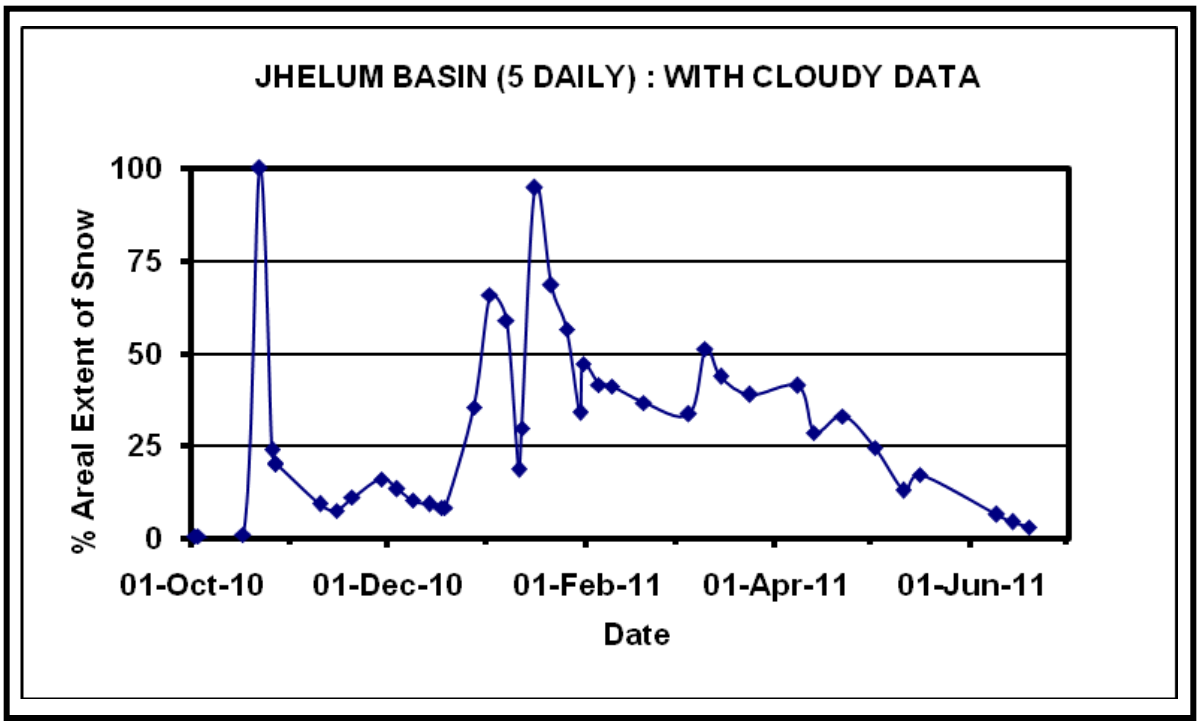
BASIN NAME: JHELUM **BASIN AREA: 14472 sq km**

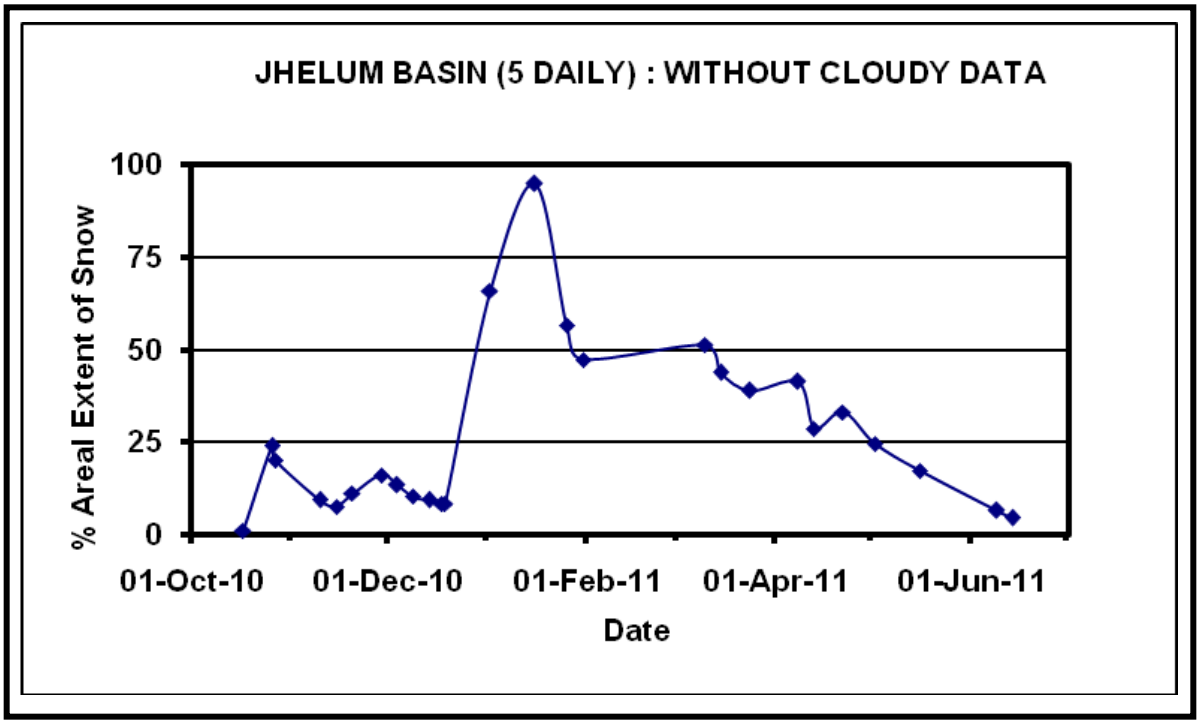
S. No	Date	Snow cover (sq. km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	02-Oct-10	87	1	4	22-Oct-10	13864	96
2	03-Oct-10	77	1	5	26-Oct-10	3451	24
3	17-Oct-10	153	1	6	27-Oct-10	2943	20
November 2010							
7	10-Nov-10	1346	9	9	20-Nov-10	1587	11
8	15-Nov-10	1086	8	10	29-Nov-10	2321	16
December 2010							
11	04-Dec-10	1913	13	14	18-Dec-10	1195	8
12	09-Dec-10	1470	10	15	19-Dec-10	1185	8
13	14-Dec-10	1350	9	16	28-Dec-10	5123	35
January 2011							
1	2-Jan-11	9501	66	6	21-Jan-11	9897	68
2	7-Jan-11	8510	59	7	26-Jan-11	8172	56
3	11-Jan-11	2694	19	8	30-Jan-11	4913	34
4	12-Jan-11	4310	30	9	31-Jan-11	6826	47
5	16-Jan-11	13718	95				
February2011							
10	5-Feb-11	6013	42	12	19-Feb-11	5288	37
11	9-Feb-11	5951	41				
March 2011							
13	5-Mar-11	4861	34	15	15-Mar-11	6332	44
14	10-Mar-11	7392	51	16	24-Mar-11	5607	39
April 2011							
1	8-Apr-11	5958	41	3	22-Apr-11	4777	33
2	13-Apr-11	4139	29				
May 2011							
1	2-May-11	3550	25	3	16-May-11	2474	17
2	11-May-11	1866	13				
June 2011							
1	9-Jun-11	929	6	3	19-Jun-11	423	3
2	14-Jun-11	641	4				

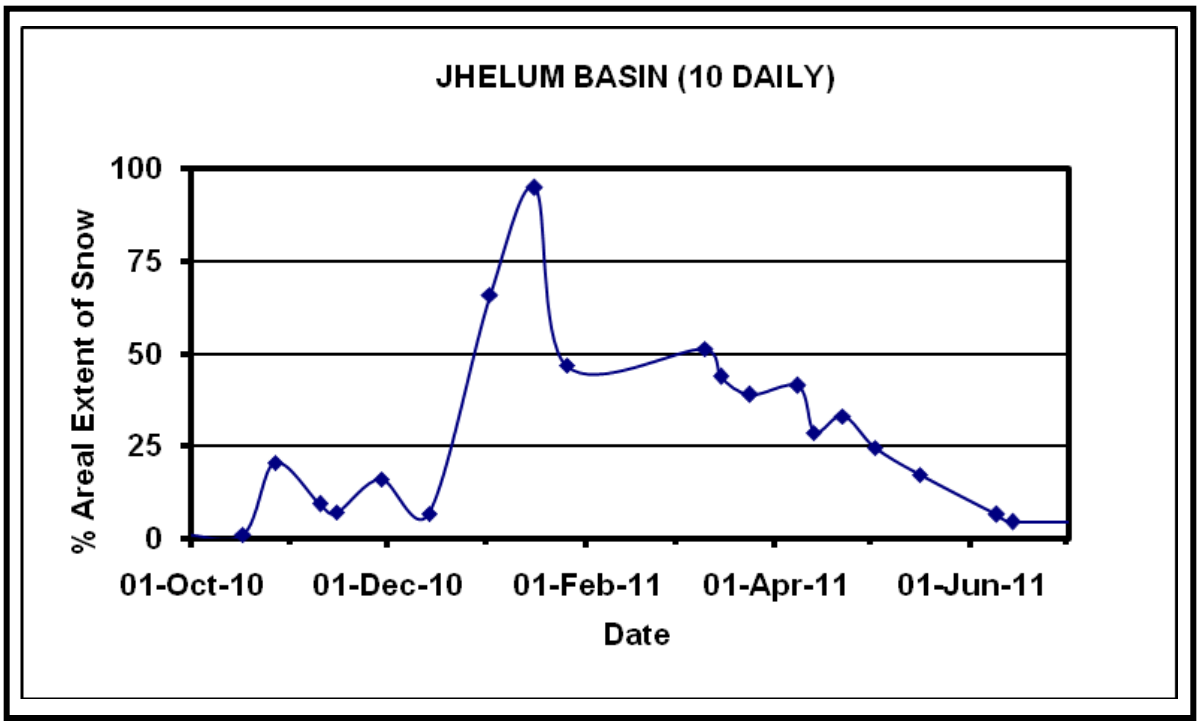
AREAL EXTENT OF SNOW (10 DAILY)

BASIN NAME: JHELUM **BASIN AREA: 14472 sq km**

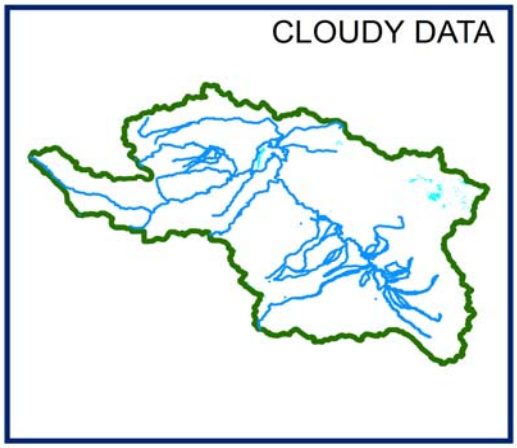
S. No	Date	Snow cover (sq km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	2-Oct-10	73	1	3	27-Oct-10	2940	20
2	17-Oct-10	153	1				
November 2010							
4	10-Nov-10	1346	9	6	29-Nov-10	2321	16
5	15-Nov-10	999	7				
December 2010							
7	14-Dec-10	952	7				
January 2011							
1	2-Jan-11	9501	66	3	26-Jan-11	6746	47
2	16-Jan-11	13718	95				
March 2011							
4	10-Mar-11	7392	51	6	24-Mar-11	5607	39
5	15-Mar-11	6332	44				
April 2011							
1	8-Apr-11	5958	41	2	13-Apr-11	4139	29
May 2011							
1	2-May-11	3550	25	2	16-May-11	2474	17
June 2011							
1	9-Jun-11	929	6	2	14-Jun-11	641	4


JHELUM BASIN (5 DAILY) : WITH CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


JHELUM BASIN (5 DAILY) : WITHOUT CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


JHELUM BASIN (10 DAILY)
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

SNOW COVER MAP: **JHELUM BASIN**



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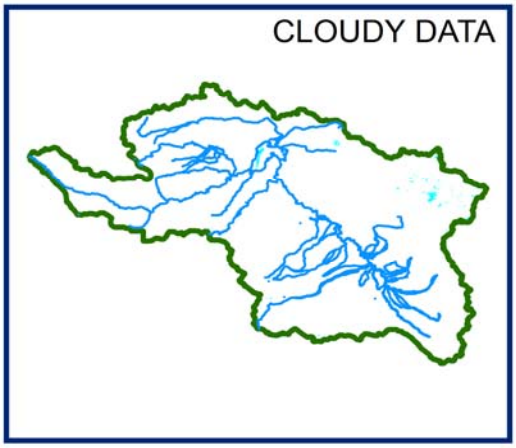

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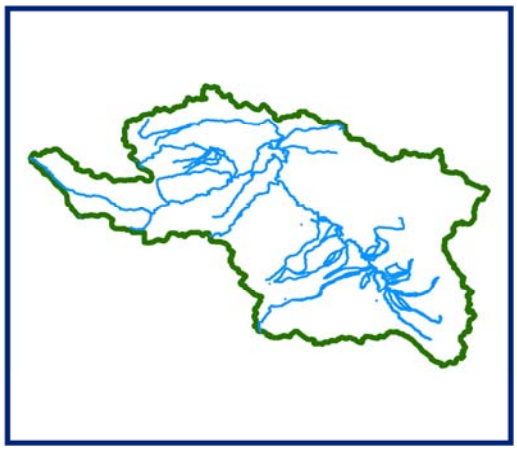

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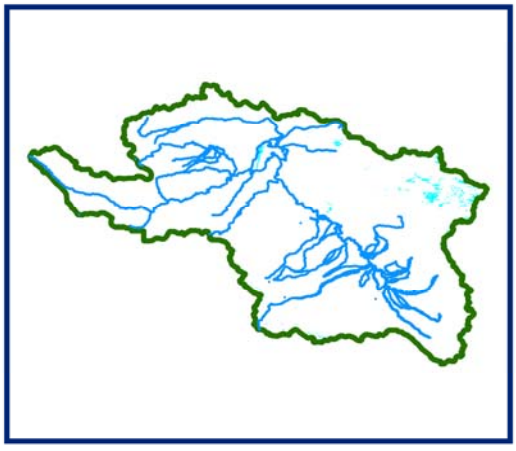

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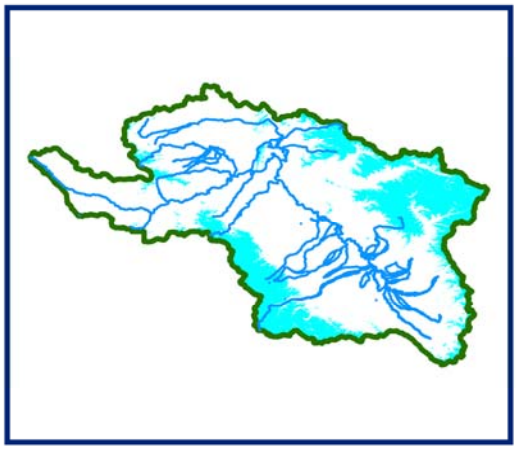

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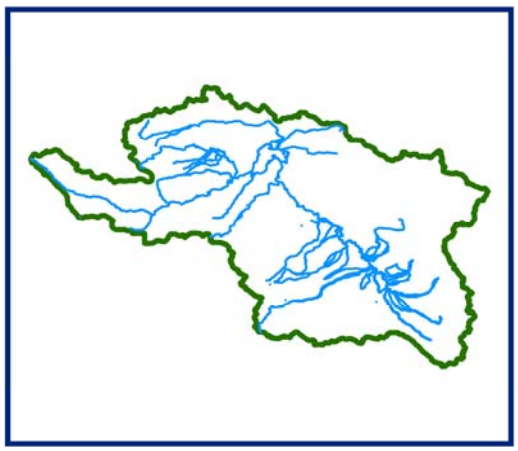


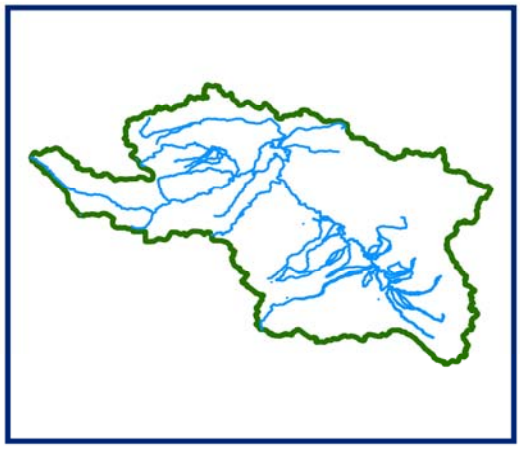
27 OCTOBER 2010

SNOW

0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: JHELUM BASIN



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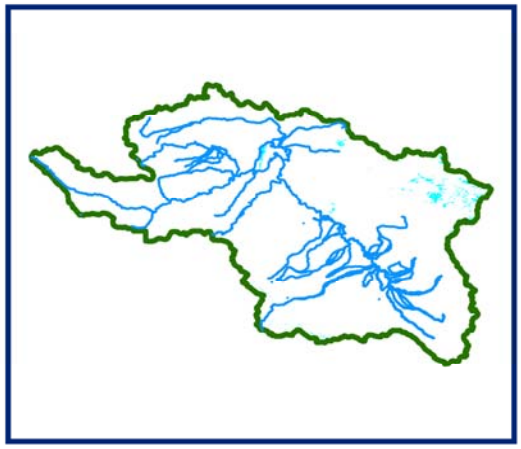

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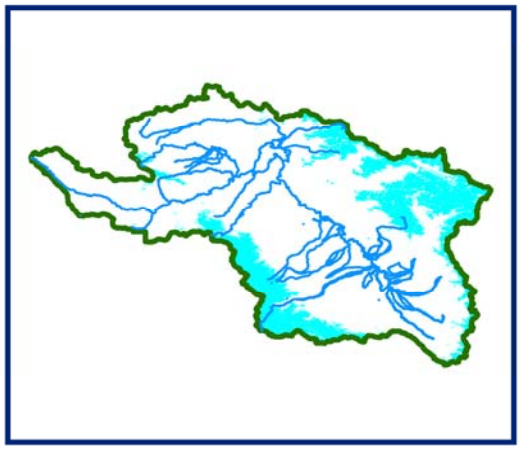
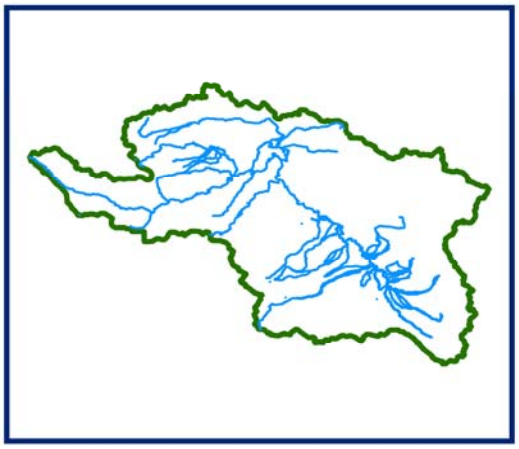


DATA USED
26 OCTOBER 2010
27 OCTOBER 2010

SNOW

0 25 50 100 150 200
Kilometers

SNOW COVER MAP: **JHELUM BASIN**



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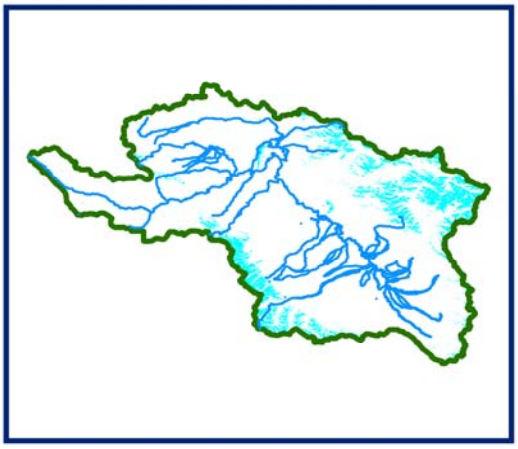

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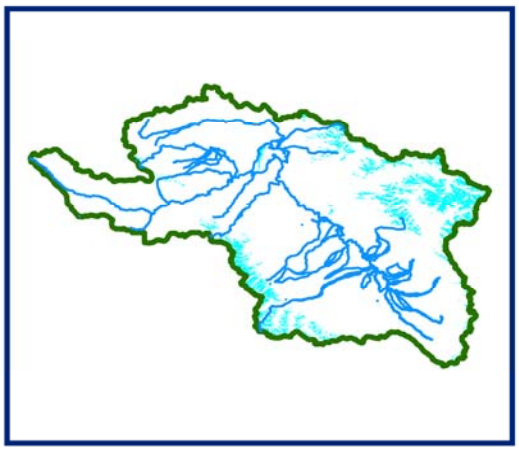

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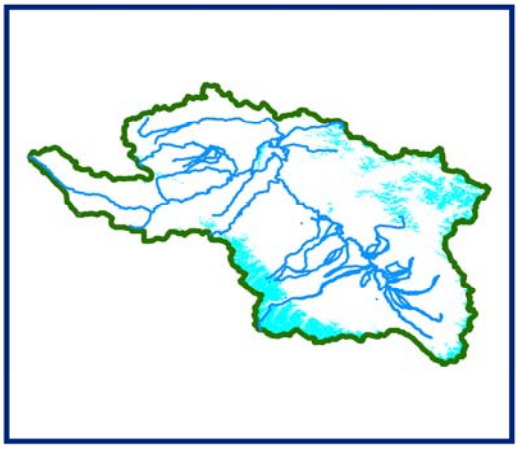

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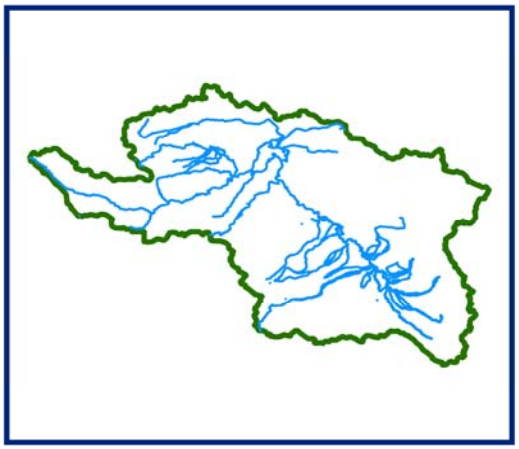

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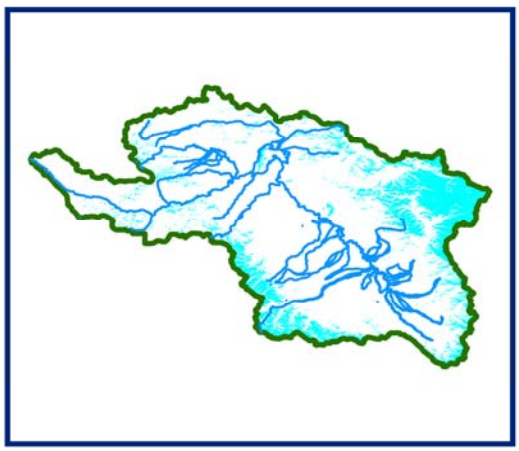

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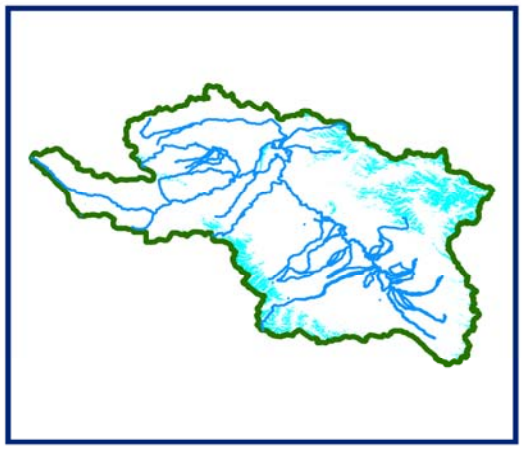
SNOW

0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: JHELUM BASIN



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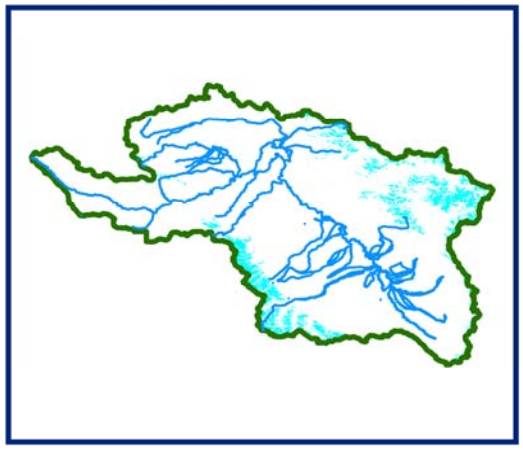

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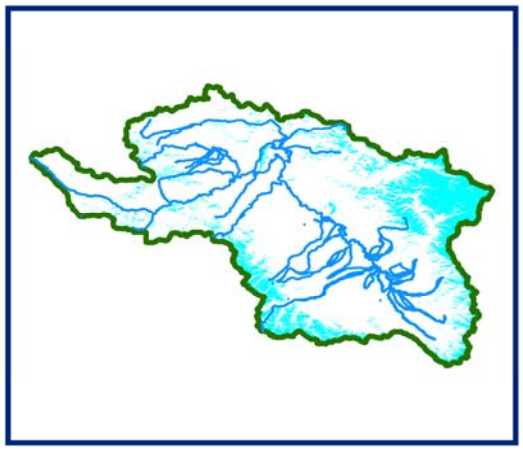

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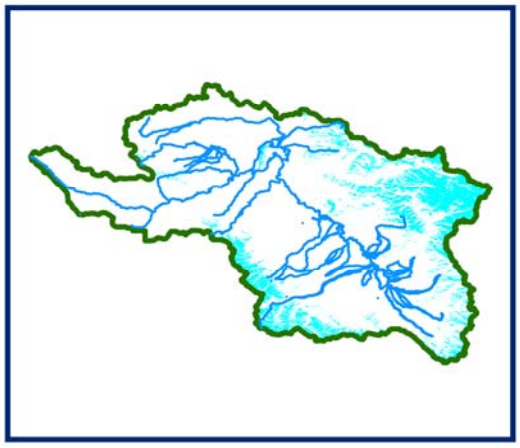
SNOW

0 25 50 100 150 200
Kilometers

SNOW COVER MAP: **JHELUM BASIN**



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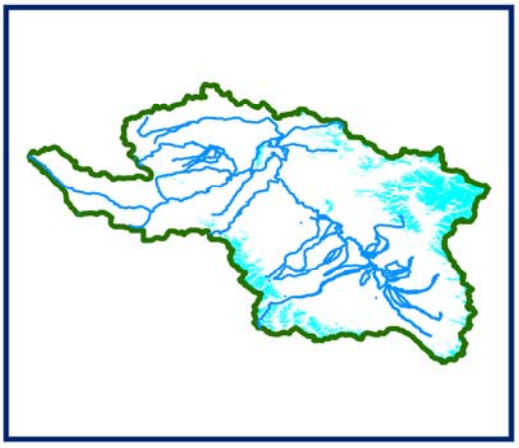

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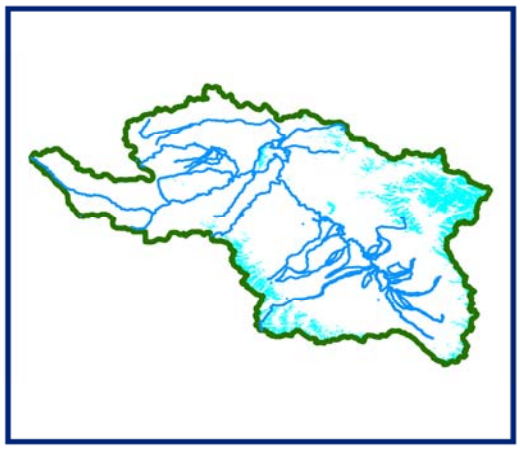

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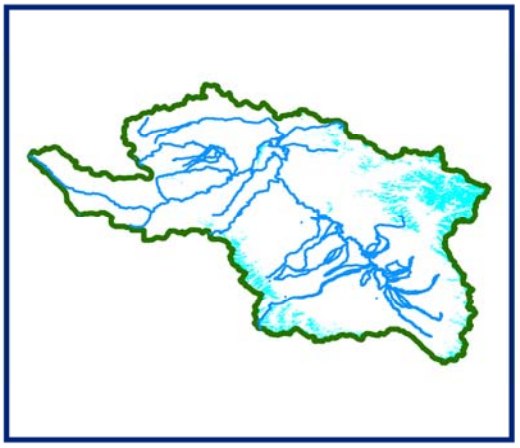

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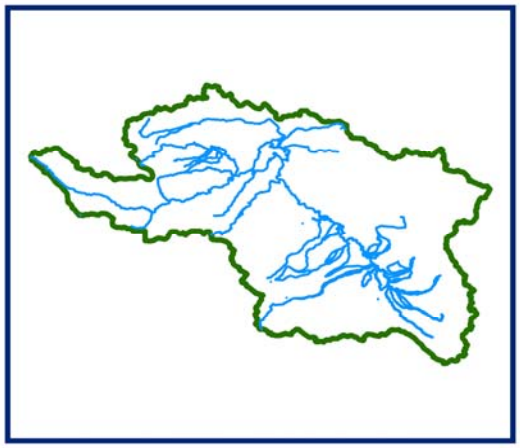

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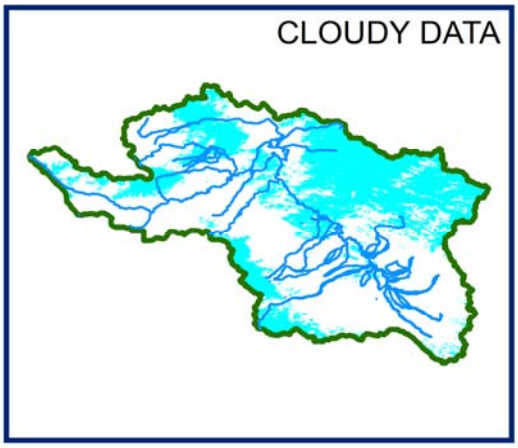


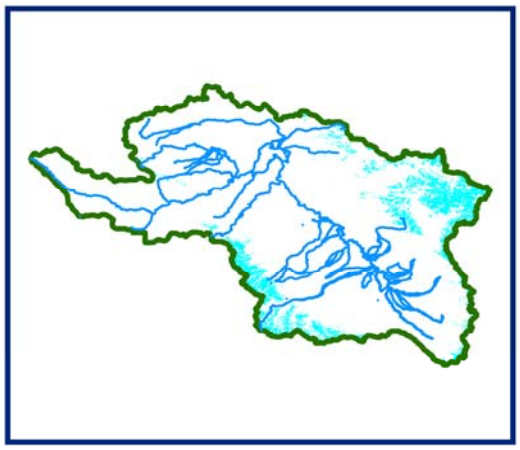
28 DECEMBER 2010

SNOW

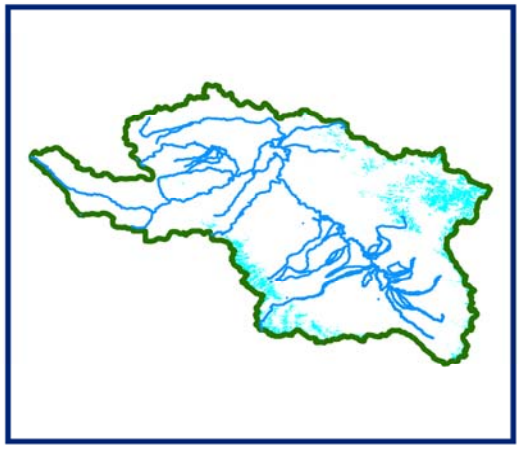
0 25 50 100 150 200

Kilometers

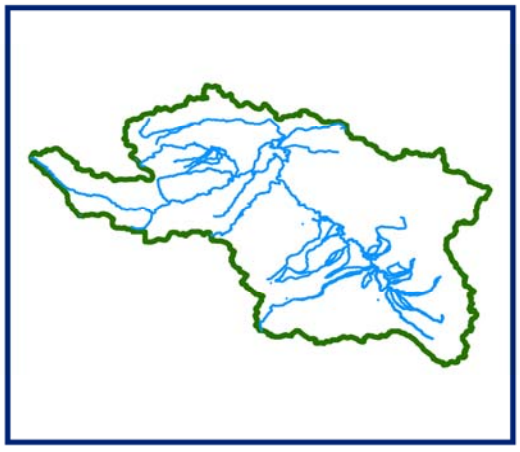
10 DAILY SNOW COVER MAP: JHELUM BASIN



DATA USED
04 DECEMBER 2010
09 DECEMBER 2010



DATA USED
14 DECEMBER 2010
19 DECEMBER 2010

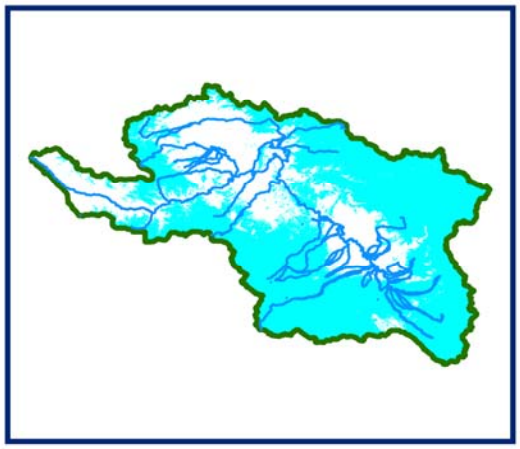


DATA USED
DATA NOT AVAILABLE

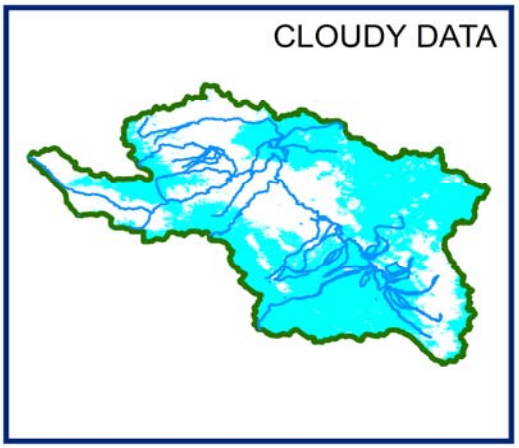
SNOW

0 25 50 100 150 200
Kilometers

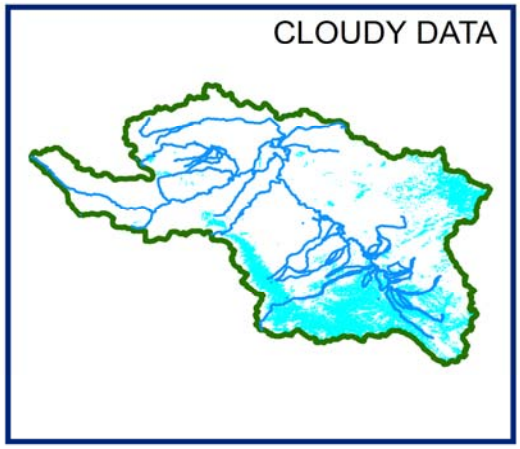
SNOW COVER MAP: **JHELUM BASIN**



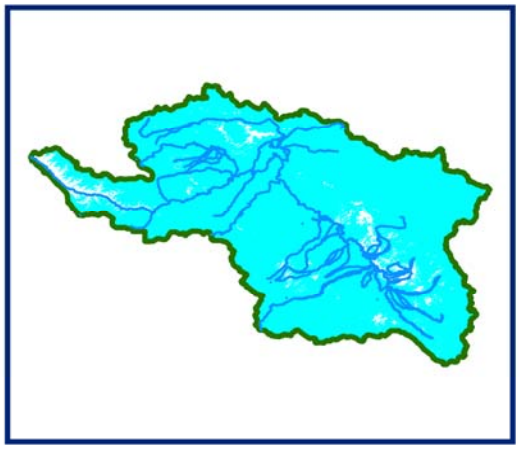
02 JANUARY 2011



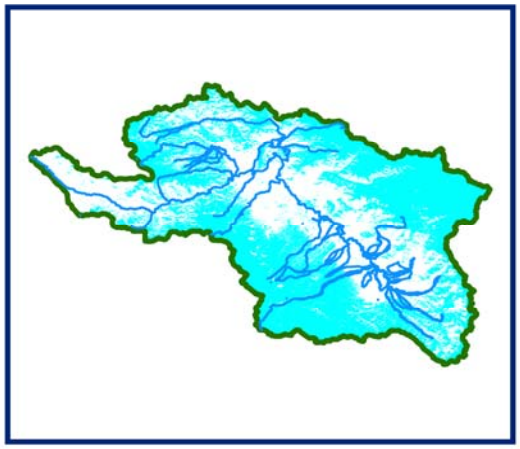
07 JANUARY 2011



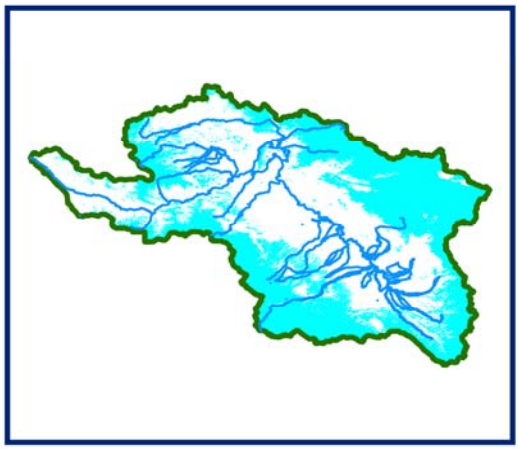
11 JANUARY 2011



16 JANUARY 2011



26 JANUARY 2011



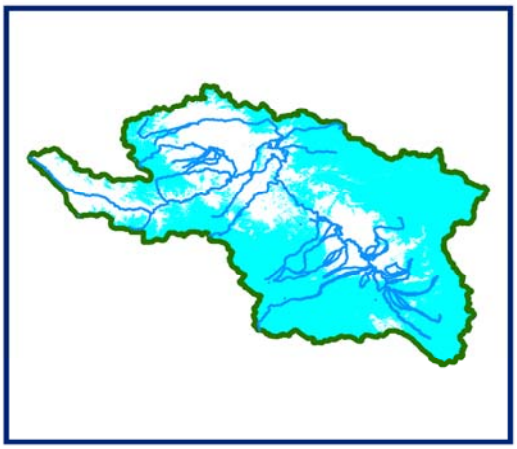
31 JANUARY 2011

SNOW

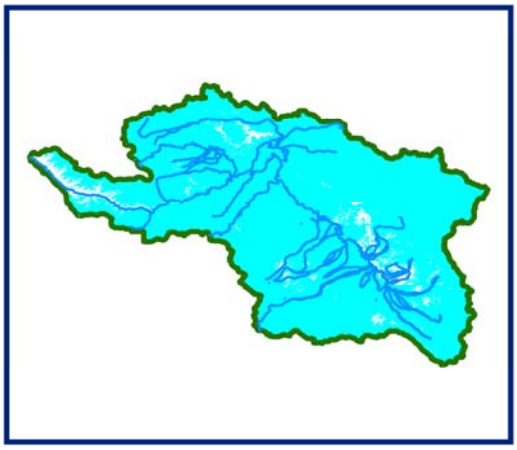
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: JHELUM BASIN



DATA USED
02 JANUARY 2011



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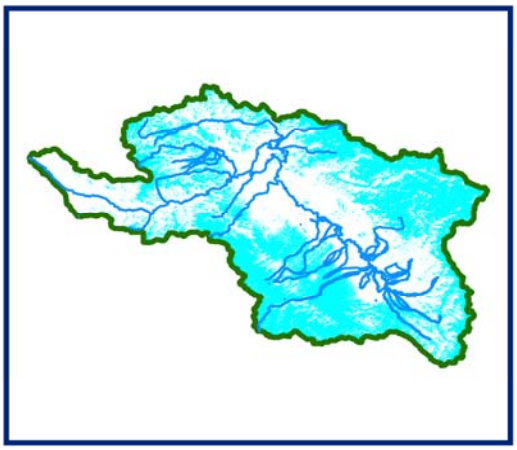
16 JANUARY 2011

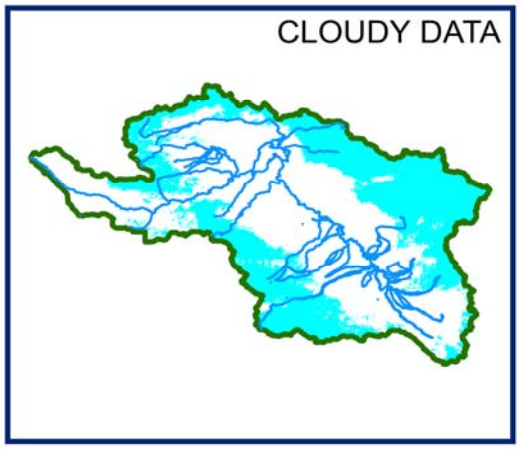


DATA USED
26 JANUARY 2011
31 JANUARY 2011

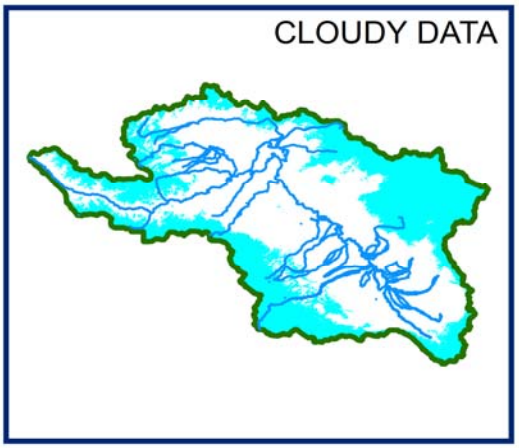
SNOW

0 25 50 100 150 200
Kilometers

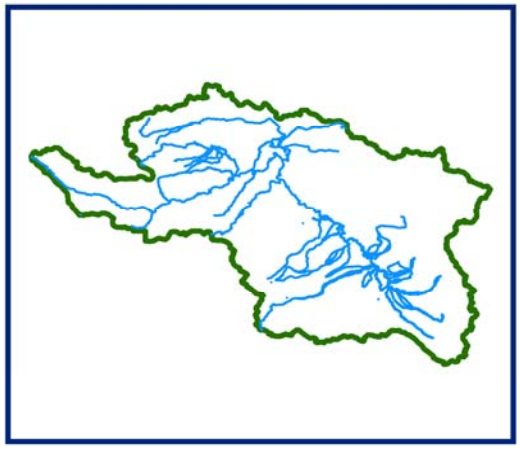
SNOW COVER MAP: **JHELUM BASIN**



05 FEBRUARY 2011



09 FEBRUARY 2011



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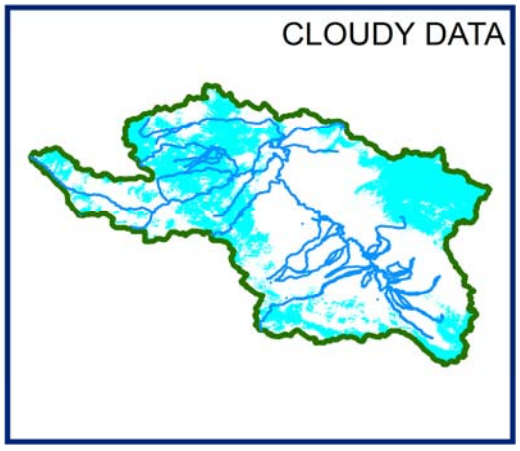
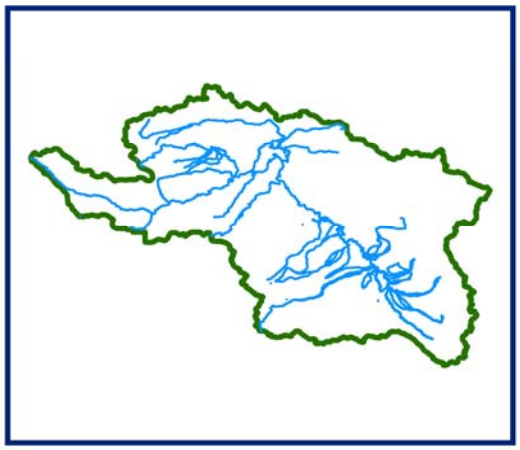


19 FEBRUARY 2011



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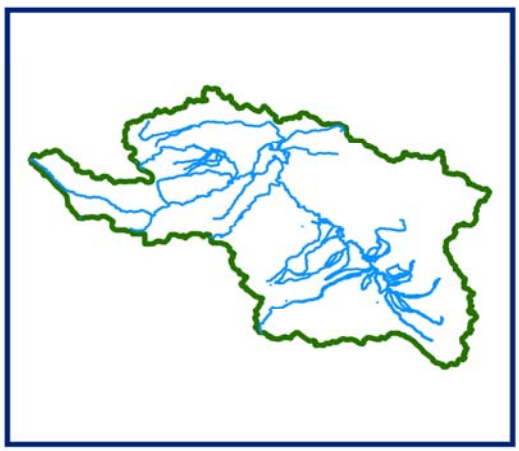


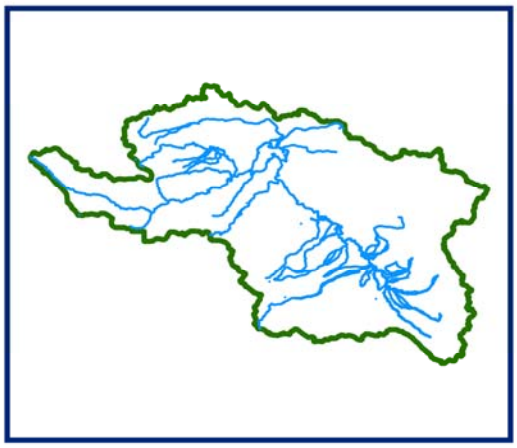
DATA NOT AVAILABLE

SNOW

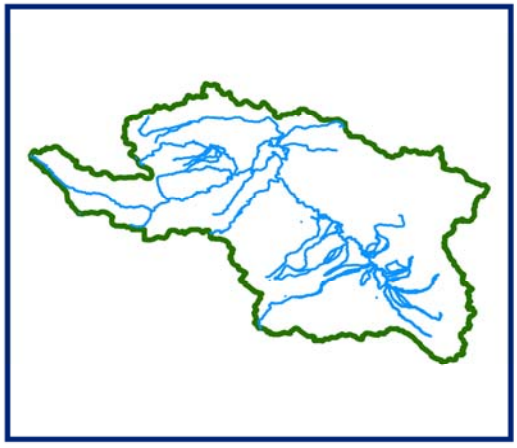
0 25 50 100 150 200

Kilometers

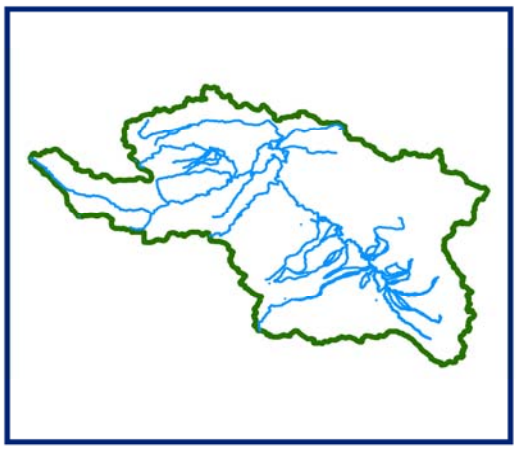
10 DAILY SNOW COVER MAP: JHELUM BASIN



DATA USED
DATA NOT AVAILABLE



DATA USED
DATA NOT AVAILABLE

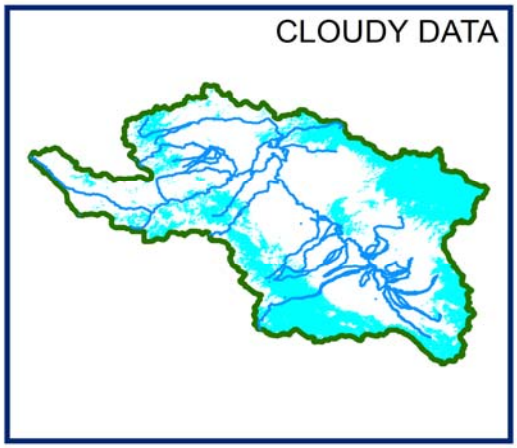


DATA USED
DATA NOT AVAILABLE

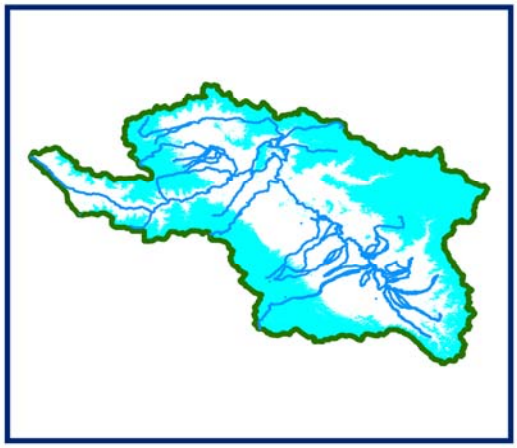
SNOW

0 25 50 100 150 200
Kilometers

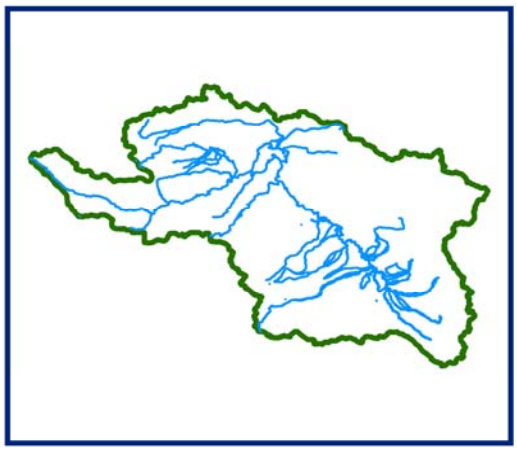
SNOW COVER MAP: **JHELUM BASIN**



05 MARCH 2011



10 MARCH 2011



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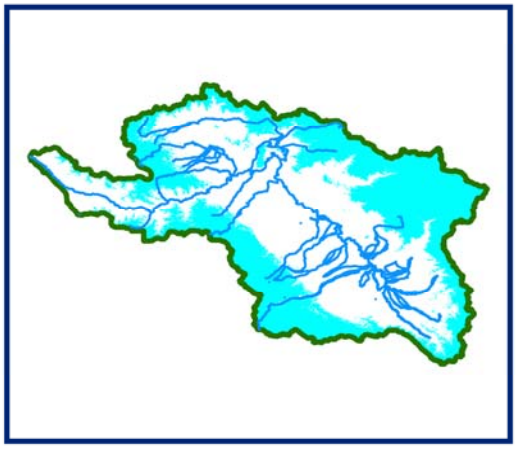
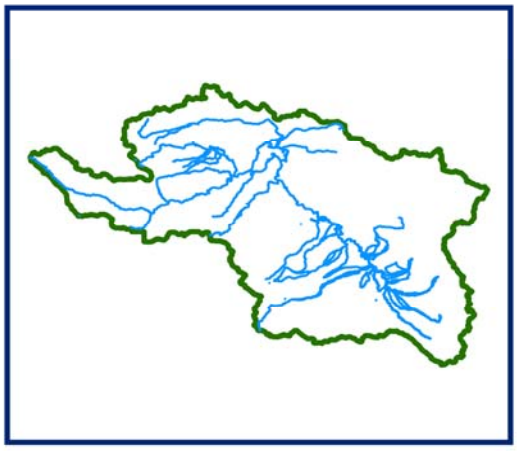


15 MARCH 2011



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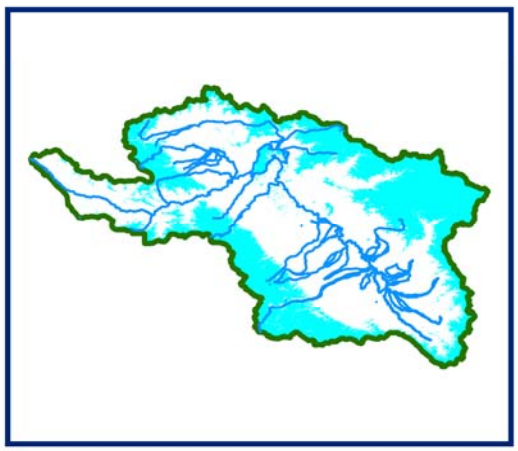


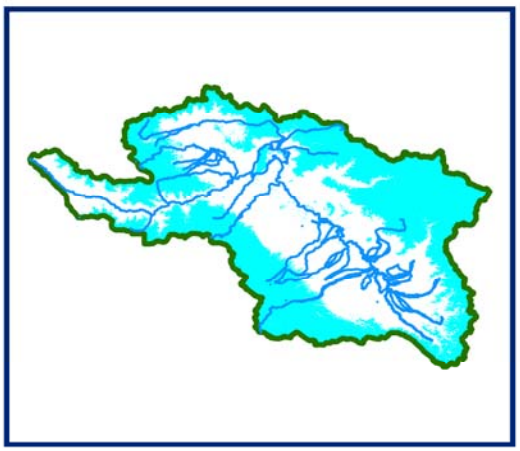
24 MARCH 2011

SNOW

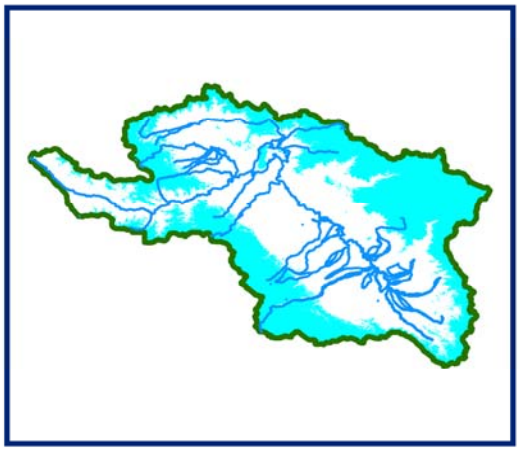
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: JHELUM BASIN



DATA USED
10 MARCH 2011



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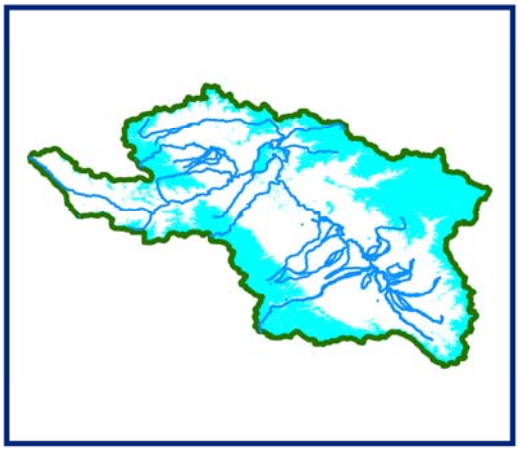
15 MARCH 2011

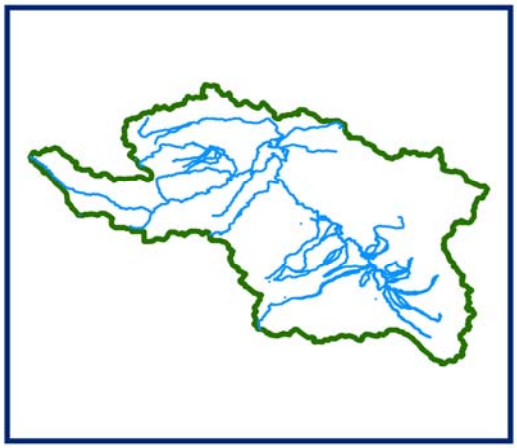


DATA USED
24 MARCH 2011

SNOW

0 25 50 100 150 200
Kilometers

SNOW COVER MAP: **JHELUM BASIN**



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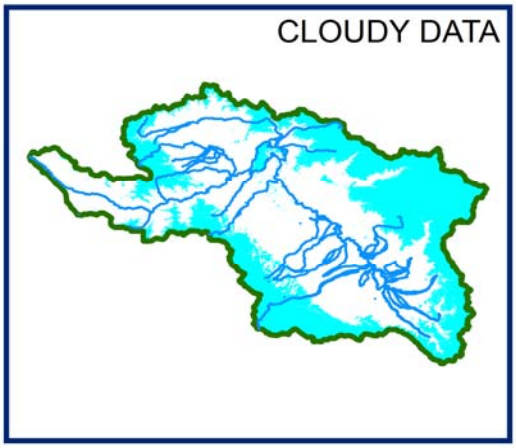
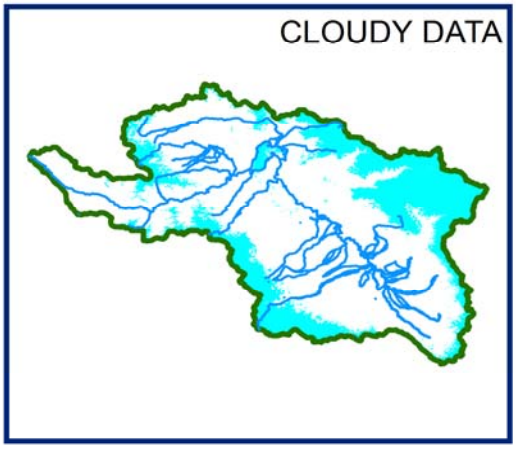
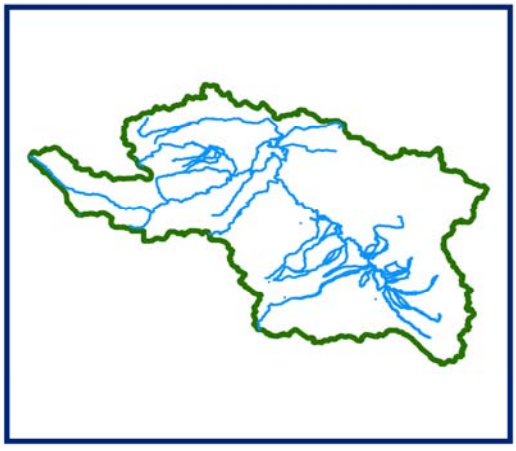


08 APRIL 2011



13 APRIL 2011



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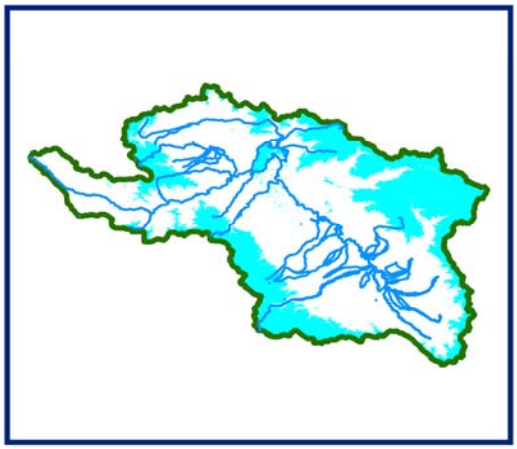
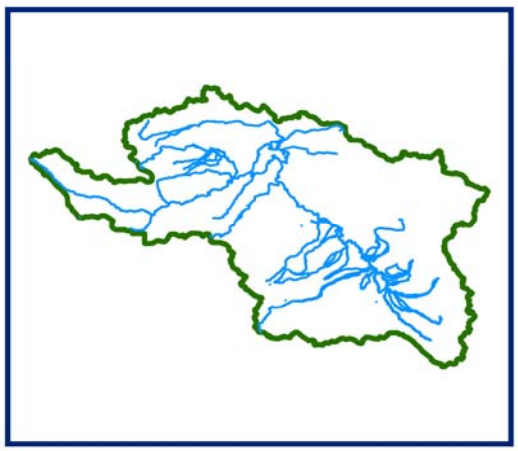


22 APRIL 2011



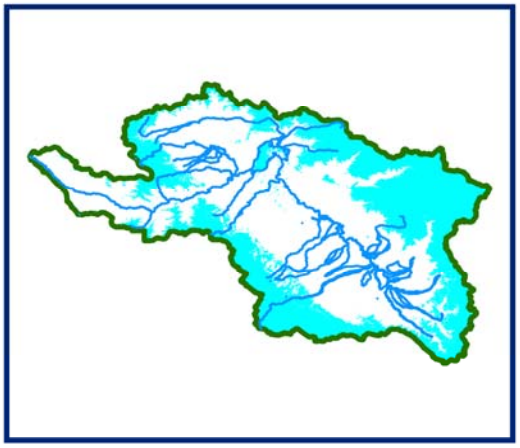
DATA NOT AVAILABLE

SNOW

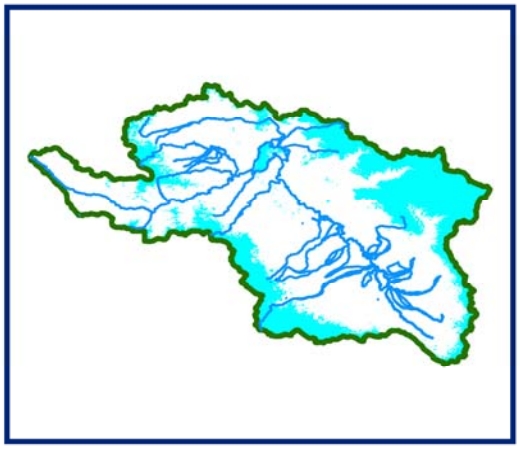
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: JHELUM BASIN



DATA USED
08 APRIL 2011



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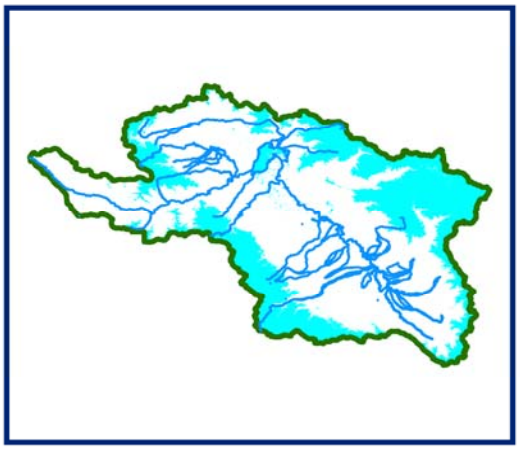
13 APRIL 2011



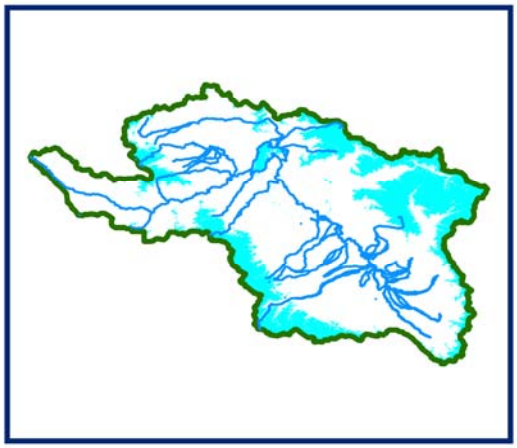
DATA USED
22 APRIL 2011

SNOW

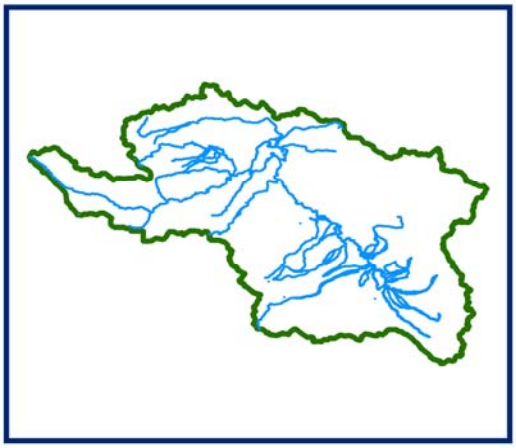
0 25 50 100 150 200

Kilometers

SNOW COVER MAP: **JHELUM BASIN**



02 MAY 2011



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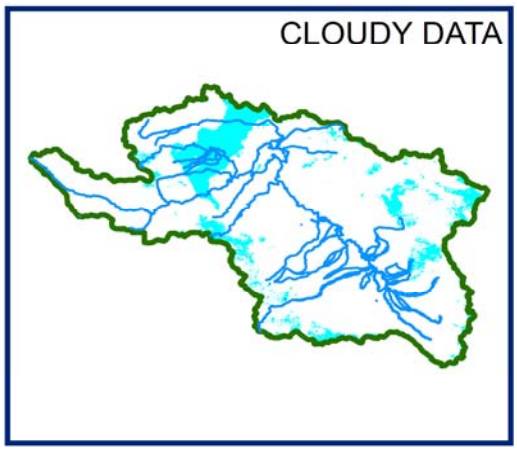

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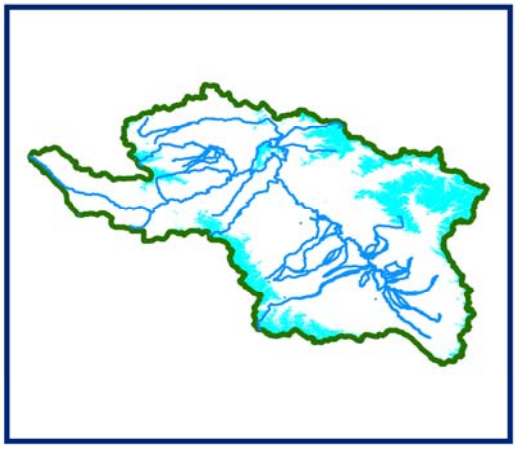

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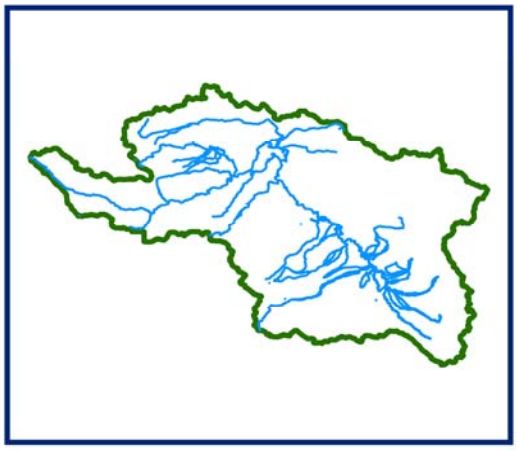

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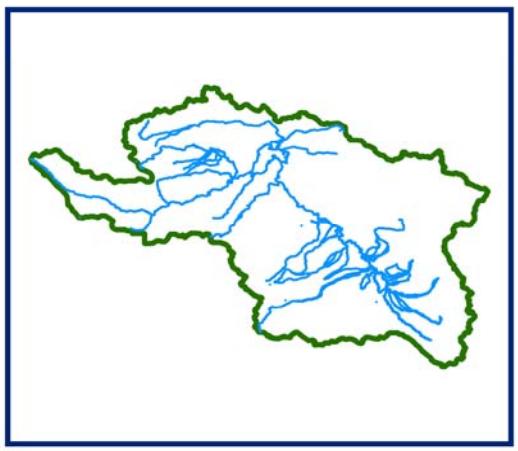


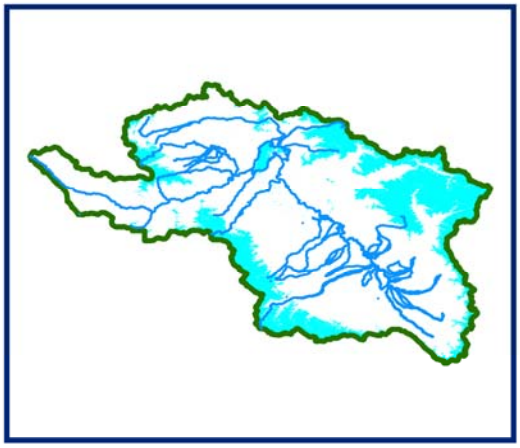
DATA NOT AVAILABLE

SNOW

0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: JHELUM BASIN



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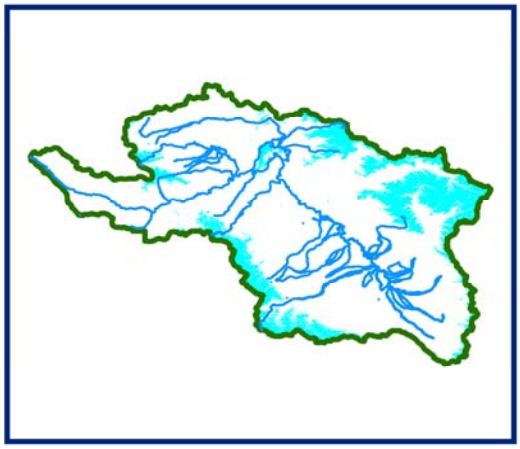
02 MAY 2011



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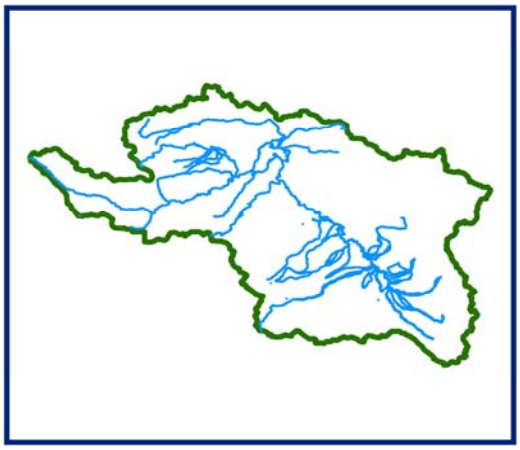
16 MAY 2011

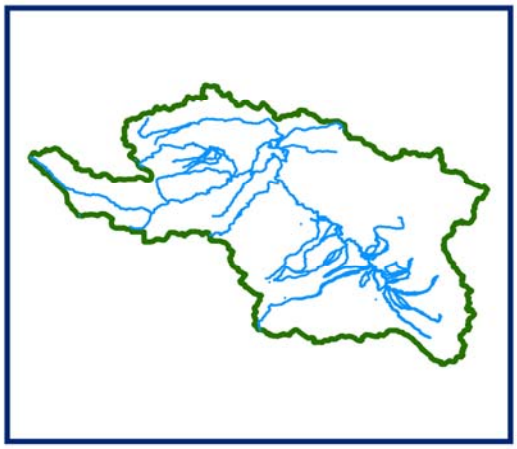


DATA USED
DATA NOT AVAILABLE

SNOW

0 25 50 100 150 200
Kilometers

SNOW COVER MAP: **JHELUM BASIN**



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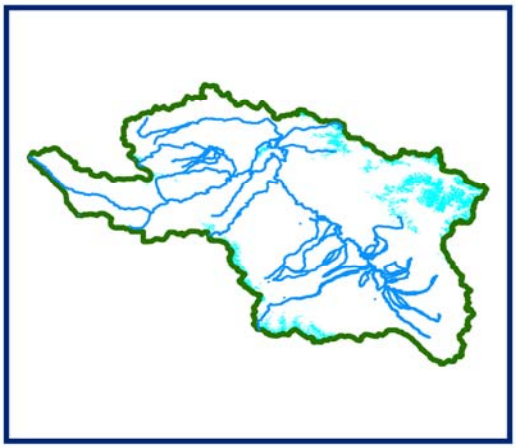
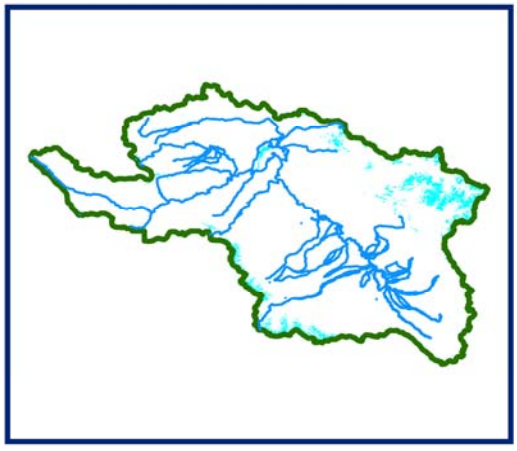
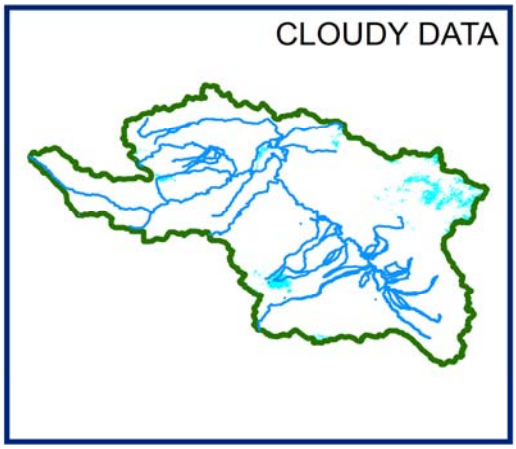


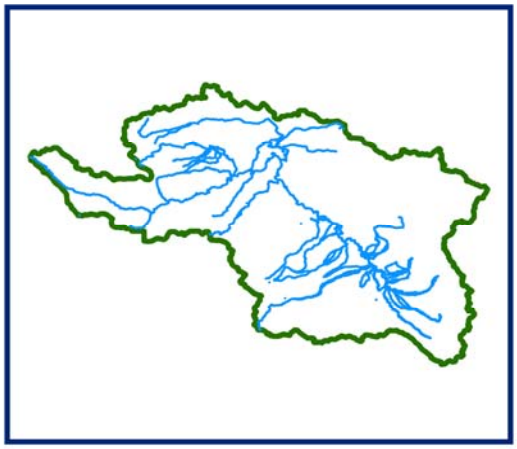
09 JUNE 2011



14 JUNE 2011



19 JUNE 2011



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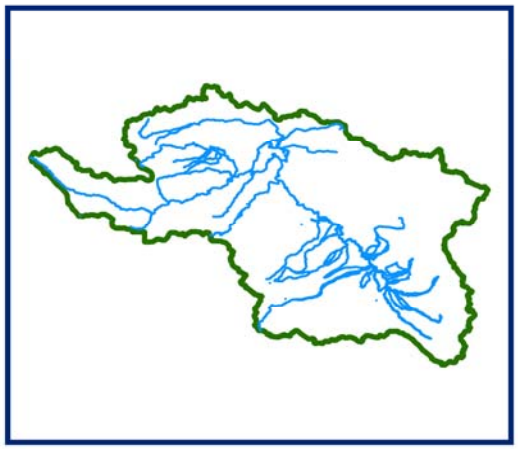


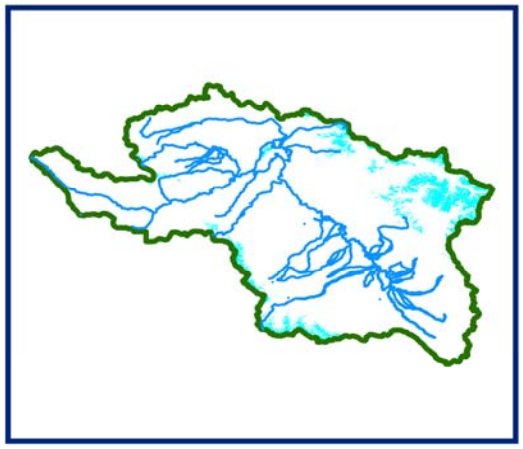
DATA NOT AVAILABLE

SNOW

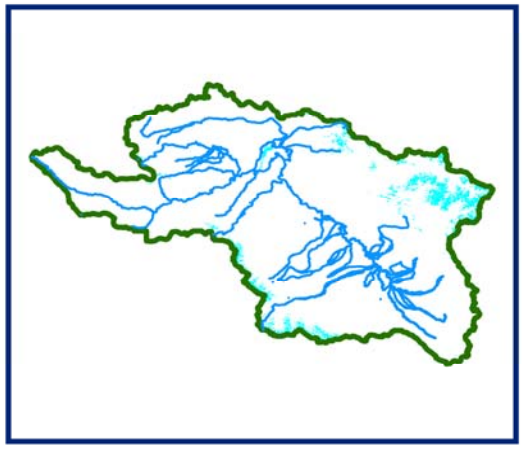
0 25 50 100 150 200

Kilometers

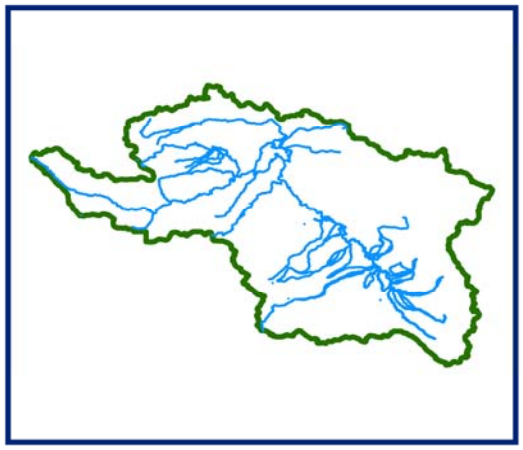
10 DAILY SNOW COVER MAP: JHELUM BASIN



DATA USED
09 JUNE 2011



DATA USED
14 JUNE 2011



DATA USED
DATA NOT AVAILABLE

SNOW

0 25 50 100 150 200
Kilometers

KISAN GANGA BASIN

AREAL EXTENT OF SNOW (5 DAILY)

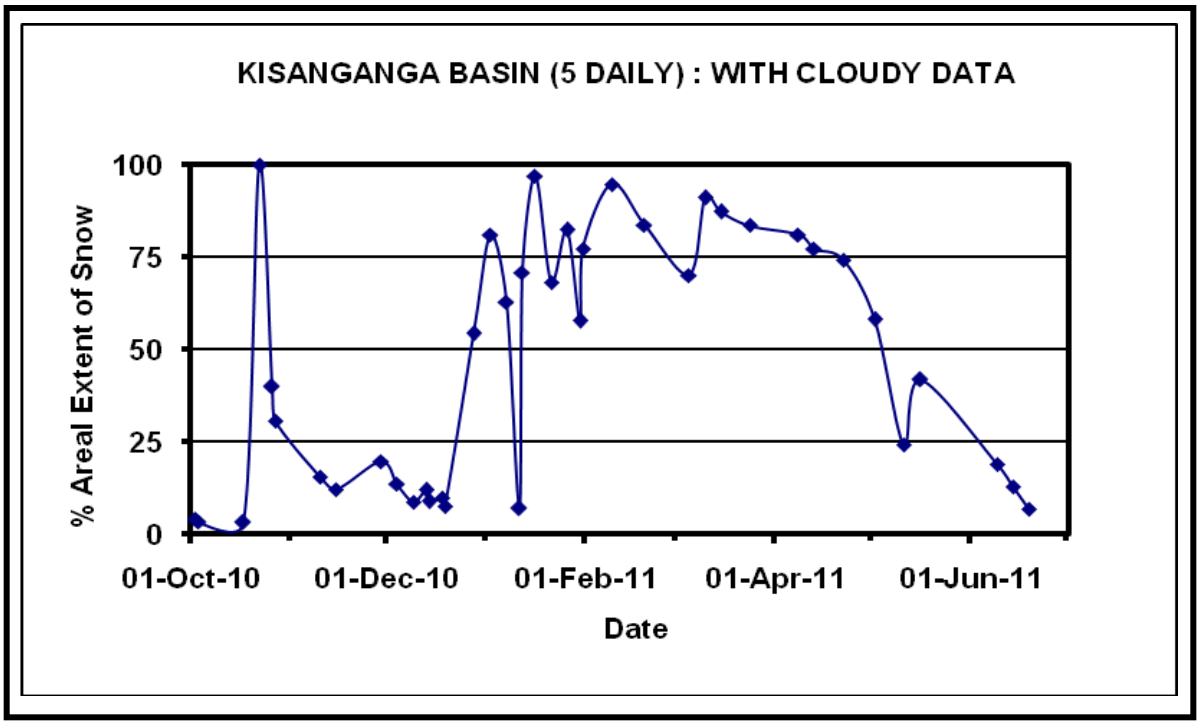
BASIN NAME: KISANGANGA **BASIN AREA: 7451 sq km**

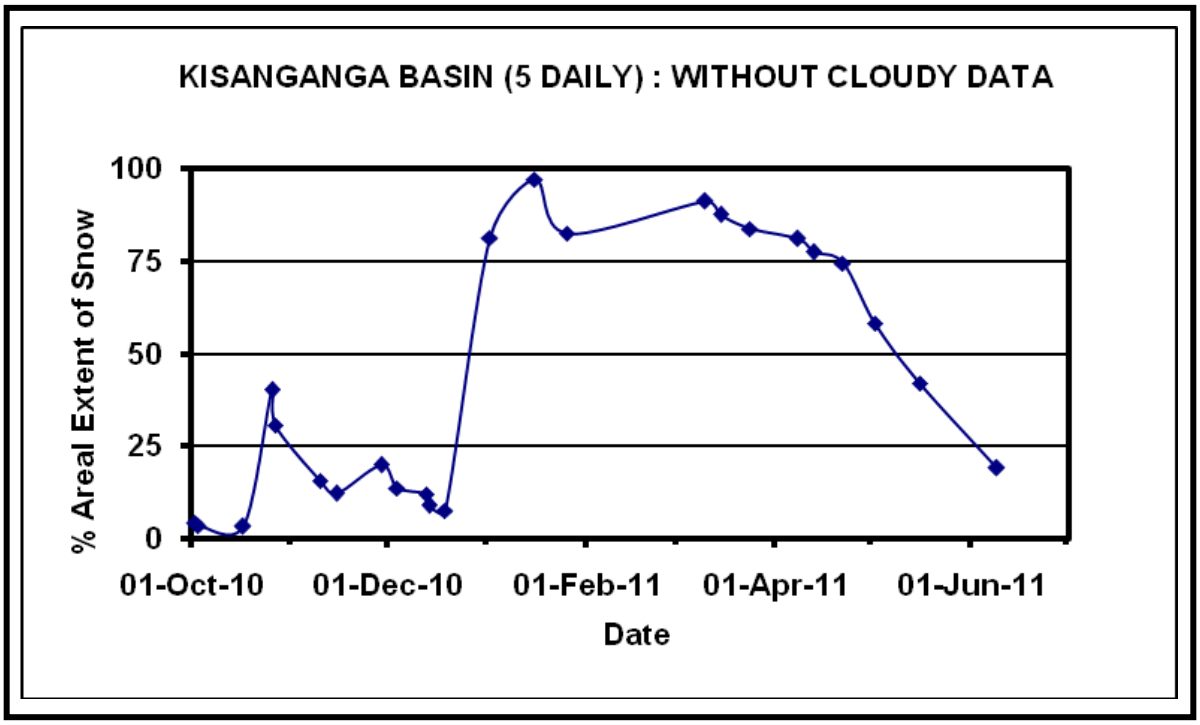
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2010							
1	02-Oct-10	308	4	4	22-Oct-10	6879	92
2	03-Oct-10	249	3	5	26-Oct-10	2981	40
3	17-Oct-10	237	3	6	27-Oct-10	2282	31
November 2010							
7	10-Nov-10	1165	16	9	29-Nov-10	1474	20
8	15-Nov-10	906	12				
December 2010							
10	4-Dec-10	1010	14	14	18-Dec-10	739	10
11	9-Dec-10	654	9	15	19-Dec-10	558	7
12	13-Dec-10	894	12	16	28-Dec-10	4048	54
13	14-Dec-10	662	9				
January 2011							
1	2-Jan-11	6048	81	6	21-Jan-11	5088	68
2	7-Jan-11	4692	63	7	26-Jan-11	6141	82
3	11-Jan-11	525	7	8	30-Jan-11	4306	58
4	12-Jan-11	5286	71	9	31-Jan-11	5759	77
5	16-Jan-11	7225	97				
February 2011							
10	9-Feb-11	7060	95	11	19-Feb-11	6235	84
March 2011							
12	5-Mar-11	5229	70	14	15-Mar-11	6510	87
13	10-Mar-11	6782	91	15	24-Mar-11	6230	84
April 2011							
1	8-Apr-11	6035	81	3	22-Apr-11	5540	74
2	13-Apr-11	5757	77				
May 2011							
1	2-May-11	4335	58	3	16-May-11	3116	42
2	11-May-11	1813	24				
June 2011							
1	9-Jun-11	1413	19	3	19-Jun-11	518	7
2	14-Jun-11	956	13				

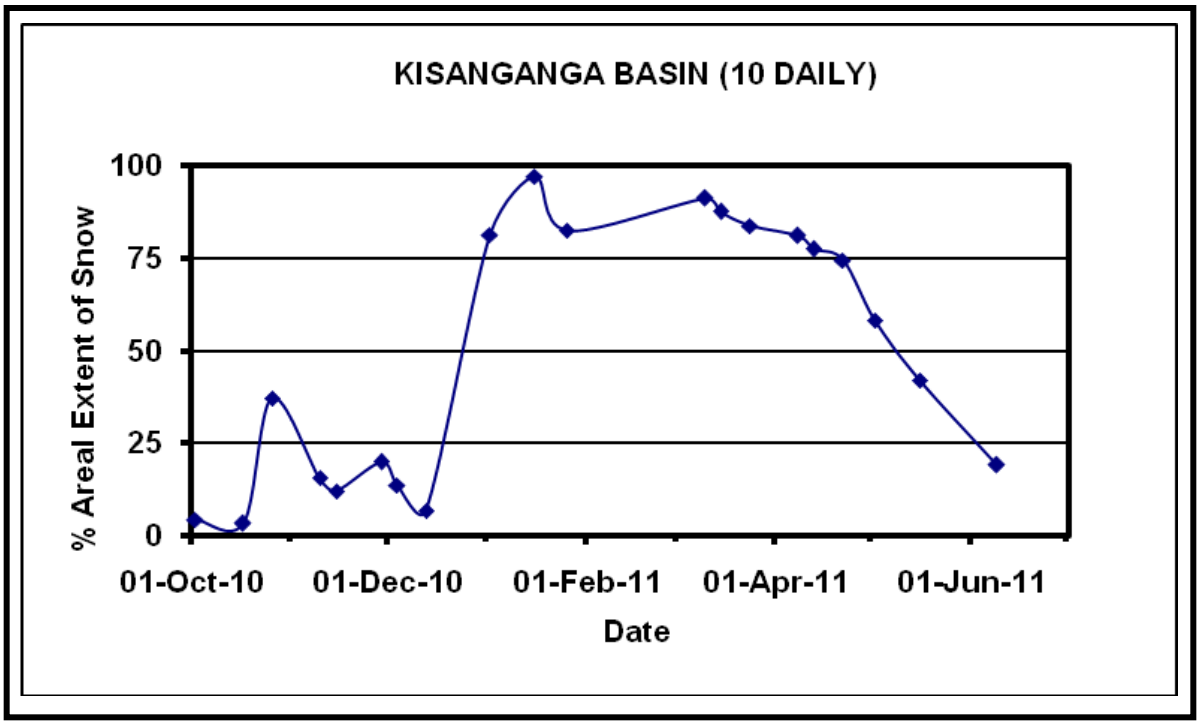
AREAL EXTENT OF SNOW (10 DAILY)

BASIN NAME: KISANGANGA **BASIN AREA: 7451 sq. km**

S. No	Date	Snow cover (sq. km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	2-Oct-10	7451	7				
2	17-Oct-10	237	3				
3	26-Oct-10	2765	37				
November 2010							
4	10-Nov-10	1150	15				
5	15-Nov-10	893	12				
6	29-Nov-10	1474	20				
December 2010							
7	4-Dec-10	678	9				
8	13-Dec-10	501	7				
9	28-Dec-10	4048	54				
January 2011							
1	2-Jan-11	6048	81	3	26-Jan-11	6141	82
2	16-Jan-11	7225	97				
March 2011							
4	10-Mar-11	6782	91				
5	15-Mar-11	6510	87				
April 2011							
1	8-Apr-11	6035	81				
2	13-Apr-11	5757	77				
3	22-Apr-11	5540	74				
May 2011							
1	2-May-11	4335	58				
2	16-May-11	3116	42				
June 2011							
1	9-Jun-11	1413	19				

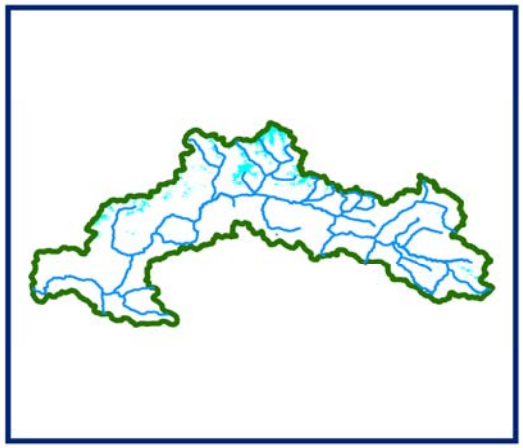

KISANGANGA BASIN (5 DAILY) : WITH CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


KISANGANGA BASIN (5 DAILY) : WITHOUT CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

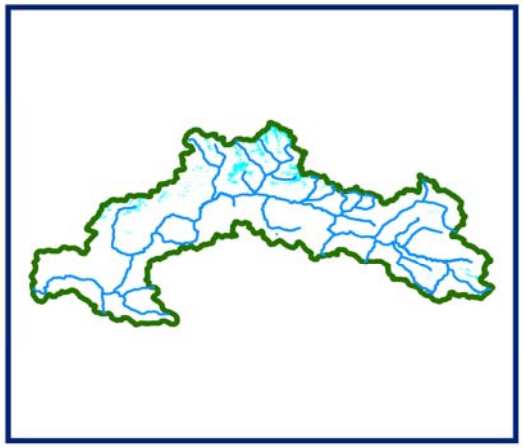

KISANGANGA BASIN (10 DAILY)
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

SNOW COVER MAP

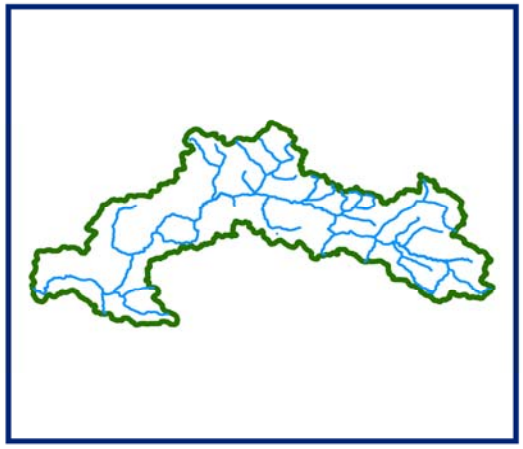
SNOW COVER MAP: **KISANGANGA BASIN**



02 OCTOBER 2010



03 OCTOBER 2010



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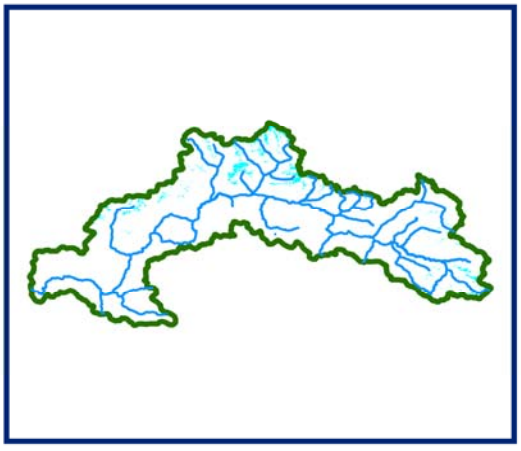
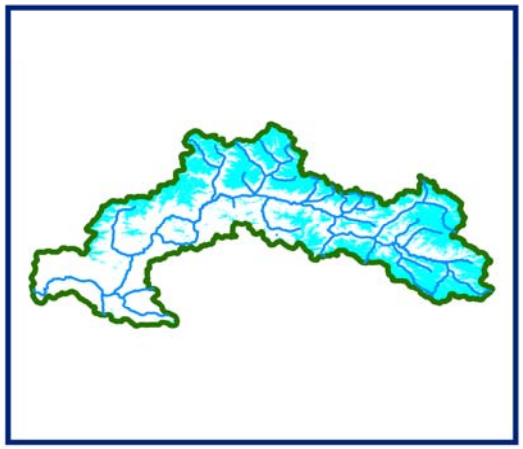
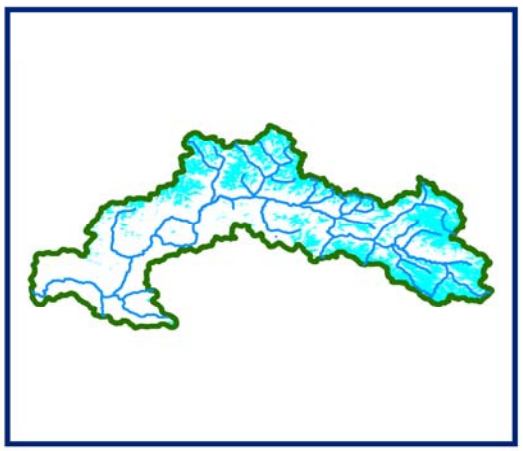


17 OCTOBER 2010



26 OCTOBER 2010



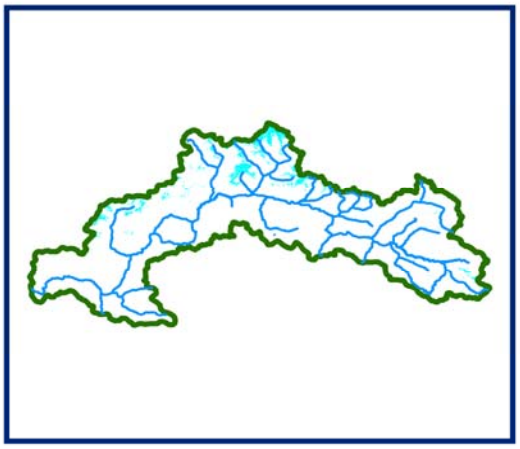
27 OCTOBER 2010

SNOW

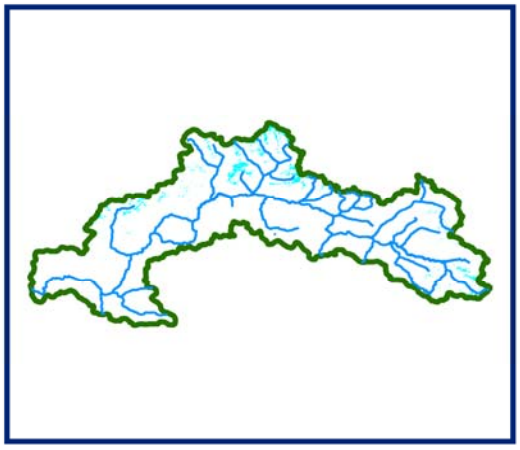
0 25 50 100 150 200

Kilometers

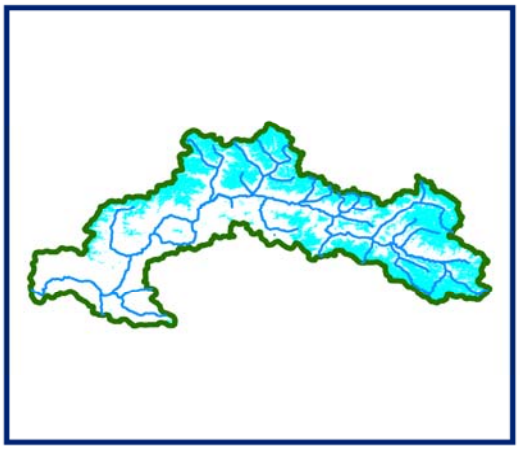
10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
02 OCTOBER 2010



DATA USED
17 OCTOBER 2010

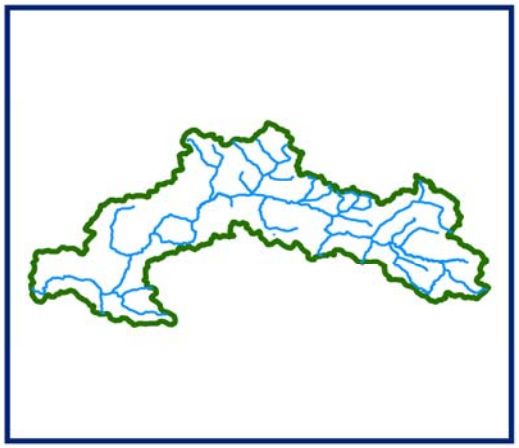


DATA USED
26 OCTOBER 2010
27 OCTOBER 2010

SNOW

0 25 50 100 150 200
Kilometers

SNOW COVER MAP: **KISANGANGA BASIN**



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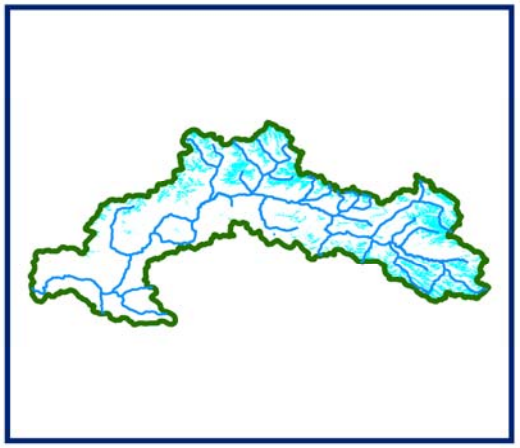
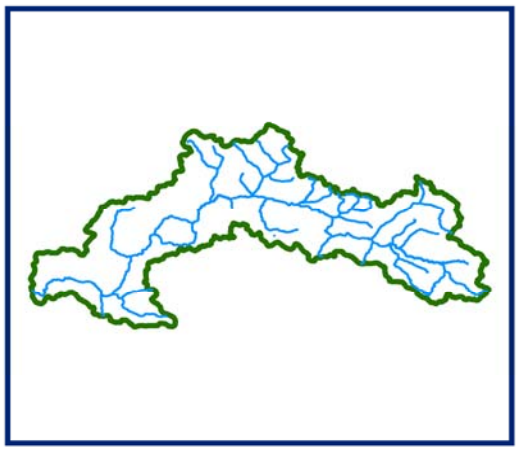


10 NOVEMBER 2010



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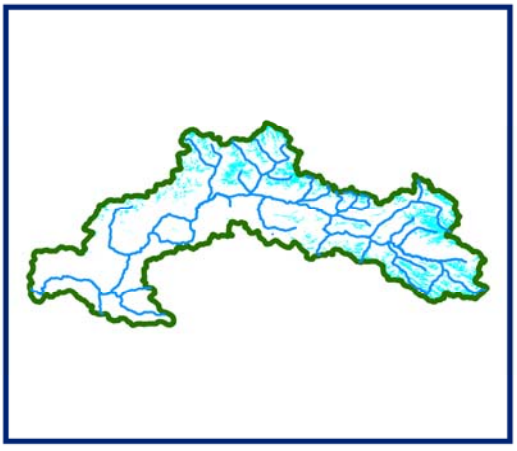

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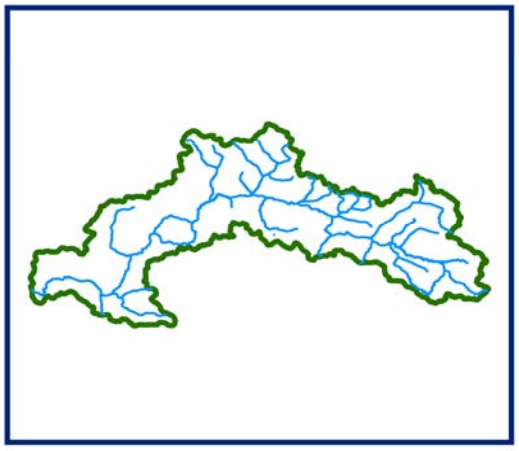

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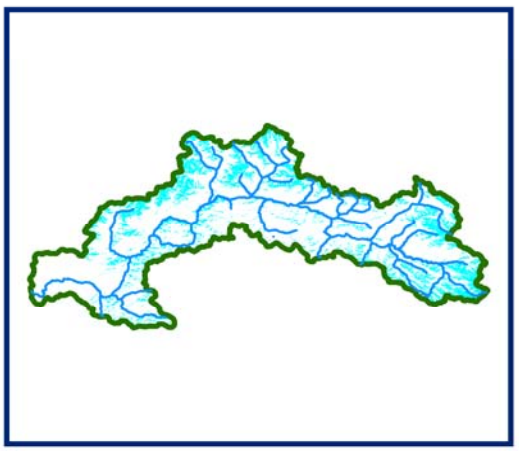


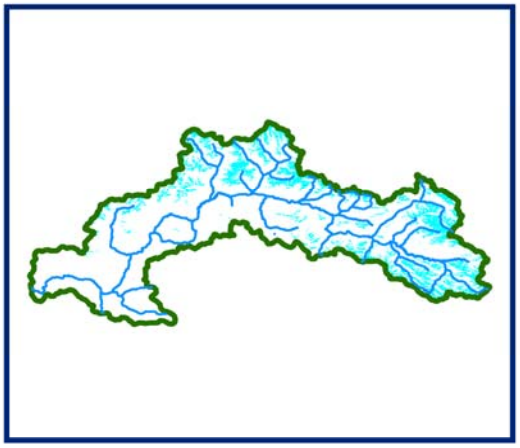
29 NOVEMBER 2010

SNOW

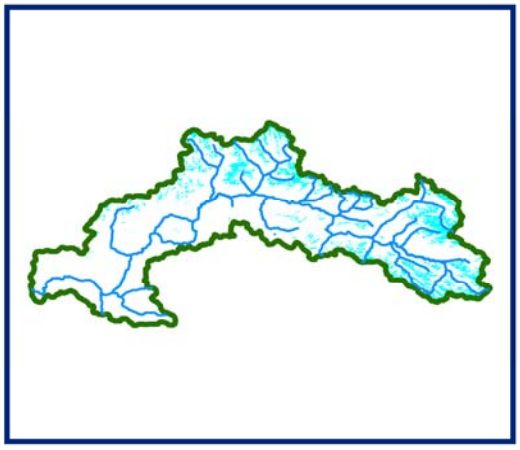
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
10 NOVEMBER 2010



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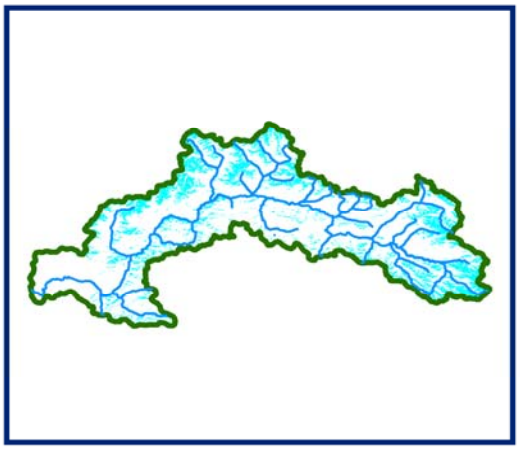
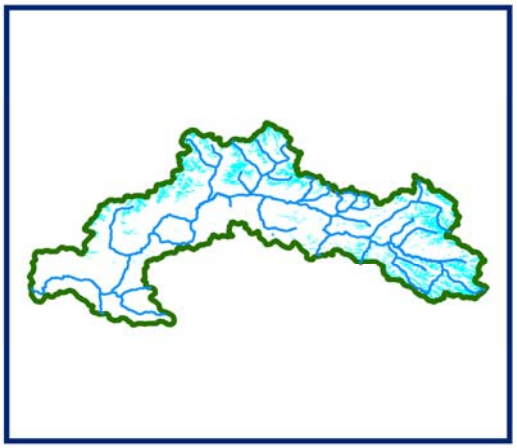


DATA USED
29 NOVEMBER 2010

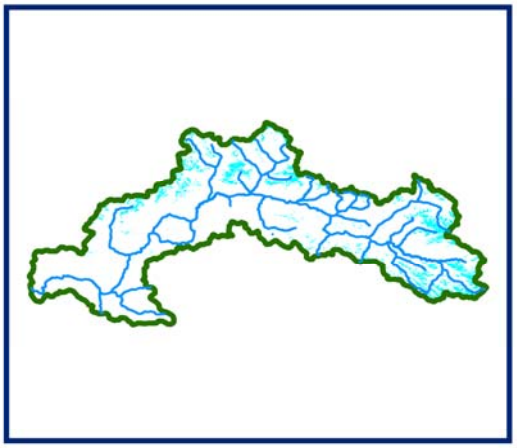
SNOW

0 25 50 100 150 200
Kilometers

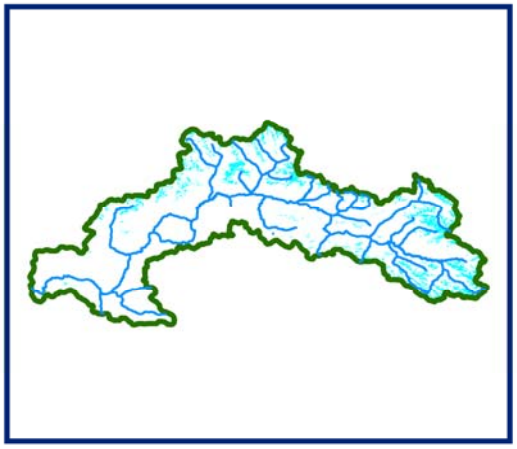
SNOW COVER MAP: **KISANGANGA BASIN**



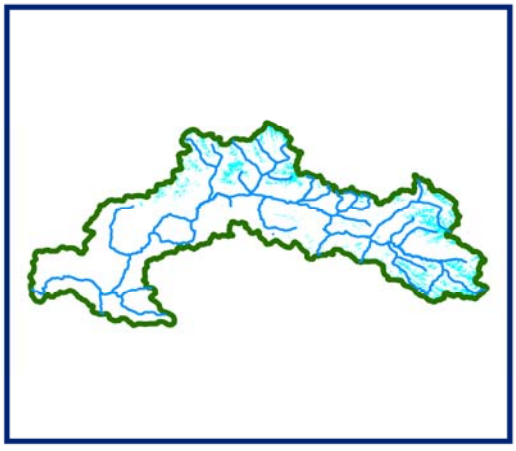
04 DECEMBER 2010



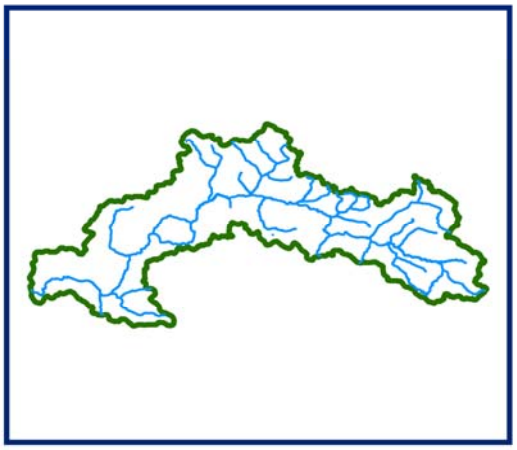
09 DECEMBER 2010



14 DECEMBER 2010



19 DECEMBER 2010



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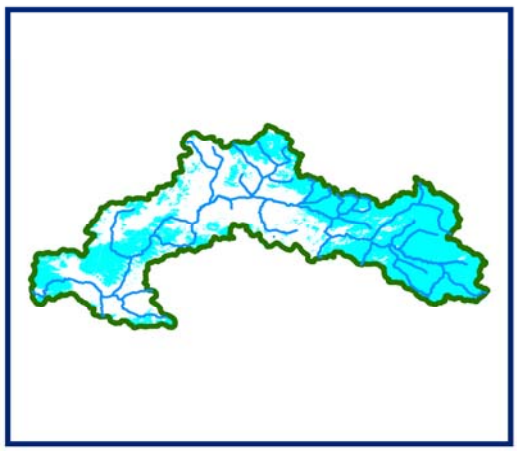


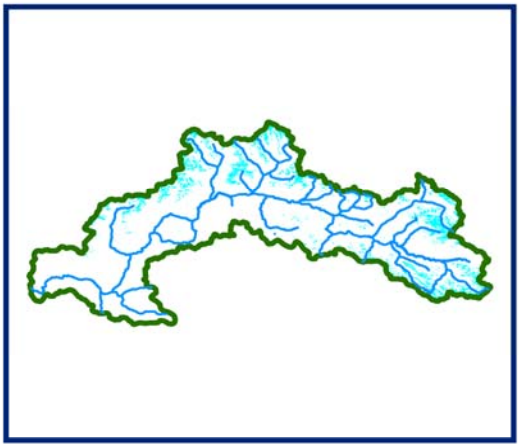
28 DECEMBER 2010

SNOW

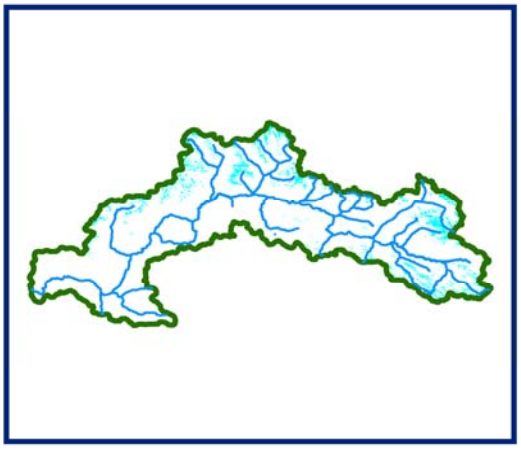
0 25 50 100 150 200

Kilometers

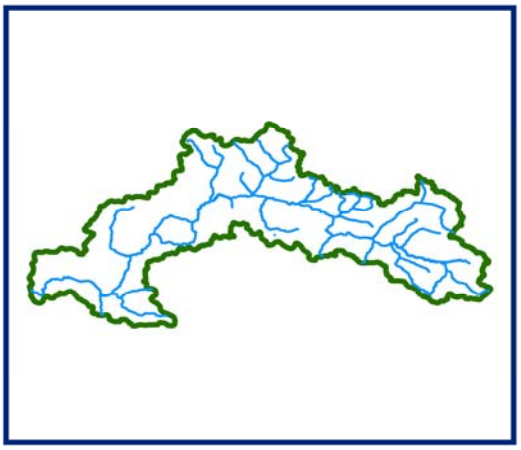
10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
04 DECEMBER 2010



DATA USED
13 DECEMBER 2010

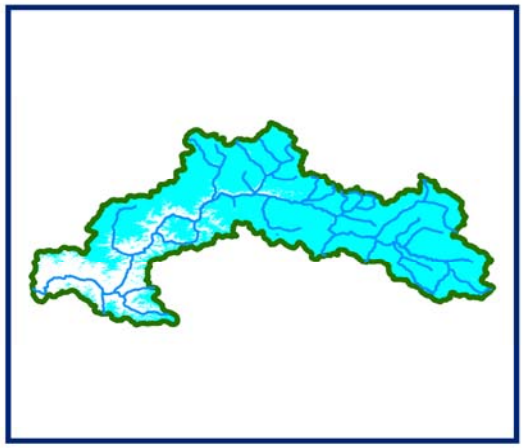


DATA USED
DATA NOT AVAILABLE

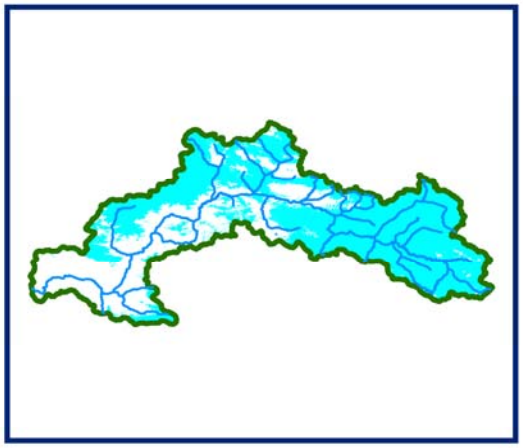
SNOW

0 25 50 100 150 200
Kilometers

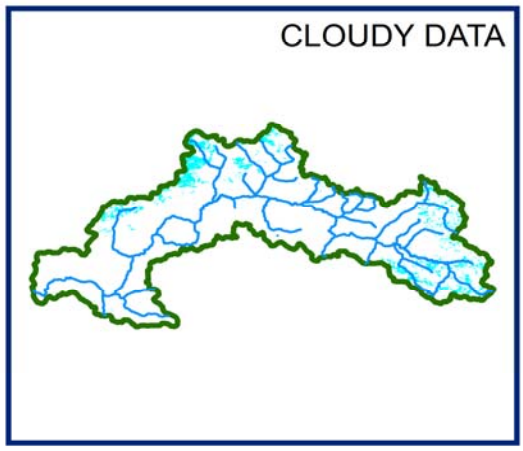
SNOW COVER MAP: **KISANGANGA BASIN**



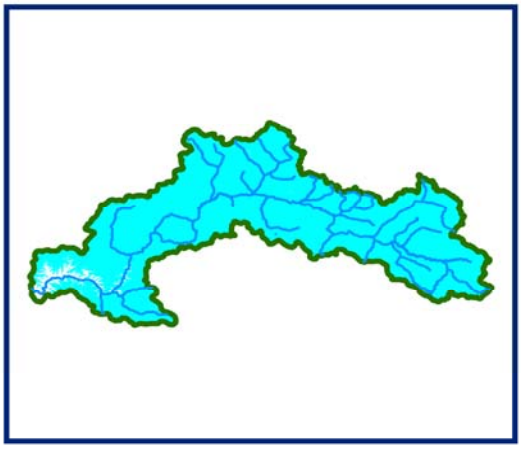
02 JANUARY 2011



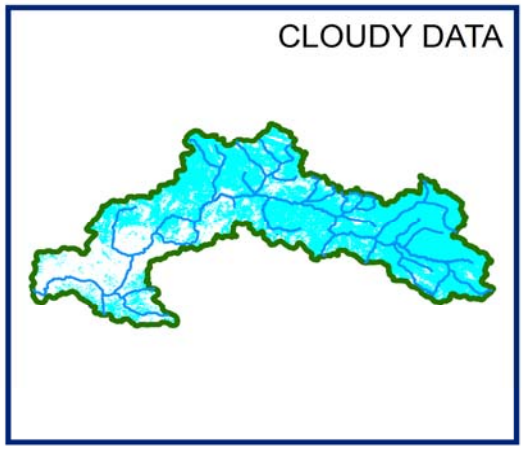
07 JANUARY 2011



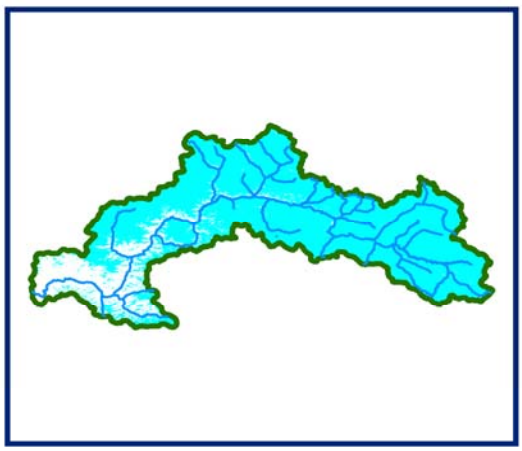
11 JANUARY 2011



16 JANUARY 2011



21 JANUARY 2011



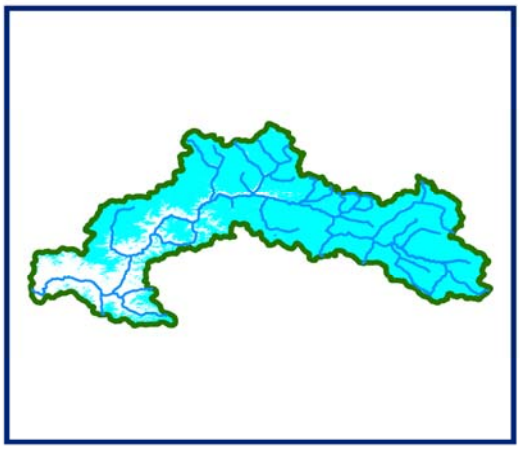
26 JANUARY 2011

SNOW

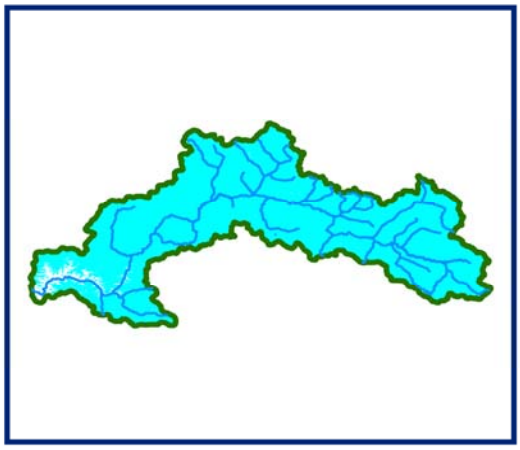
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
02 JANUARY 2011



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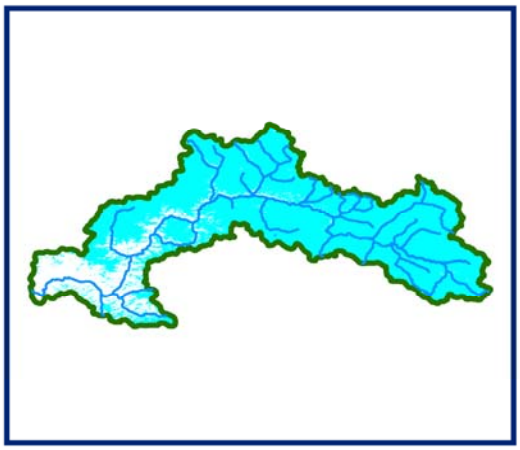
16 JANUARY 2011



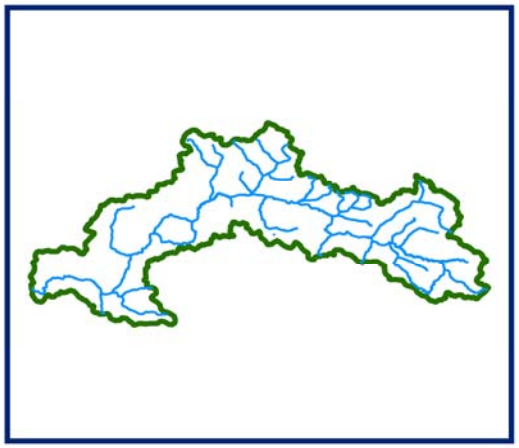
DATA USED
26 JANUARY 2011

SNOW

0 25 50 100 150 200

Kilometers

SNOW COVER MAP: **KISANGANGA BASIN**



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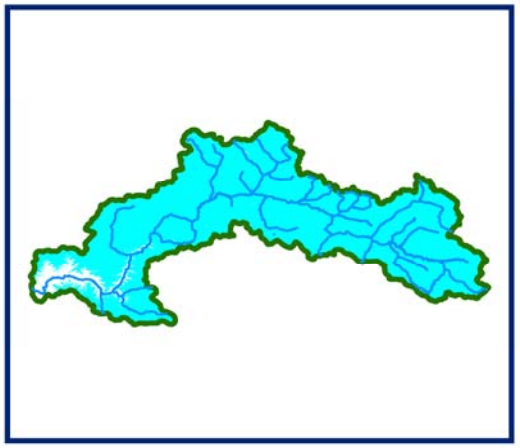
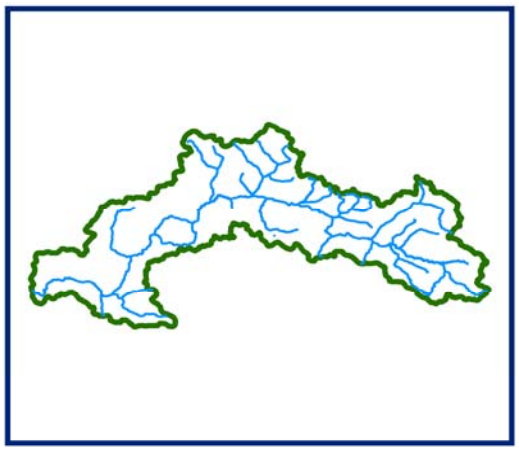


09 FEBRUARY 2011



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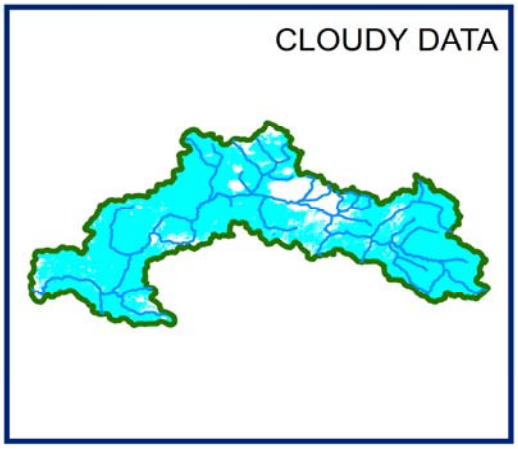
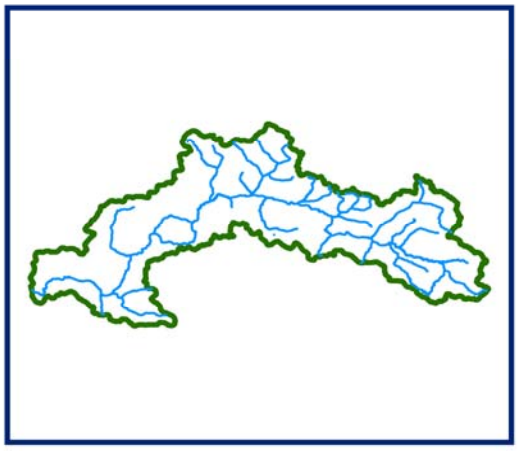


19 FEBRUARY 2011



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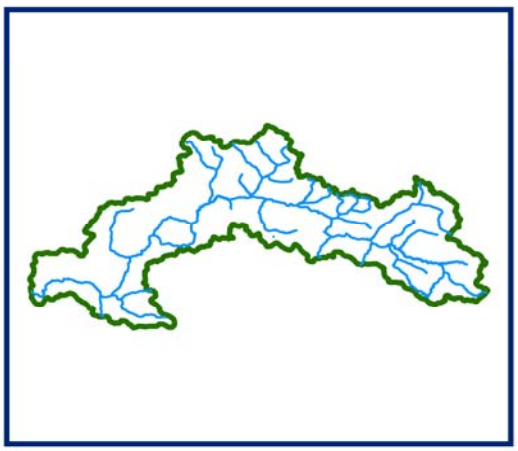


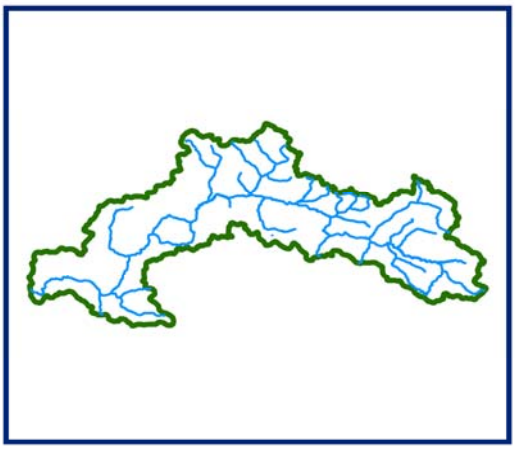
DATA NOT AVAILABLE

SNOW

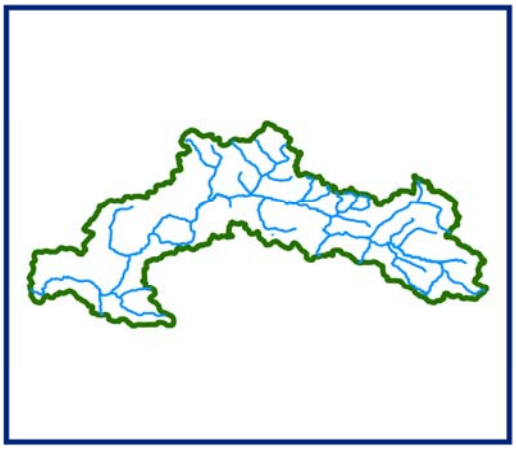
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
DATA NOT AVAILABLE



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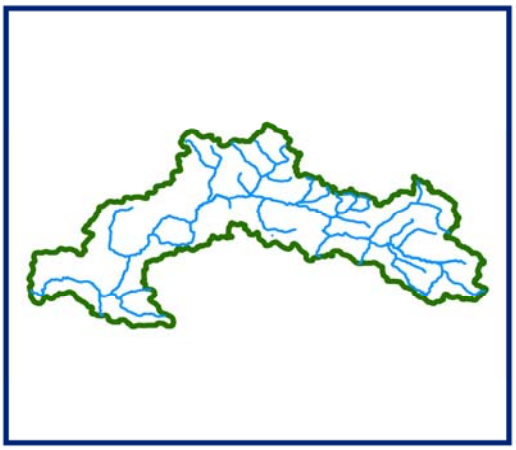
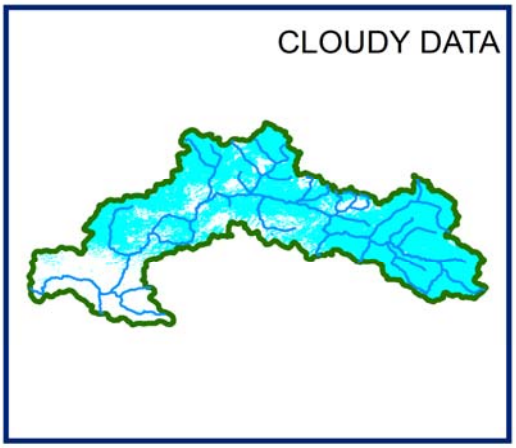


DATA USED
DATA NOT AVAILABLE

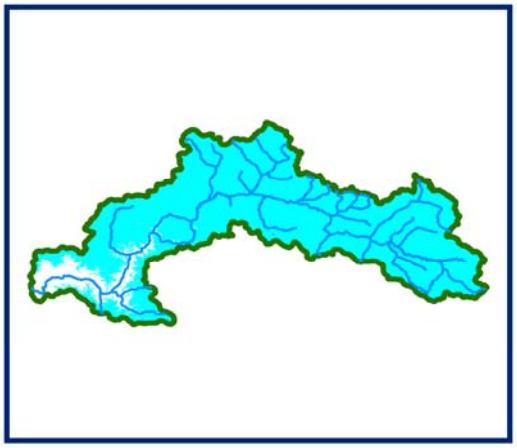
SNOW

0 25 50 100 150 200
Kilometers

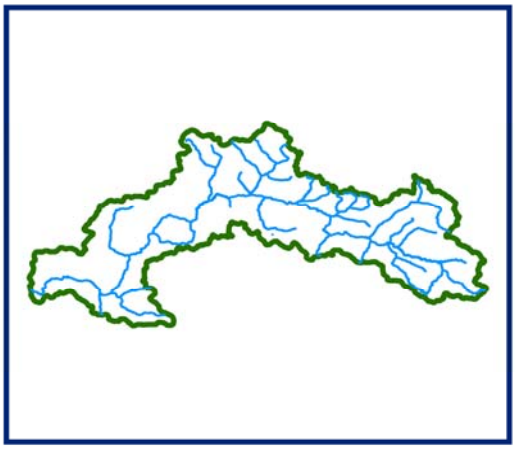
SNOW COVER MAP: **KISANGANGA BASIN**



05 MARCH 2011



10 MARCH 2011



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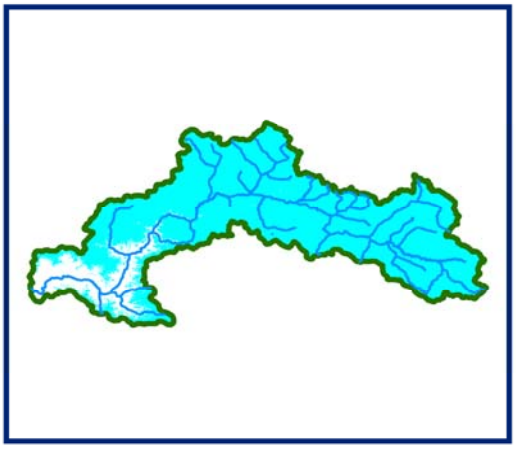
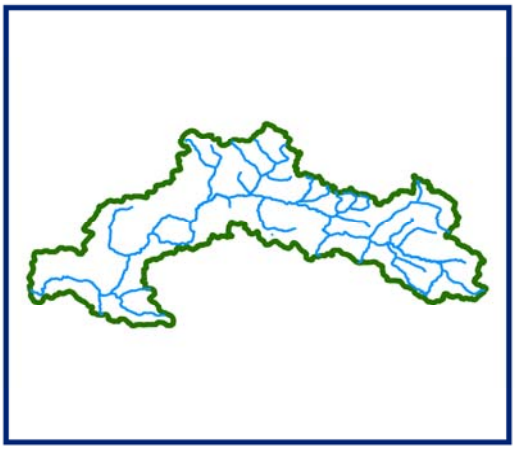


15 MARCH 2011



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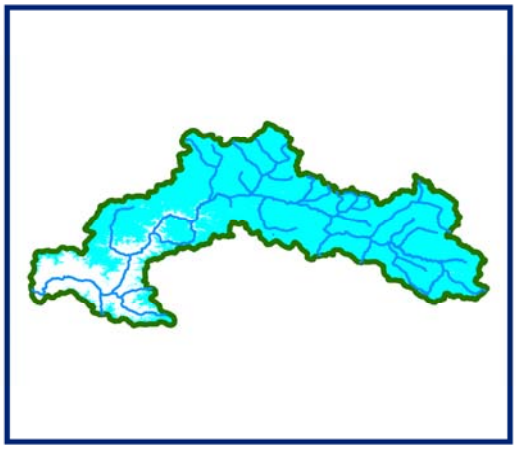


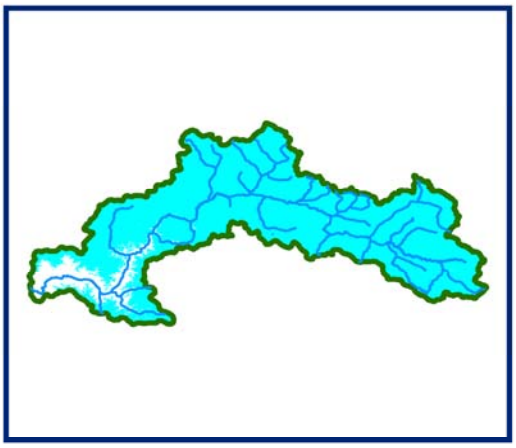
24 MARCH 2011

SNOW

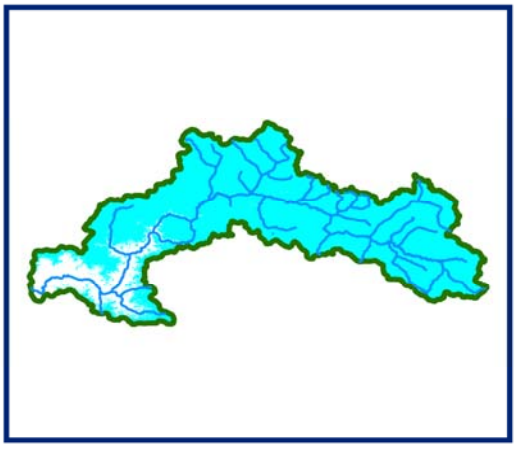
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
10 MARCH 2011



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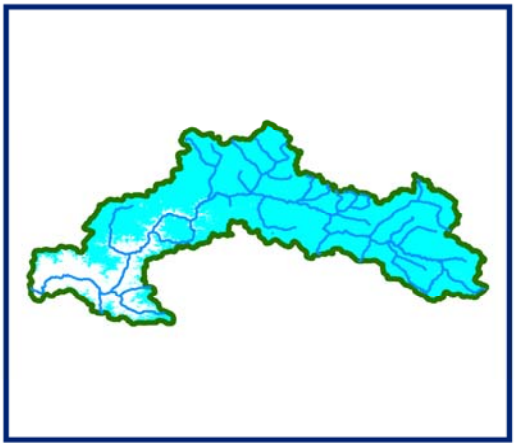
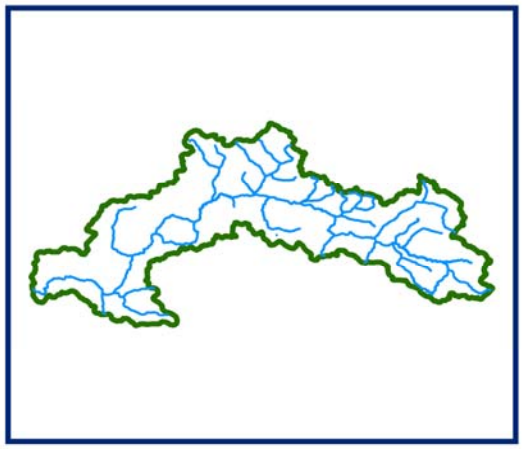


DATA USED
24 MARCH 2011

SNOW

0 25 50 100 150 200
Kilometers

SNOW COVER MAP: **KISANGANGA BASIN**



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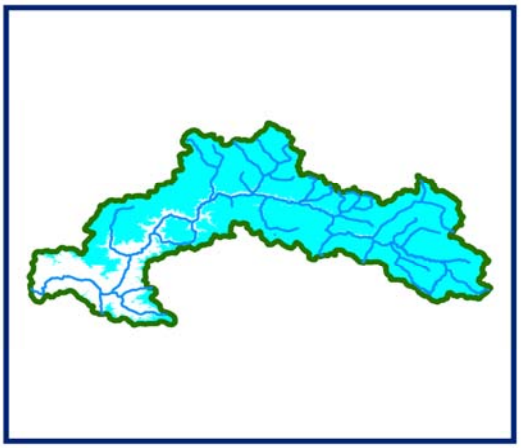
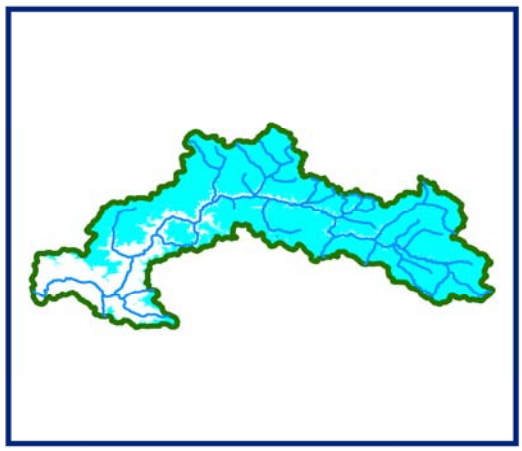
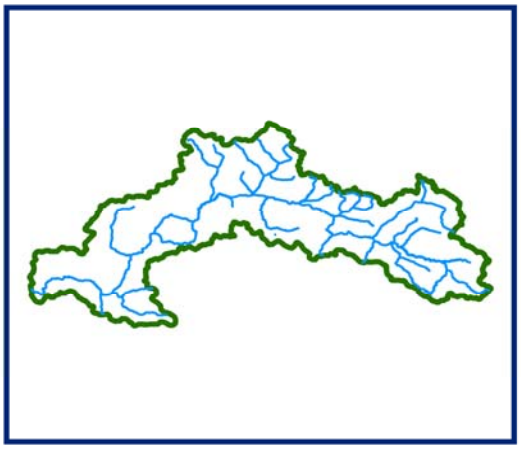


08 APRIL 2011



13 APRIL 2011



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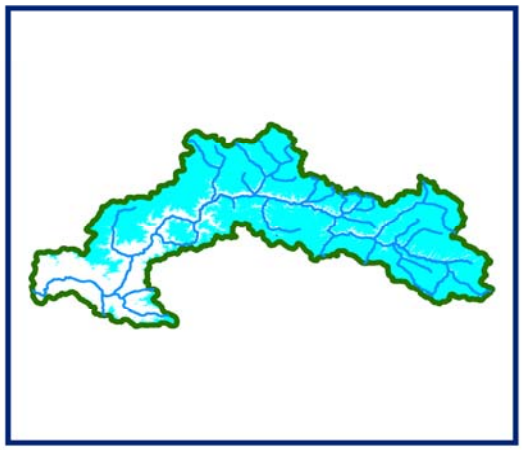
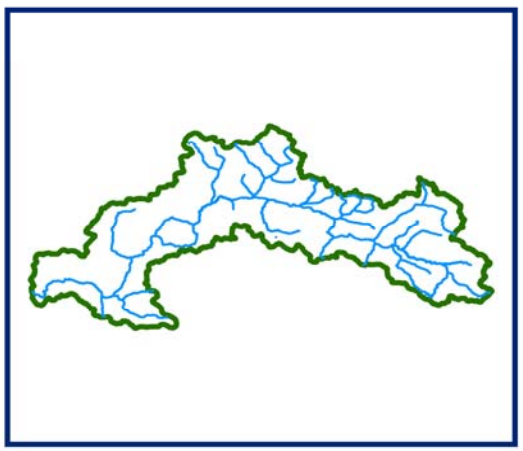


22 APRIL 2011



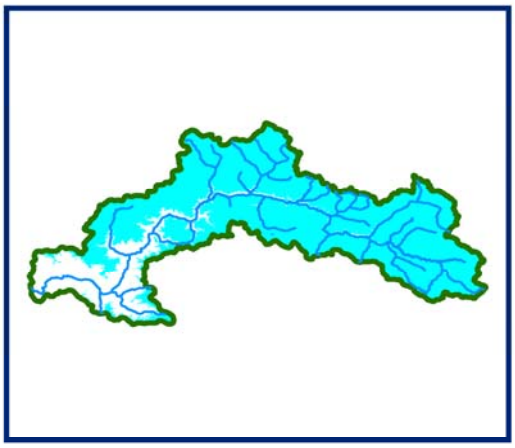
DATA NOT AVAILABLE

SNOW

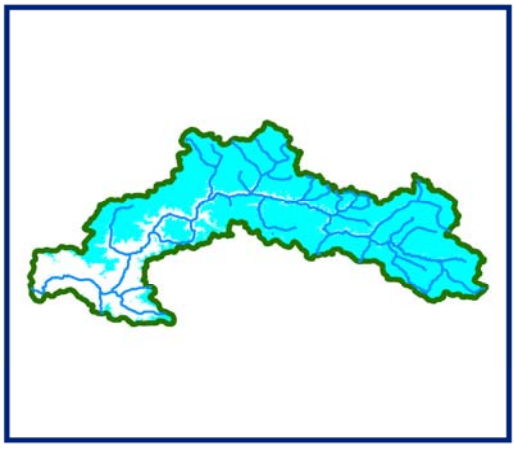
0 25 50 100 150 200

Kilometers

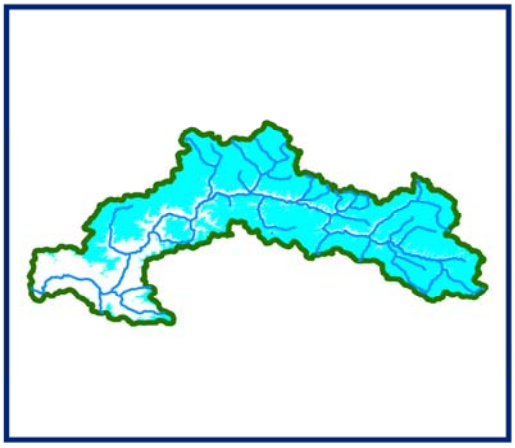
10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
08 APRIL 2011



DATA USED
13 APRIL 2011

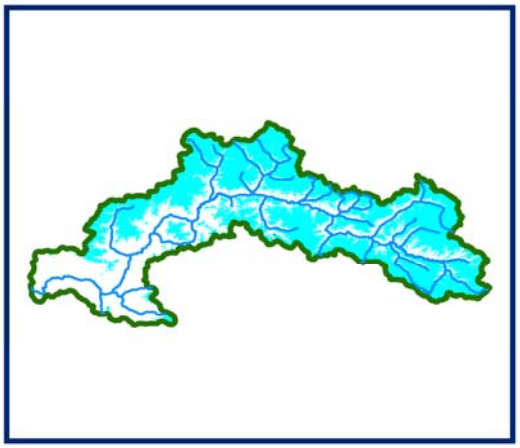


DATA USED
22 APRIL 2011

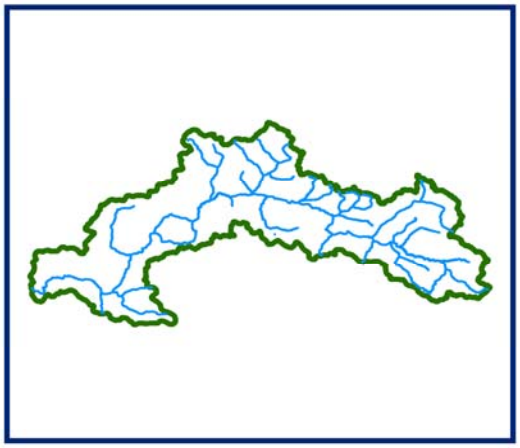
SNOW

0 25 50 100 150 200
Kilometers

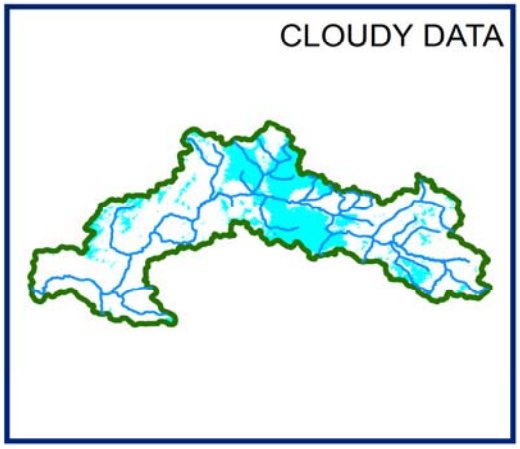
SNOW COVER MAP: **KISANGANGA BASIN**



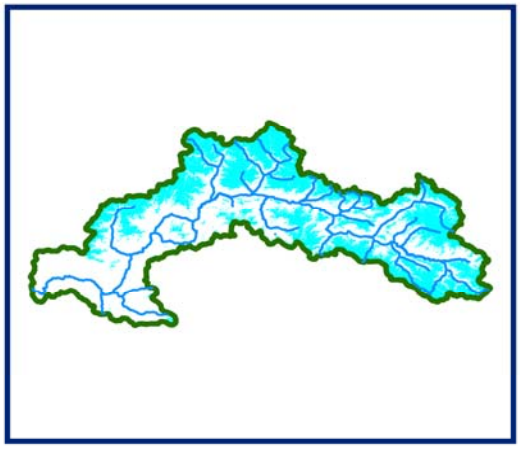
02 MAY 2011



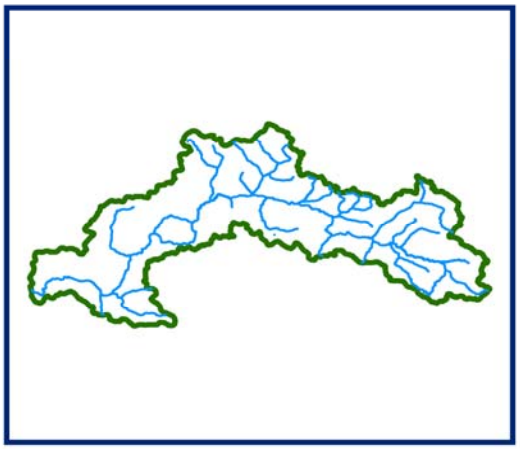
DATA NOT AVAILABLE



11 MAY 2011



16 MAY 201



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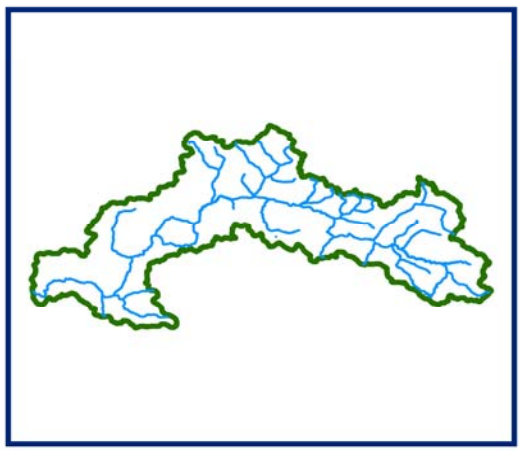


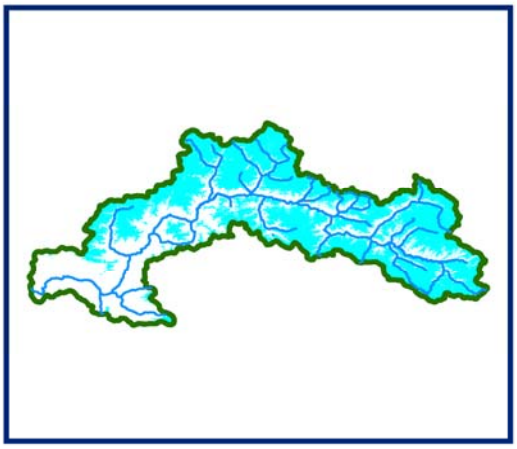
DATA NOT AVAILABLE

SNOW

0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: KISANGANGA BASIN



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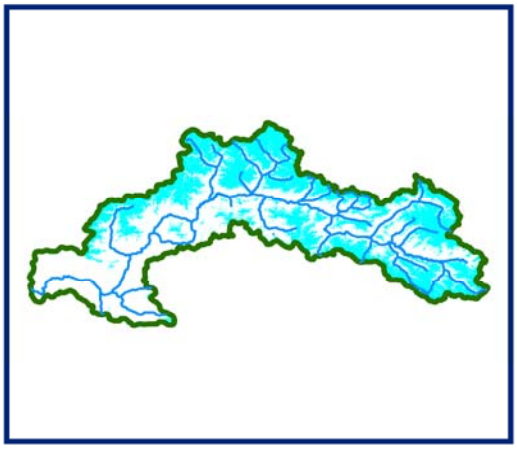
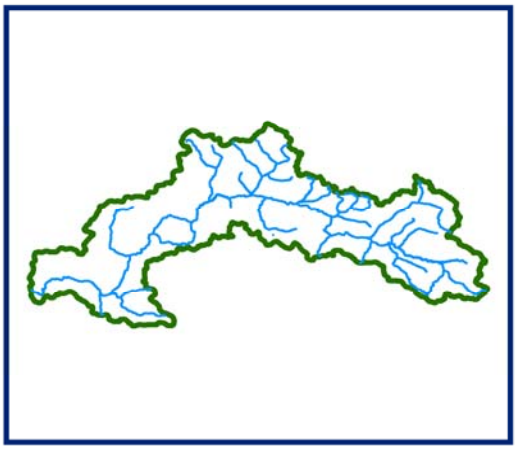


DATA USED
16 MAY 2011

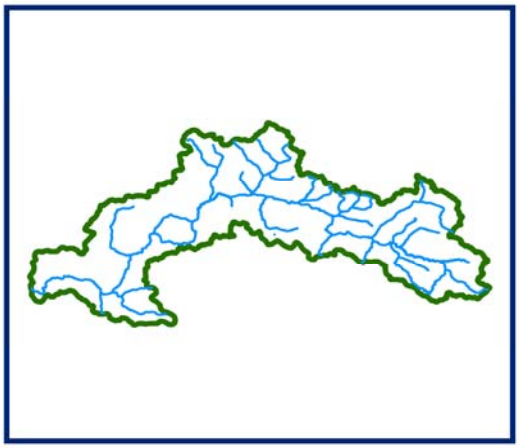


DATA USED
DATA NOT AVAILABLE

SNOW

0 25 50 100 150 200
Kilometers

SNOW COVER MAP: **KISANGANGA BASIN**



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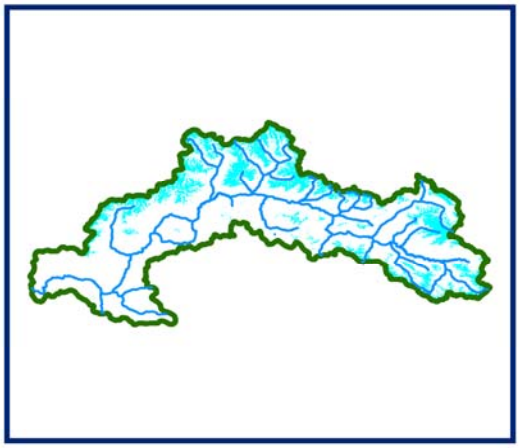
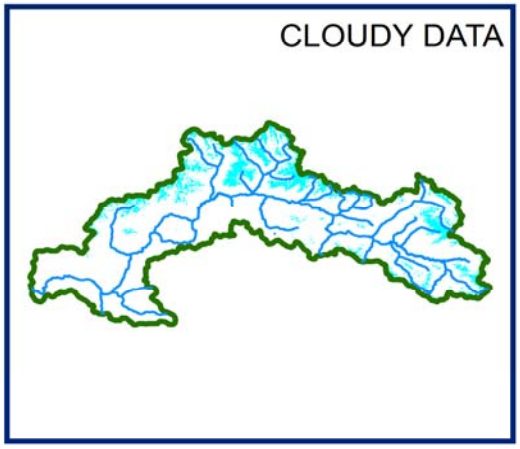
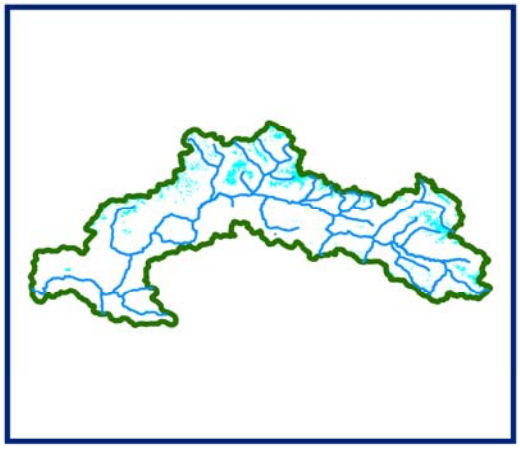


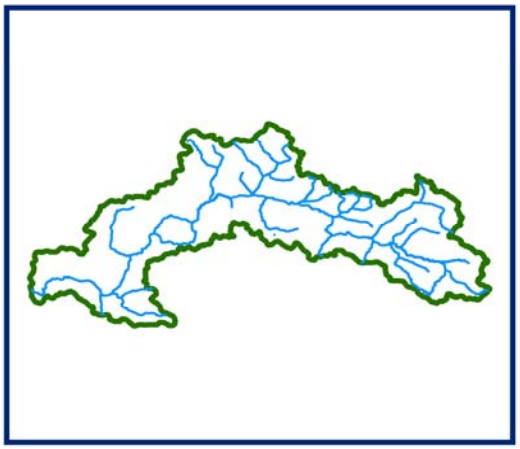
09 JUNE 2011



14 JUNE 2011



19 JUNE 2011



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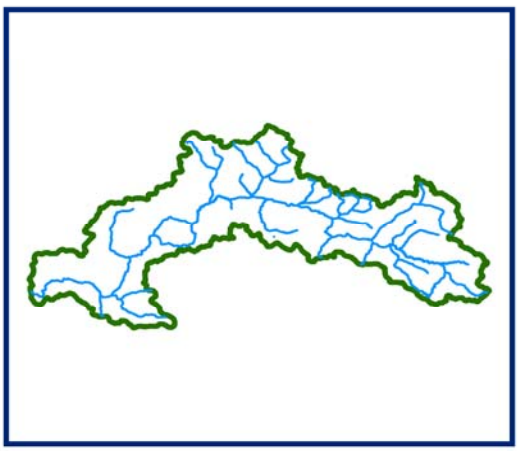


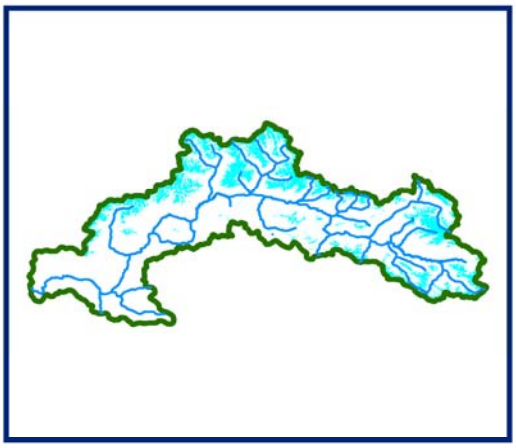
DATA NOT AVAILABLE

SNOW

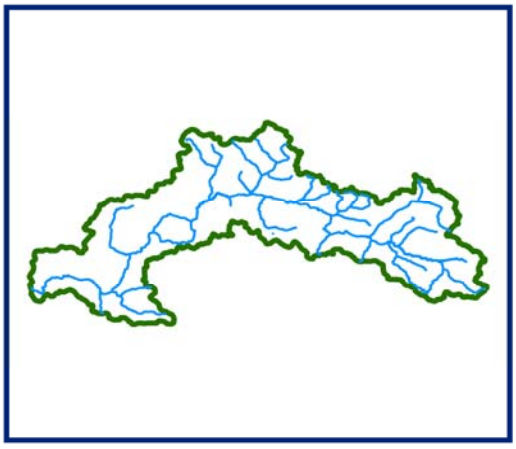
0 25 50 100 150 200

Kilometers

10 DAILY SNOW COVER MAP: KISANGANGA BASIN



DATA USED
09 JUNE 2011



DATA USED
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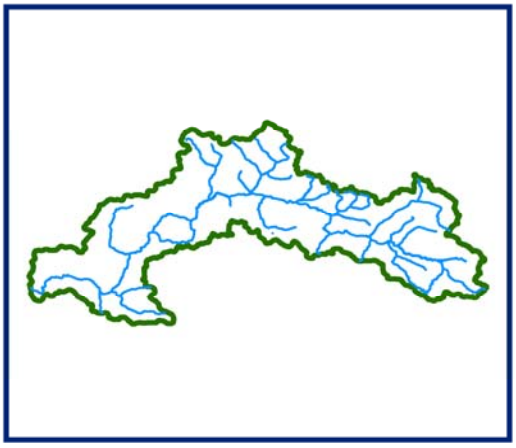


DATA USED
DATA NOT AVAILABLE

SNOW

0 25 50 100 150 200
Kilometers

ASTOR BASIN

AREAL EXTENT OF SNOW (5 DAILY)

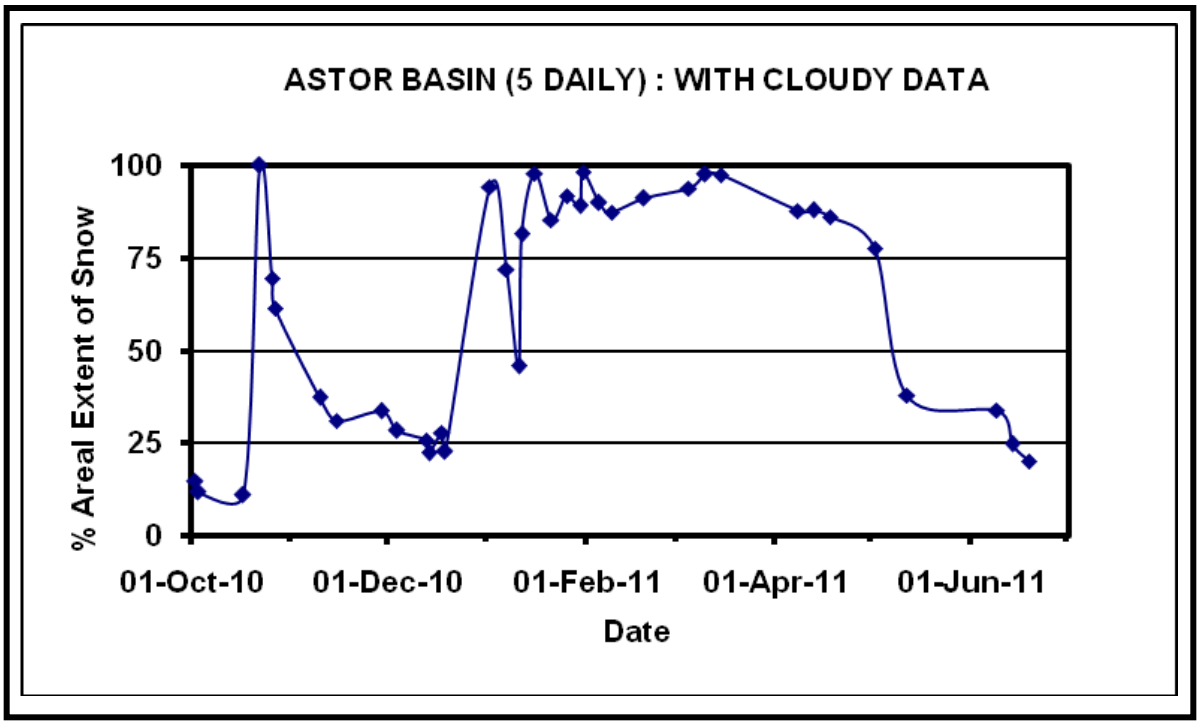
BASIN NAME: ASTOR **BASIN AREA: 4008 sq km**

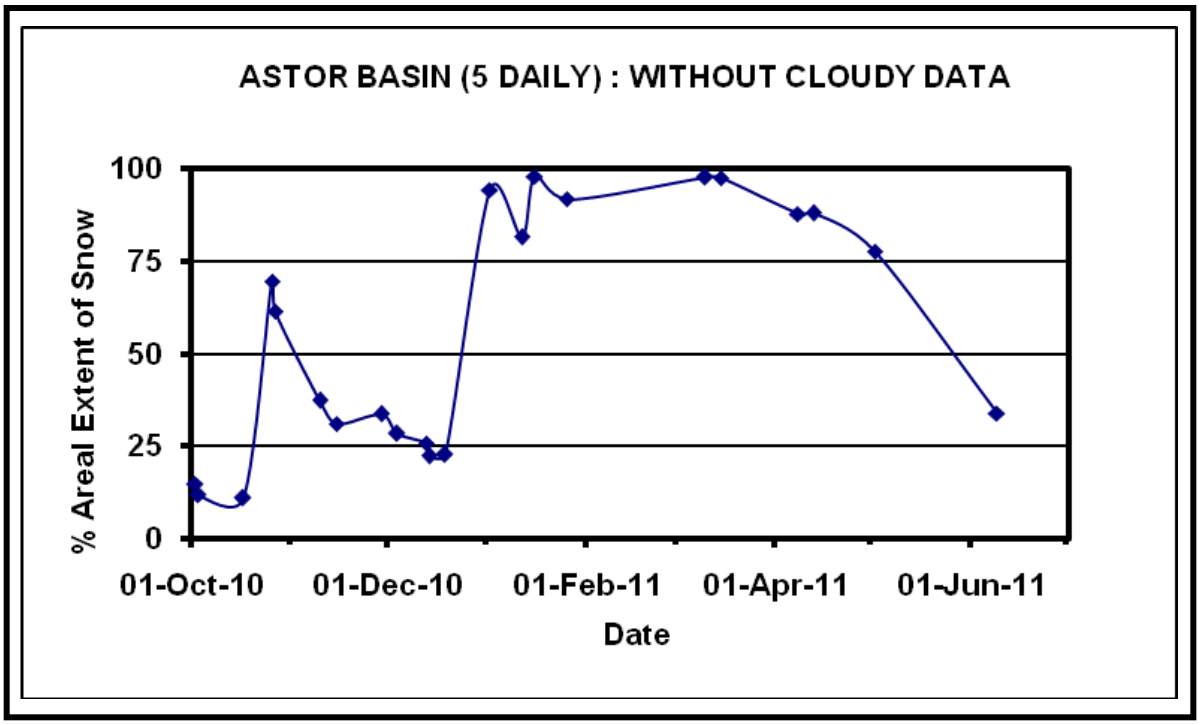
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2010							
1	02-Oct-10	586	15	4	22-Oct-10	3965	99
2	03-Oct-10	470	12	5	26-Oct-10	2786	70
3	17-Oct-10	439	11	6	27-Oct-10	2461	61
November 2010							
7	10-Nov-10	1494	37	9	29-Nov-10	1345	34
8	15-Nov-10	1244	31				
December 2010							
10	4-Dec-10	1135	28	13	18-Dec-10	1107	28
11	13-Dec-10	1028	26	14	19-Dec-10	909	23
12	14-Dec-10	888	22				
January 2011							
1	02-jan-11	3772	94	6	21-jan-11	3214	85
2	07-jan-11	2881	72	7	26-jan-11	3672	92
3	11-jan-11	1833	46	8	30-jan-11	3566	89
4	12-jan-11	3258	81	9	31-jan-11	3931	98
5	16-jan-11	3920	98				
February 2011							
10	5-feb-11	3604	90	12	19-feb-11	3653	91
11	9-feb-11	3497	87				
March 2011							
13	5-Mar-11	3752	94	15	15-Mar-11	3901	97
14	10-Mar-11	3908	97				
April 2011							
1	8-Apr-11	3510	88	3	18-Apr-11	3450	86
2	13-Apr-11	3520	88				
May 2011							
1	2-May-11	3103	77	2	12-May-11	1511	38
June 2011							
1	9-Jun-11	1351	34	3	19-Jun-11	799	20
2	14-Jun-11	988	25				

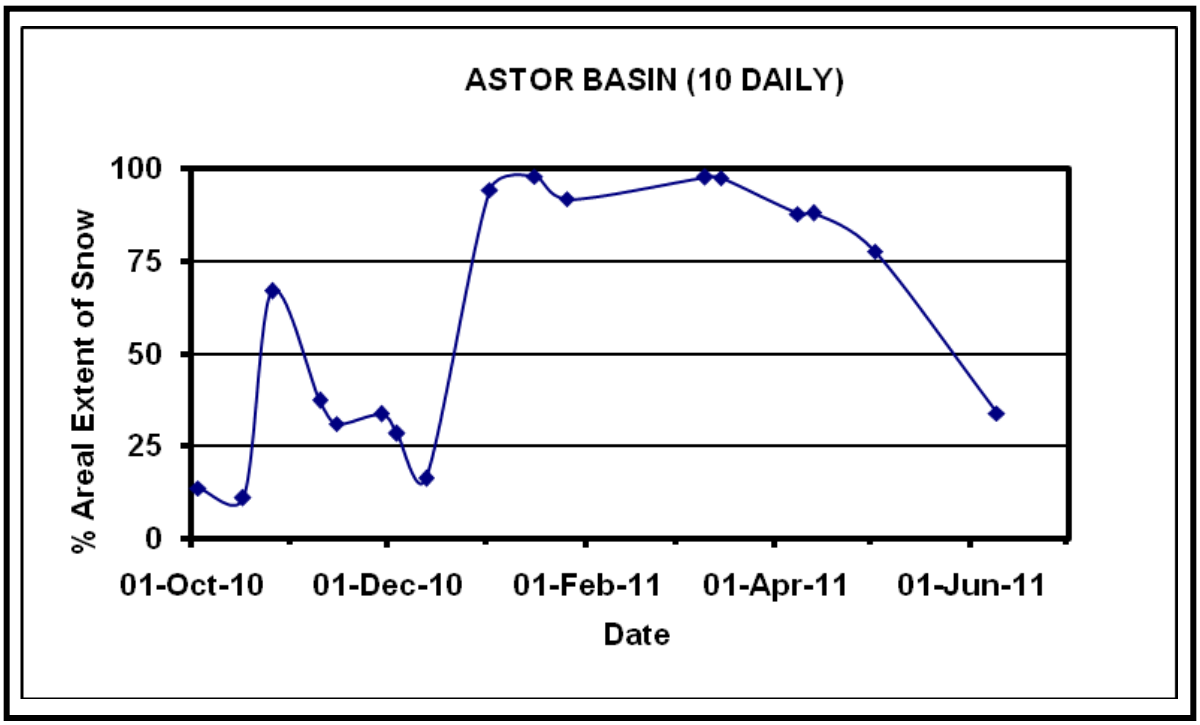
AREAL EXTENT OF SNOW (10 DAILY)

BASIN NAME: ASTOR **BASIN AREA: 4008 sq. km**

S. No	Date	Snow cover (sq. km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	3-Oct-10	541	14	3	26-Oct-10	2673	67
2	17-Oct-10	439	11				
November 2010							
4	10-Nov-10	1494	37	6	29-Nov-10	1345	34
5	15-Nov-10	1244	31				
December 2010							
7	4-Dec-10	1135	28				
January 2011							
1	2-Jan-11	3772	94	3	26-Jan-11	3672	92
2	16-Jan-11	3920	98				
March 2011							
4	10-Mar-11	3908	97				
5	15-Mar-11	3901	97				
April 2011							
1	8-Apr-11	3510	88	2	13-Apr-11	3520	88
May 2011							
3	2-May-11	3103	77				
June 2011							
4	9-June-11	1351	34				

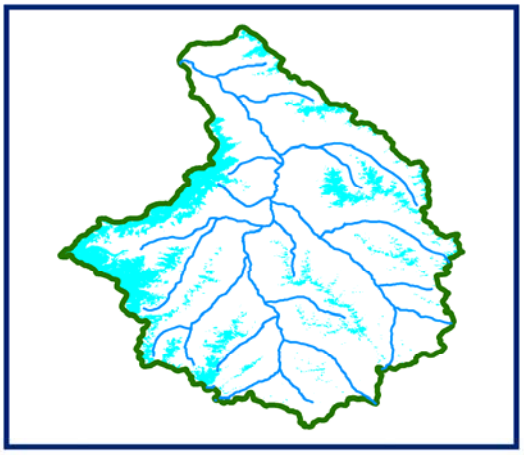

ASTOR BASIN (5 DAILY) : WITH CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


ASTOR BASIN (5 DAILY) : WITHOUT CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

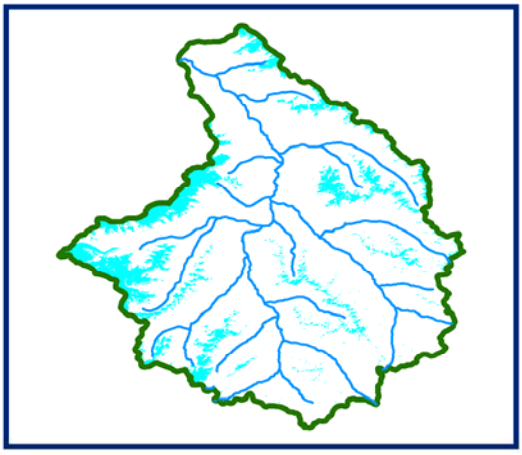

ASTOR BASIN (10 DAILY)
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

SNOW COVER MAP

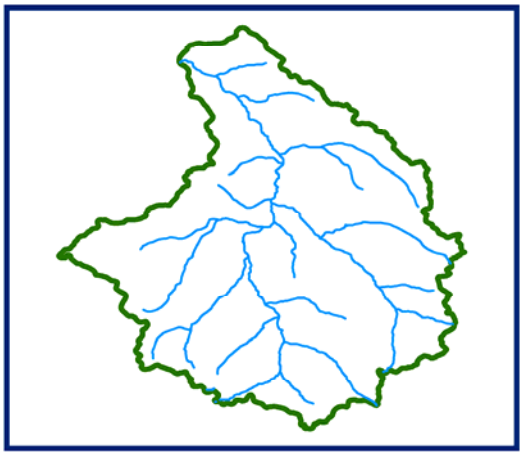
SNOW COVER MAP: **ASTOR BASIN**



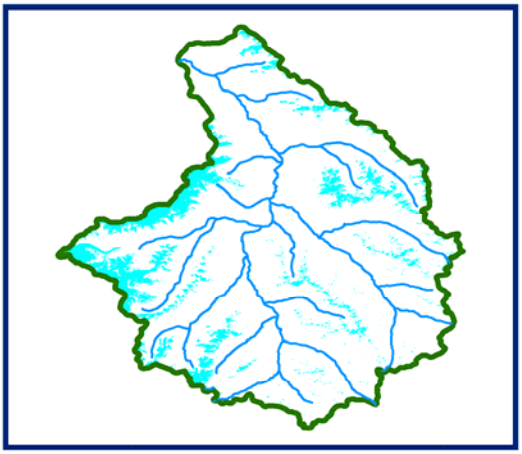
02 OCTOBER 2010



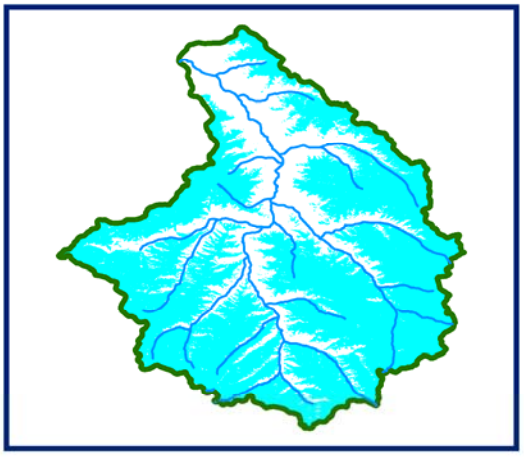
03 OCTOBER 2010



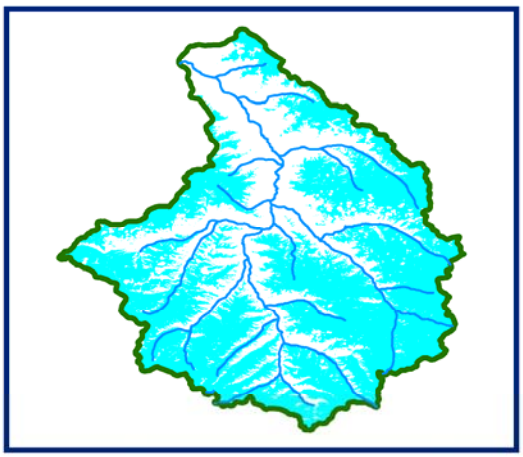
DATA NOT AVAILABLE



17 OCTOBER 2010



26 OCTOBER 2010



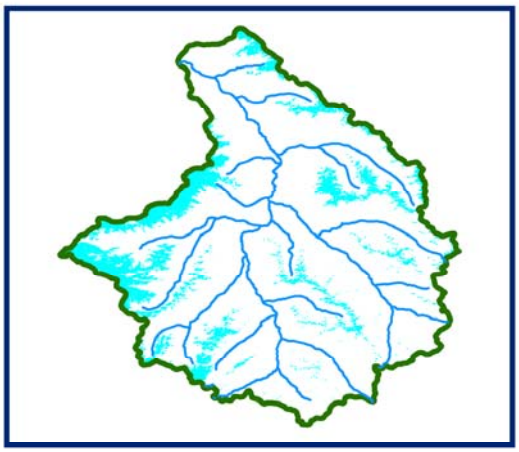
27 OCTOBER 2010

SNOW

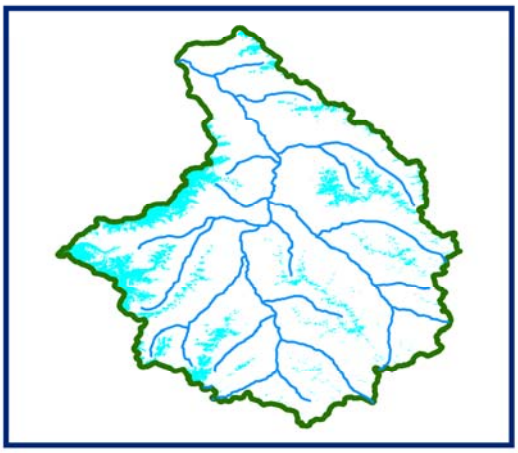
0 12.5 25 50 75 100

Kilometers

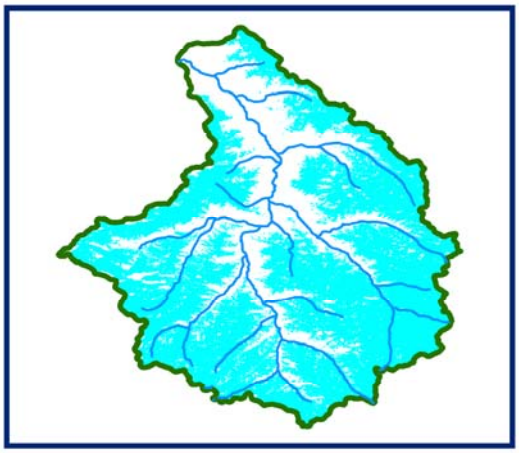
10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
02 OCTOBER 2010
03 OCTOBER 2010



DATA USED
17 OCTOBER 2010

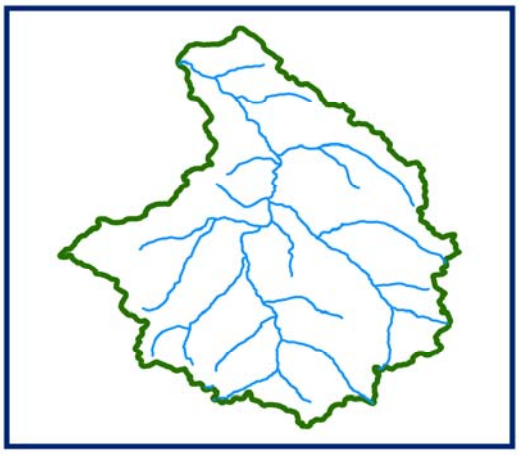


DATA USED
26 OCTOBER 2010
27 OCTOBER 2010

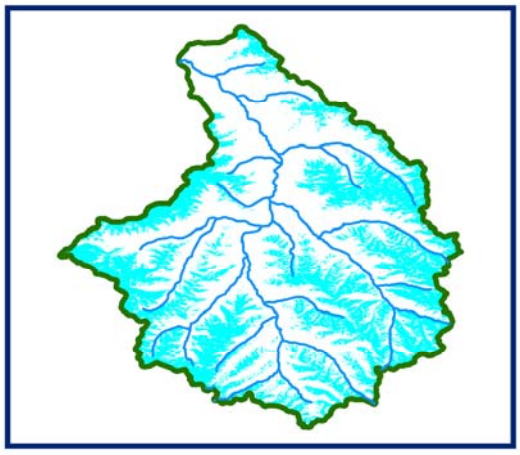
SNOW

0 12.5 25 50 75 100
Kilometers

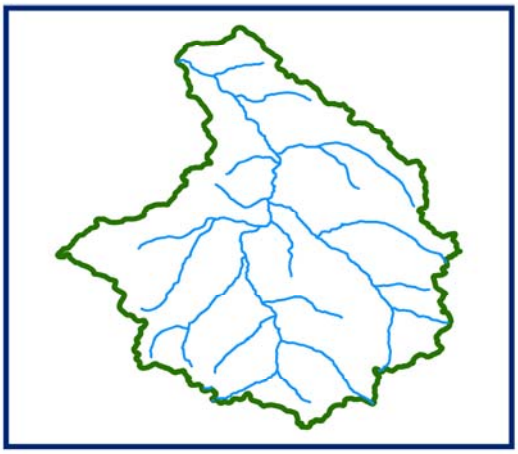
SNOW COVER MAP: **ASTOR BASIN**



DATA NOT AVAILABLE



10 NOVEMBER 2010



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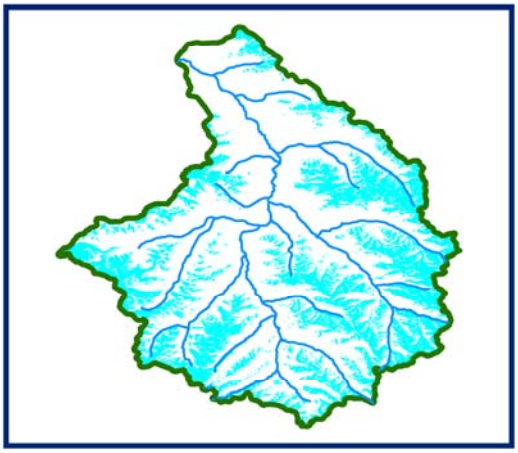
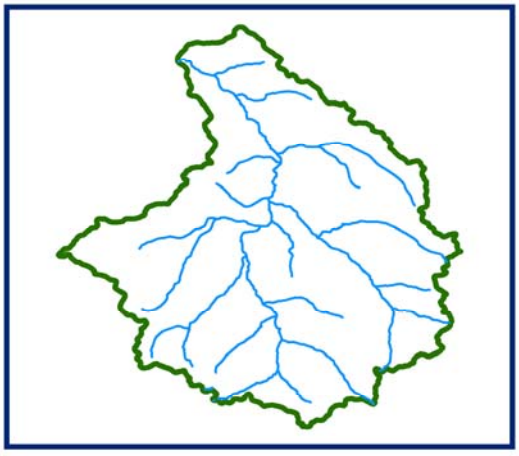


15 NOVEMBER 2010



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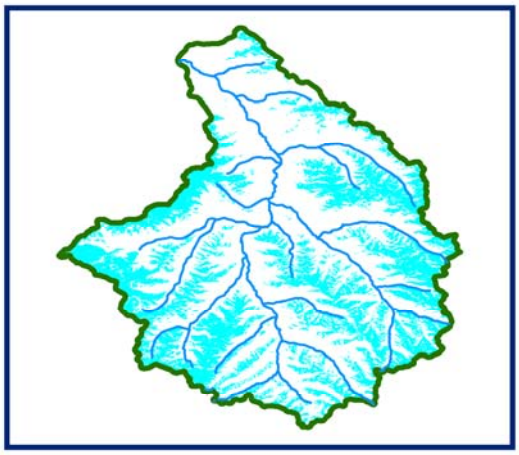


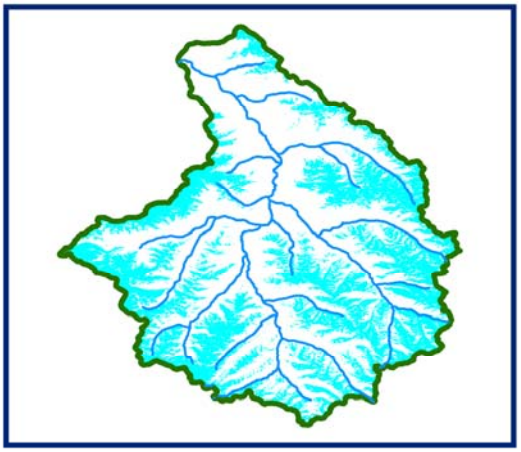
29 NOVEMBER 2010

SNOW

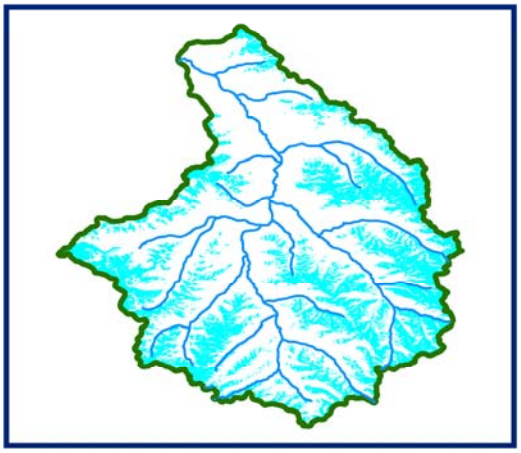
0 12.5 25 50 75 100

Kilometers

10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
10 NOVEMBER 2010



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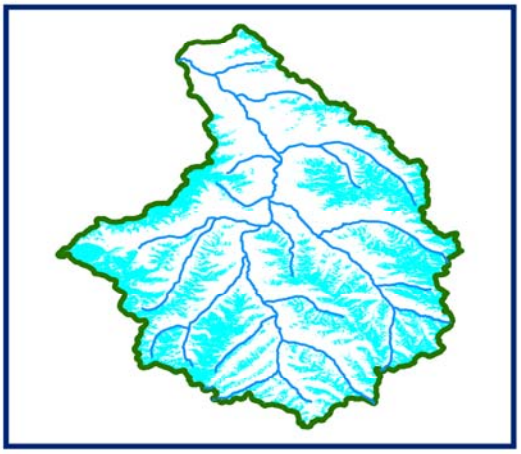


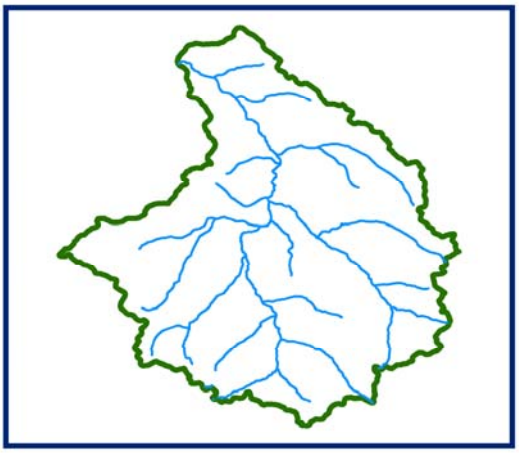
DATA USED
29 NOVEMBER 2010

SNOW

0 12.5 25 50 75 100

Kilometers

SNOW COVER MAP: **ASTOR BASIN**



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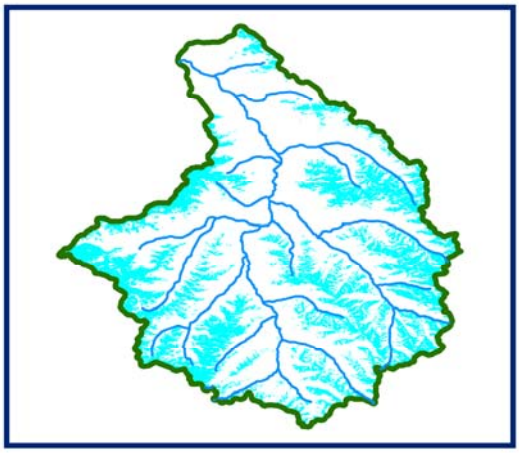
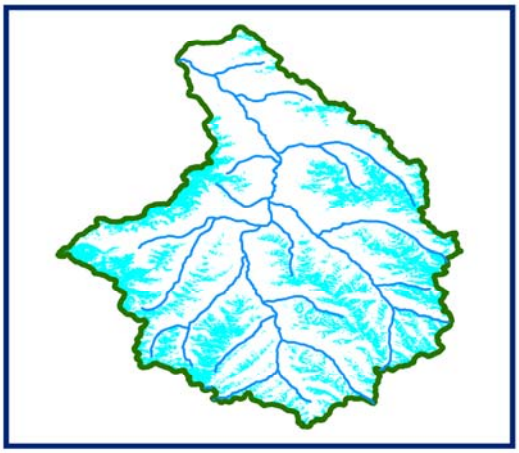
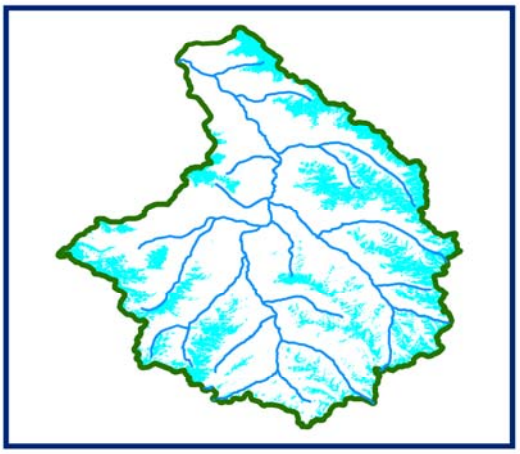


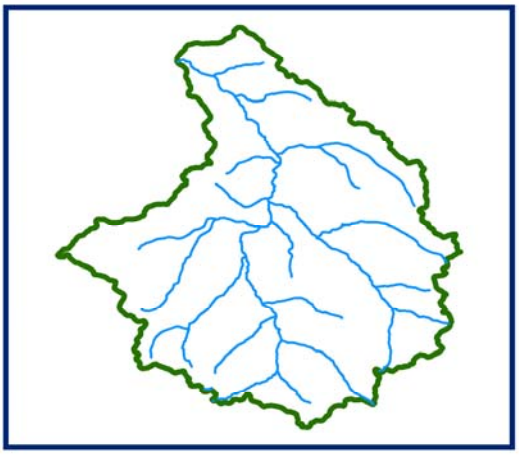
04 DECEMBER 2010



13 DECEMBER 2010



19 DECEMBER 2010



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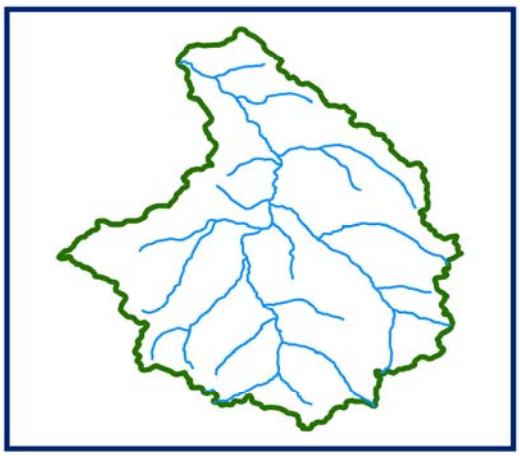


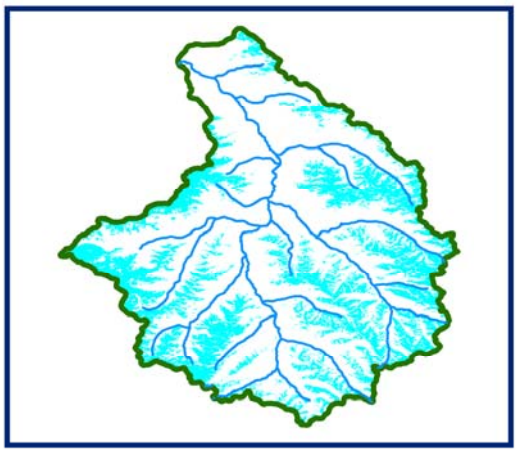
DATA NOT AVAILABLE

SNOW

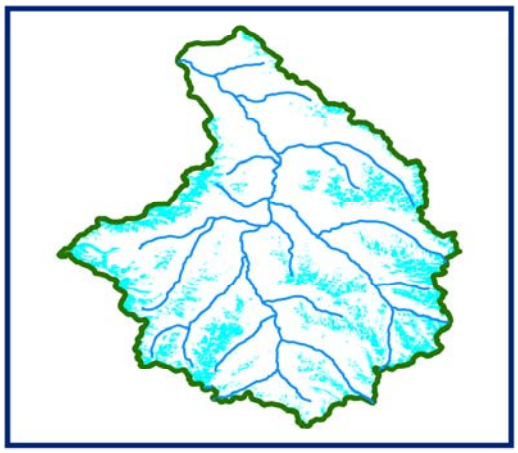
0 12.5 25 50 75 100

Kilometers

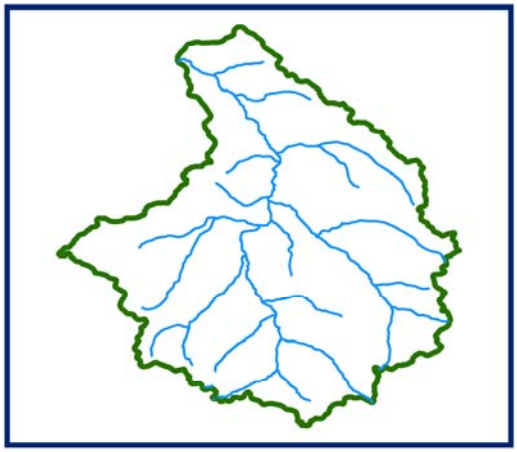
10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
04 DECEMBER 2010



DATA USED
13 DECEMBER 2010
14 DECEMBER 2010

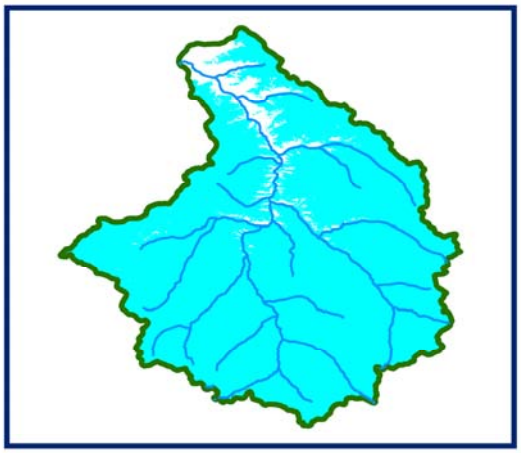


DATA NOT AVAILABLE

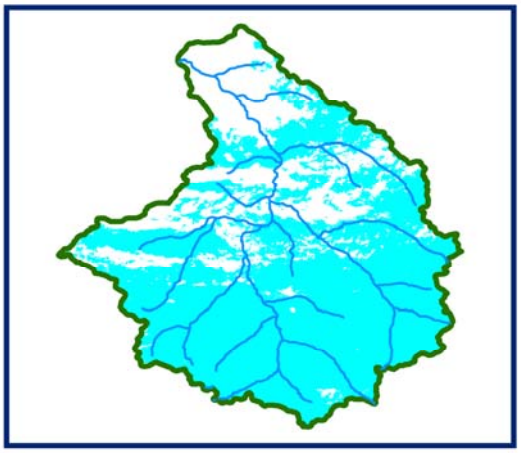
SNOW

0 12.5 25 50 75 100
Kilometers

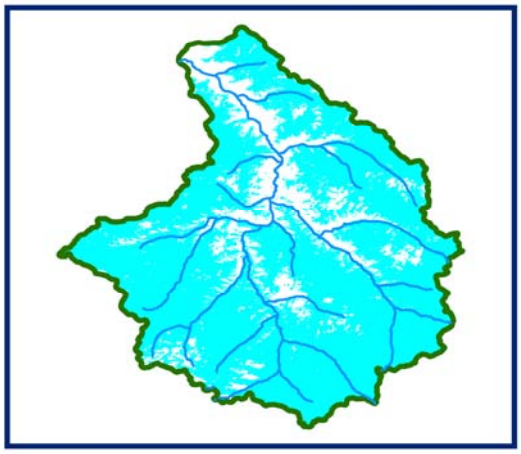
SNOW COVER MAP: **ASTOR BASIN**



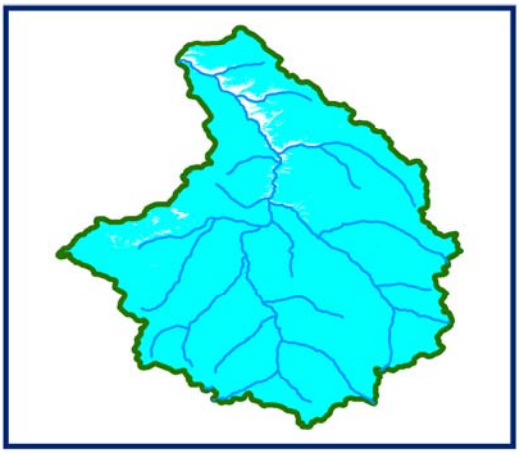
02 JANUARY 2011



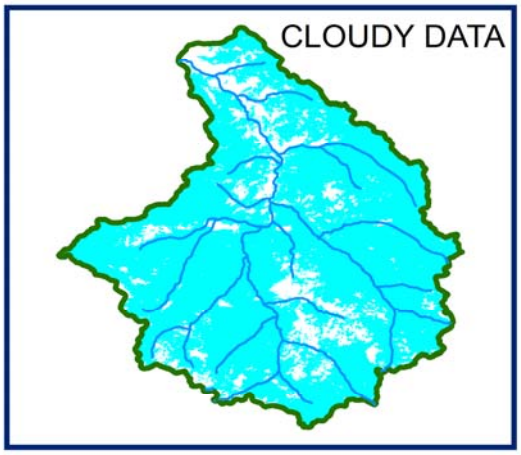
07 JANUARY 2011



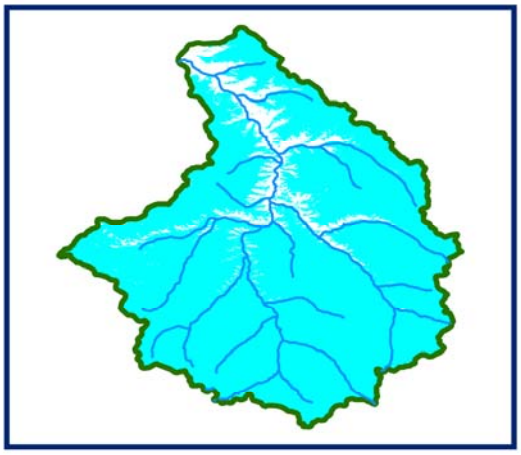
12 JANUARY 2011



16 JANUARY 2011



21 JANUARY 2011



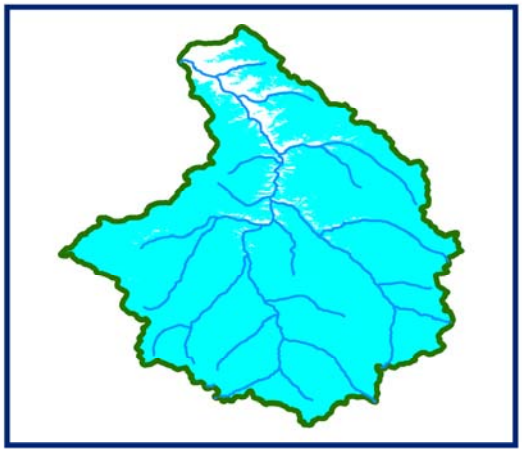
26 JANUARY 2011

SNOW

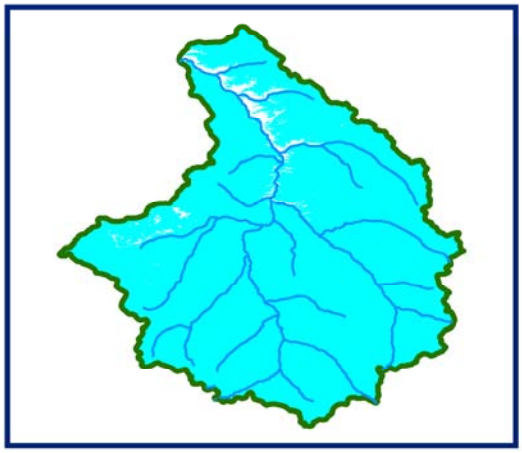
0 12.5 25 50 75 100

Kilometers

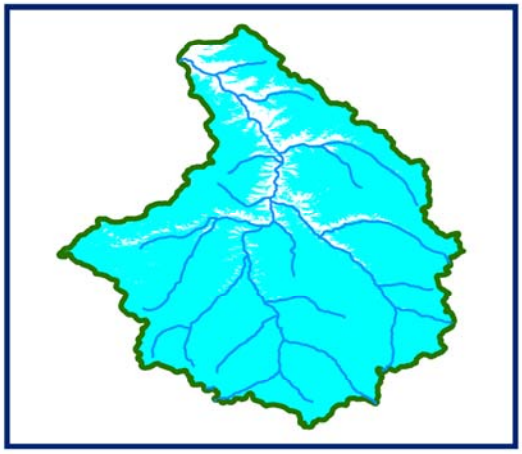
10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
02 JANUARY 2011



DATA USED
12 JANUARY 2011
16 JANUARY 2011

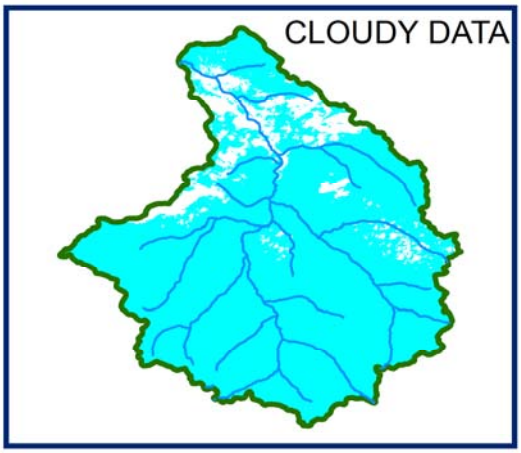


DATA USED
26 JANUARY 2011

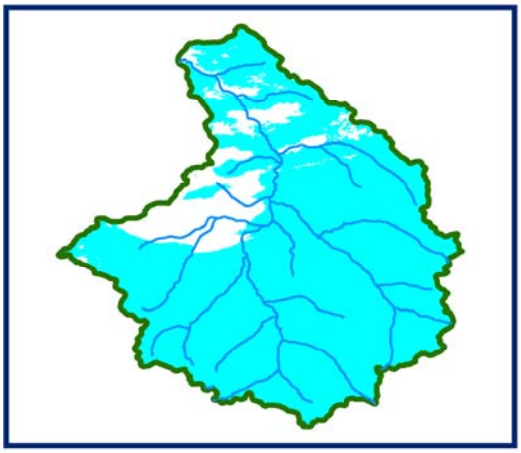
SNOW

0 12.5 25 50 75 100
Kilometers

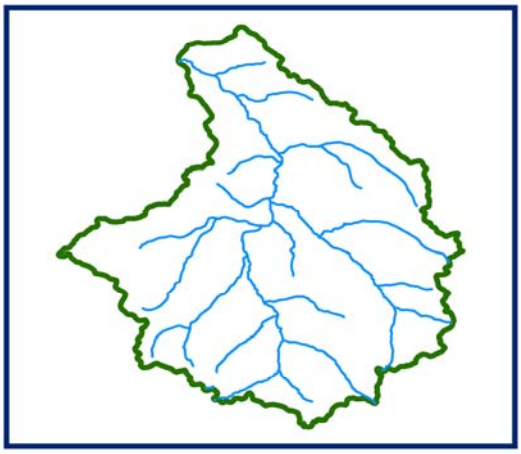
SNOW COVER MAP: **ASTOR BASIN**



05 FEBRUARY 2011



09 FEBRUARY 2011



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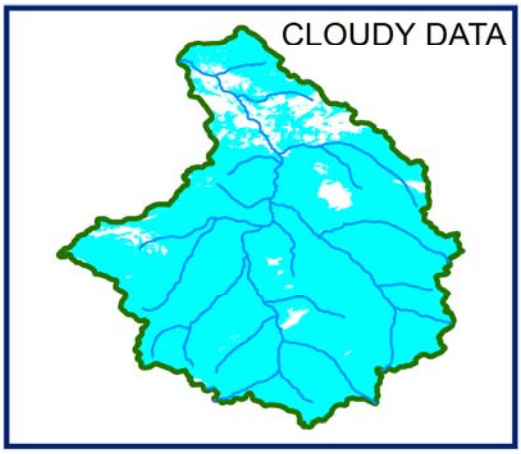
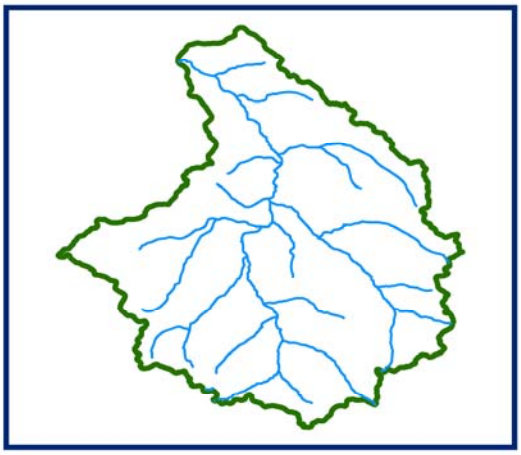


19 FEBRUARY 2011



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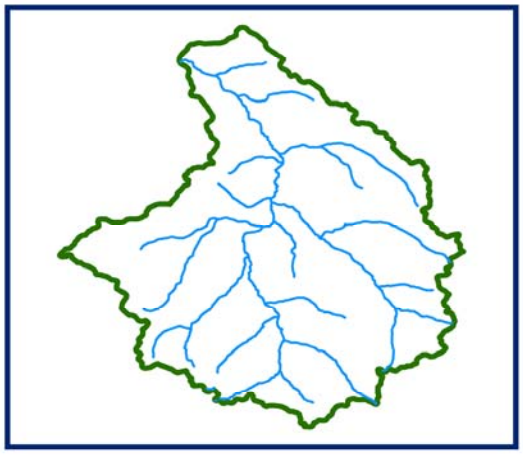


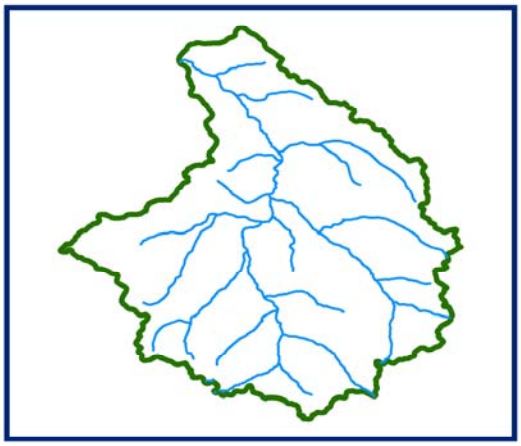
DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100

Kilometers

10 DAILY SNOW COVER MAP: ASTOR BASIN



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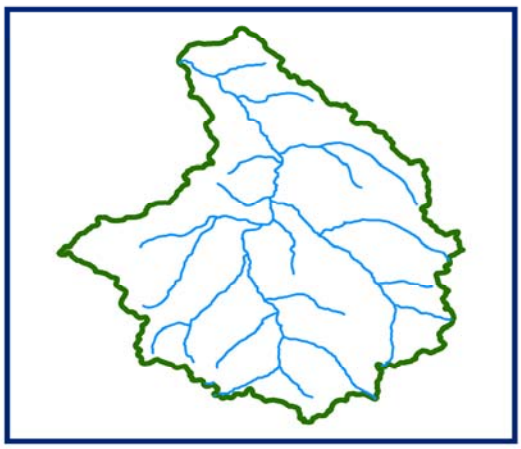

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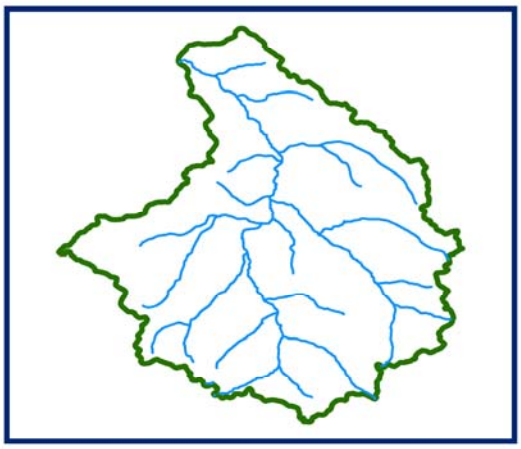


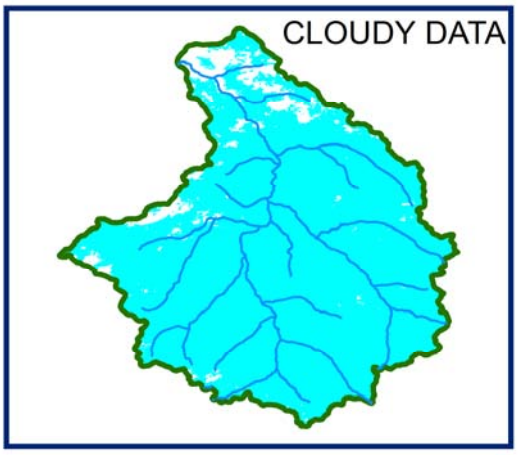
DATA NOT AVAILABLE

SNOW

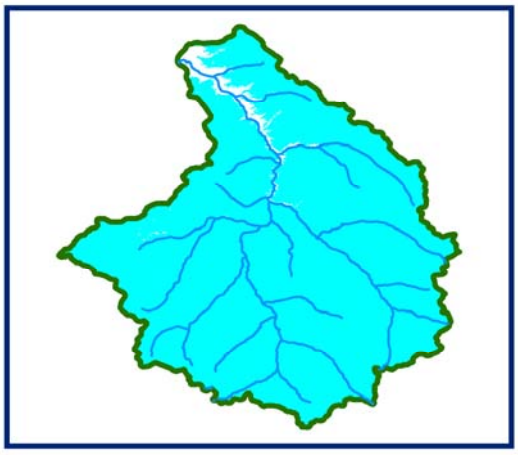
0 12.5 25 50 75 100

Kilometers

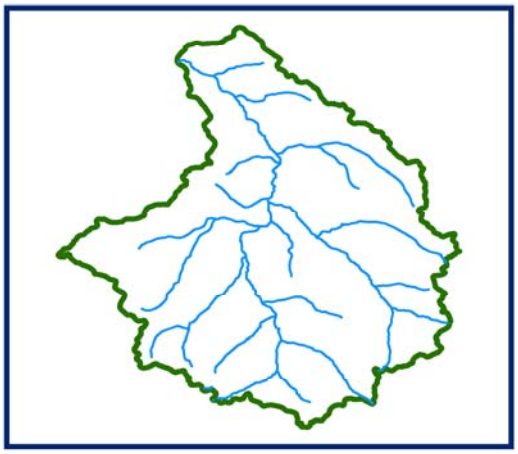
SNOW COVER MAP: **ASTOR BASIN**



05 MARCH 2011



10 MARCH 2011



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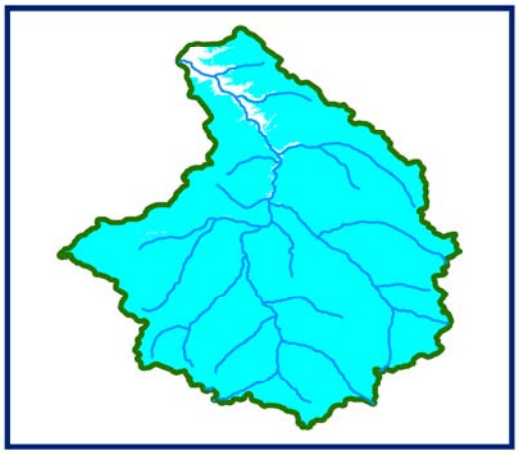

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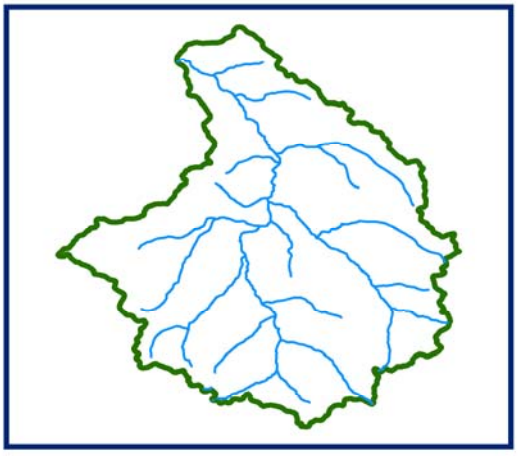

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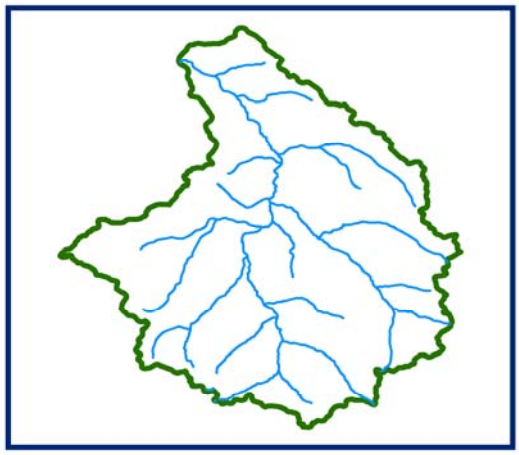


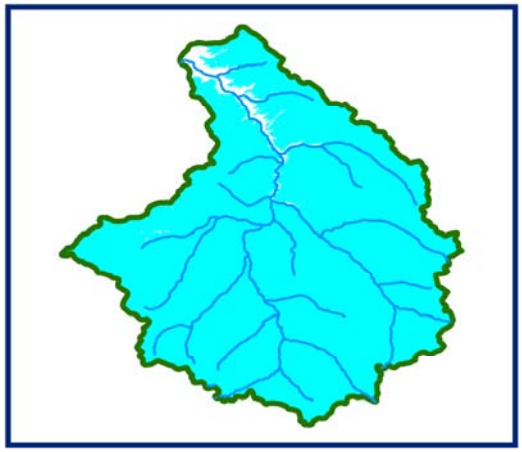
DATA NOT AVAILABLE

SNOW

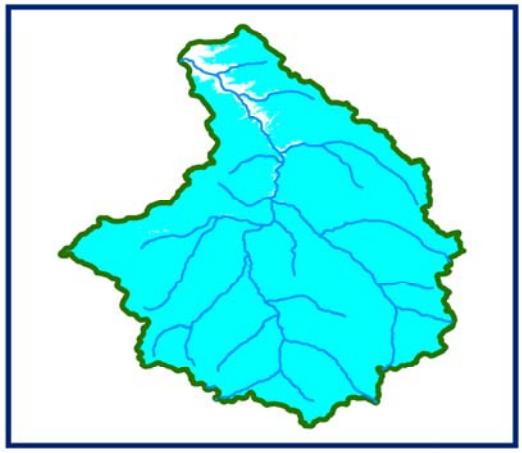
0 12.5 25 50 75 100

Kilometers

10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
10 MARCH 2011



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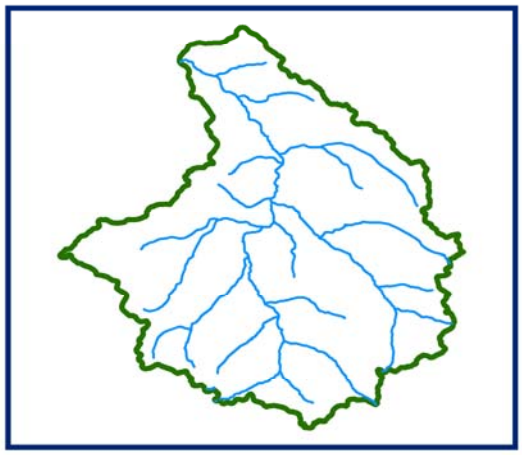


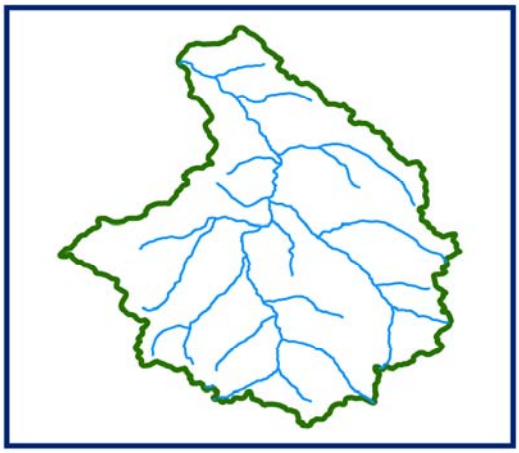
DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100

Kilometers

SNOW COVER MAP: **ASTOR BASIN**



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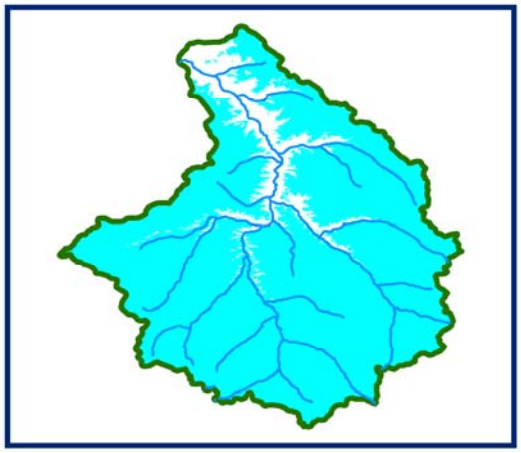
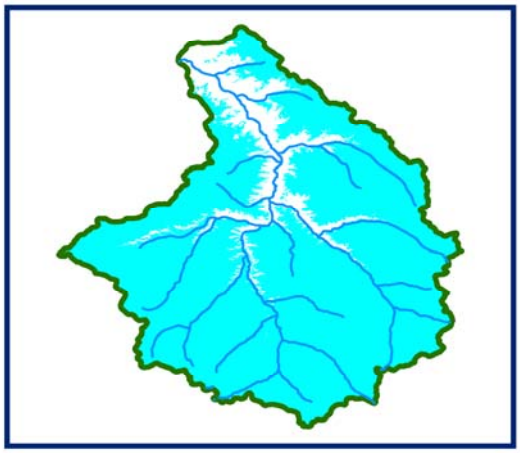
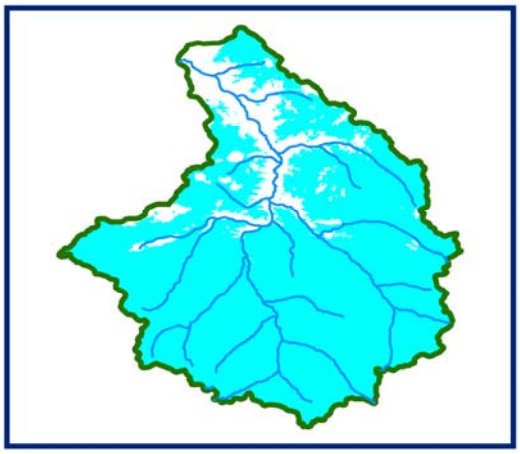


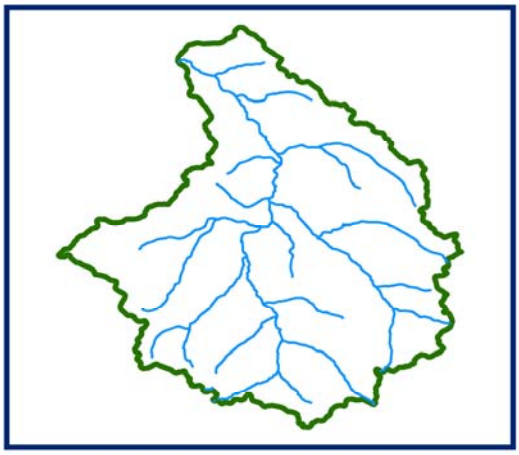
08 APRIL 2011



13 APRIL 2011



18 APRIL 2011



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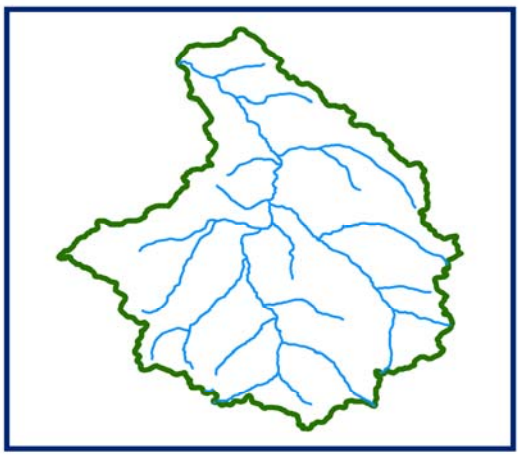


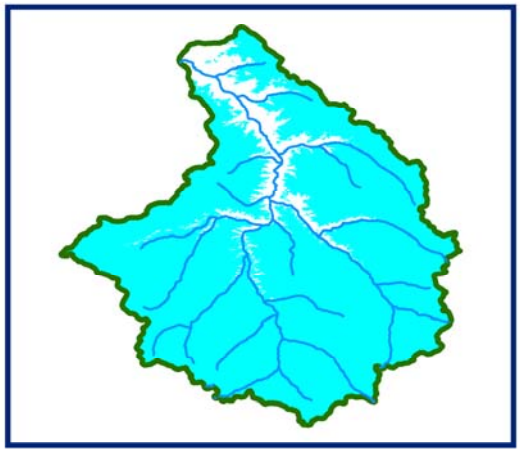
DATA NOT AVAILABLE

SNOW

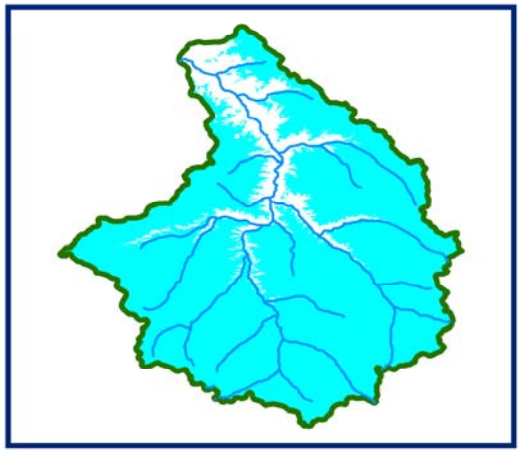
0 12.5 25 50 75 100

Kilometers

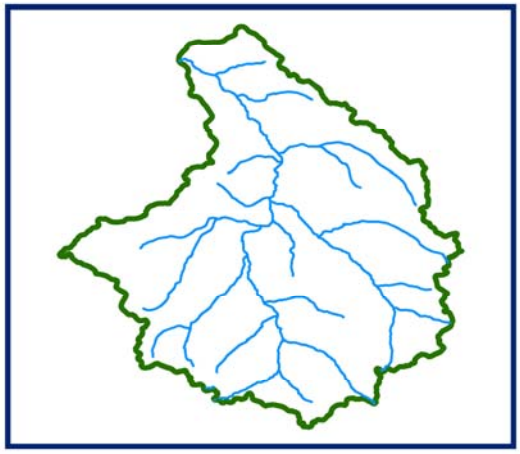
10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
08 APRIL 2011



DATA USED
13 APRIL 2011



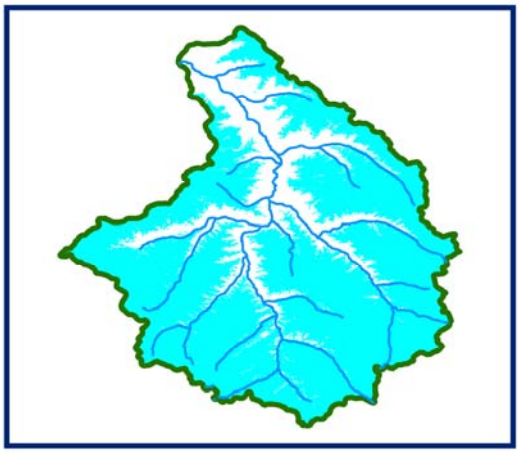
DATA NOT AVAILABLE

SNOW

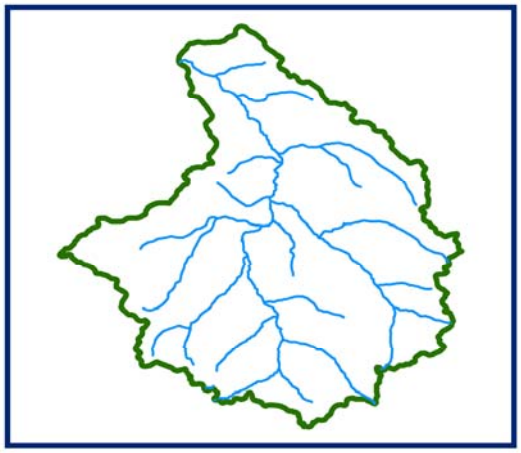
0 12.5 25 50 75 100

Kilometers

SNOW COVER MAP: **ASTOR BASIN**



02 MAY 2011



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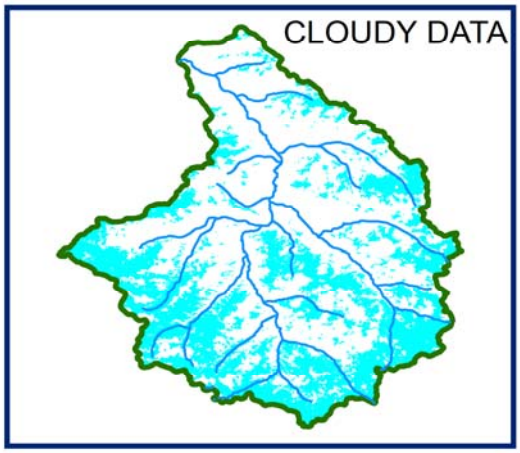
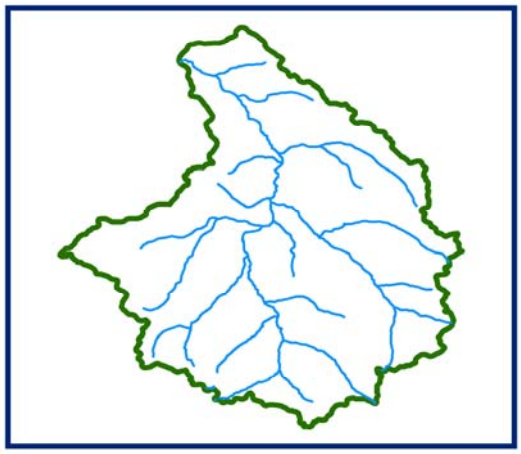
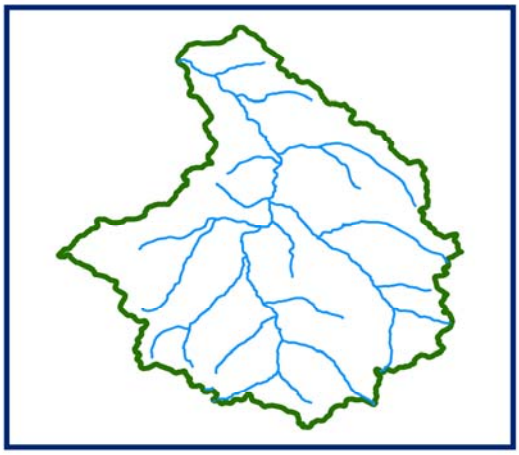


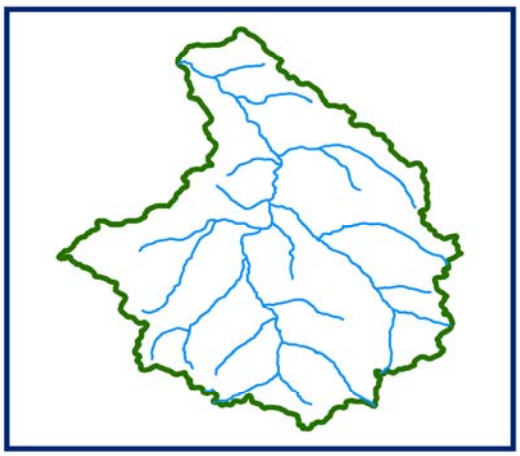
12 MAY 2011



DATA NOT AVAILABLE



DATA NOT AVAILABLE



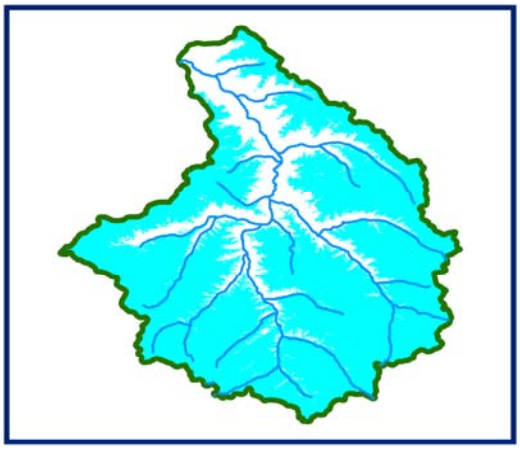
DATA NOT AVAILABLE

SNOW

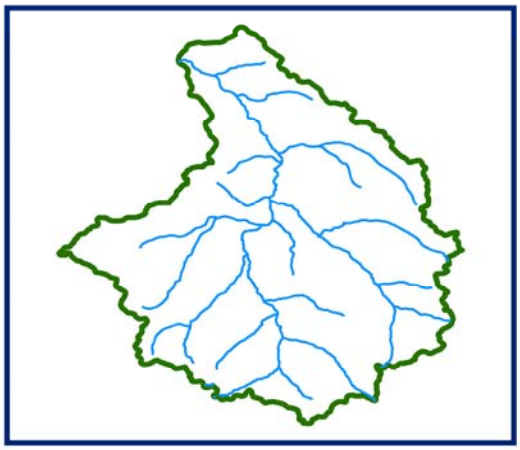
0 12.5 25 50 75 100

Kilometers

10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
02 MAY 2011



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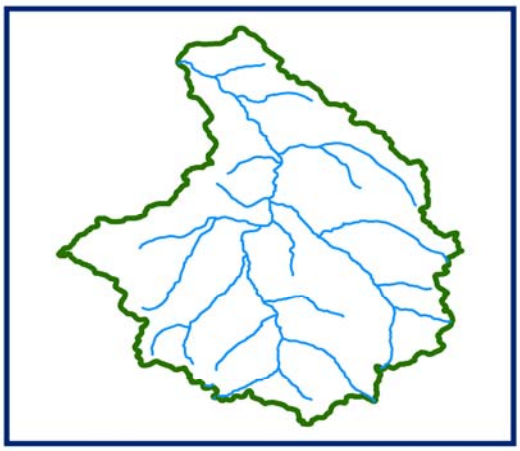
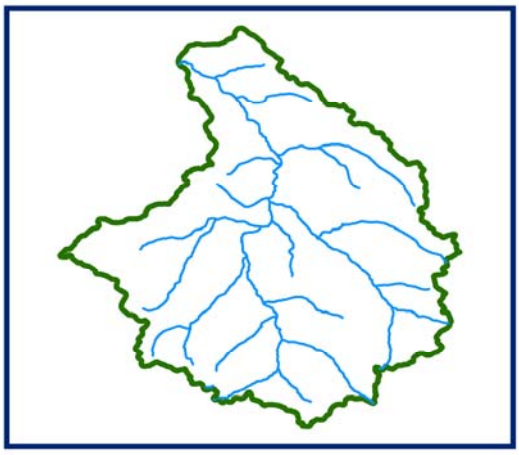


DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100
Kilometers

SNOW COVER MAP: **ASTOR BASIN**



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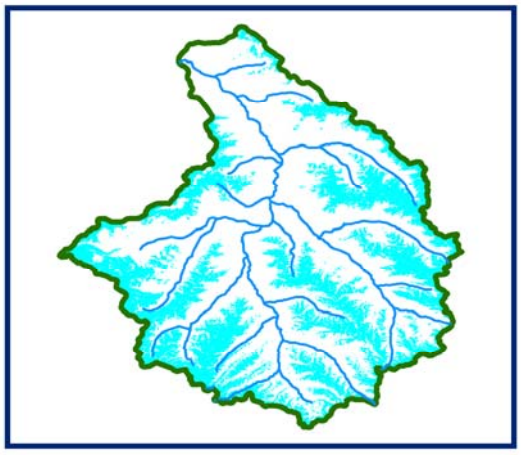
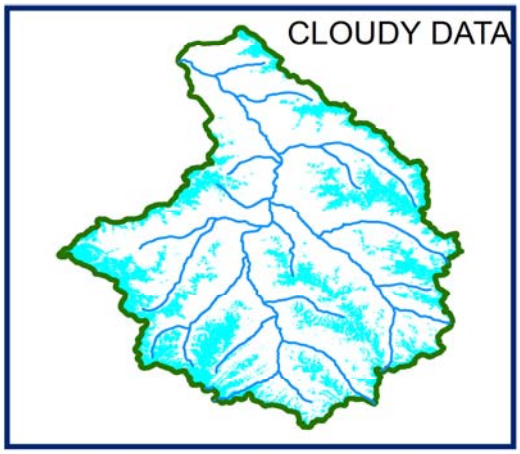
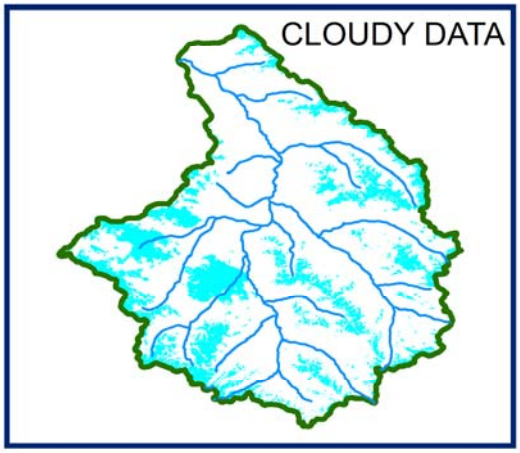


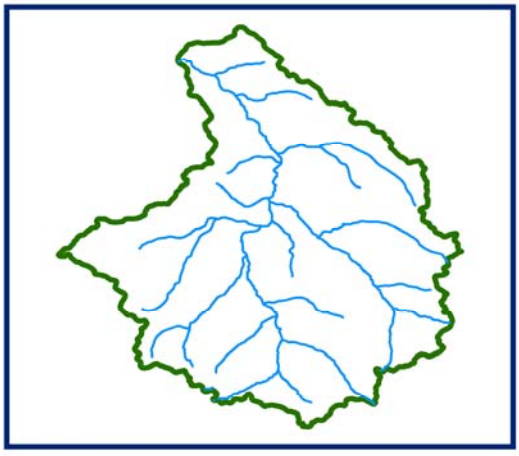
09 JUNE 2011



14 JUNE 2011



19 JUNE 2011



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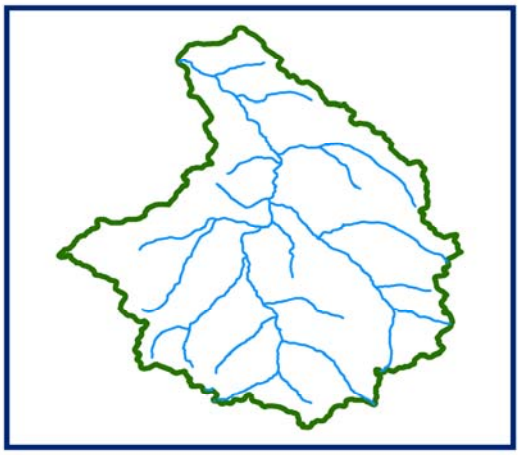


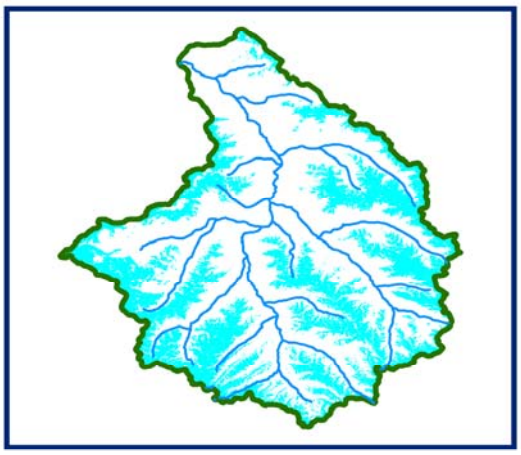
DATA NOT AVAILABLE

SNOW

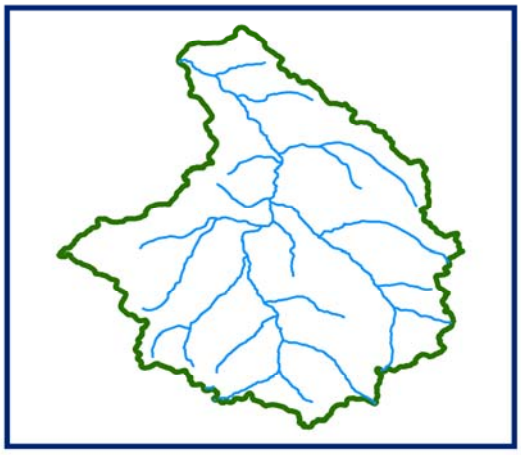
0 12.5 25 50 75 100

Kilometers

10 DAILY SNOW COVER MAP: ASTOR BASIN



DATA USED
09 JUNE 2011



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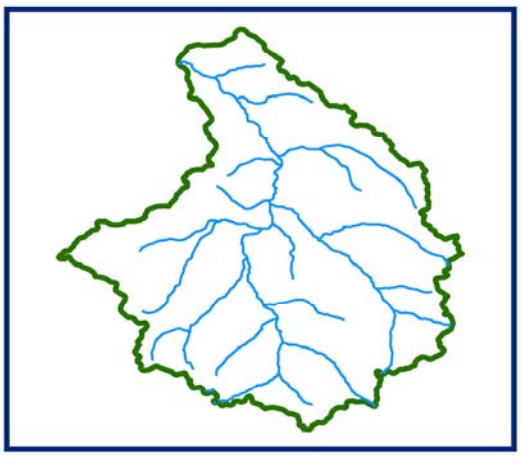


DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100

Kilometers

SHIGO BASIN

AREAL EXTENT OF SNOW (5 DAILY)

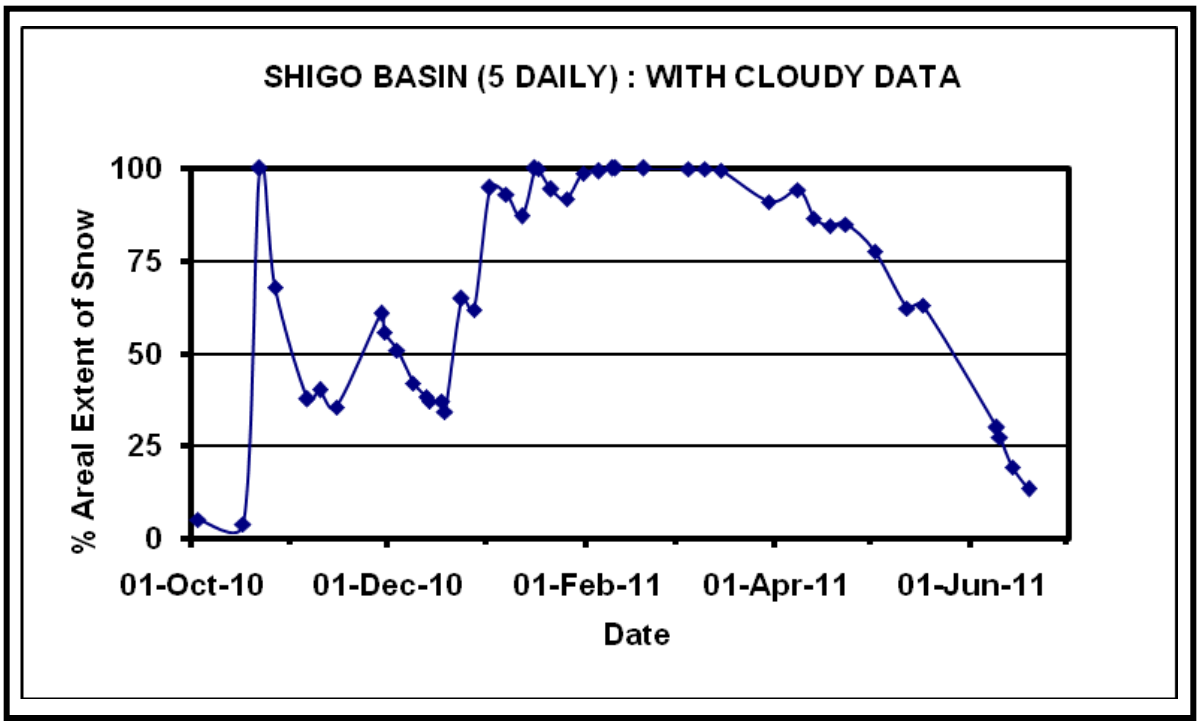
BASIN NAME: SHIGO **BASIN AREA: 5539 sq km**

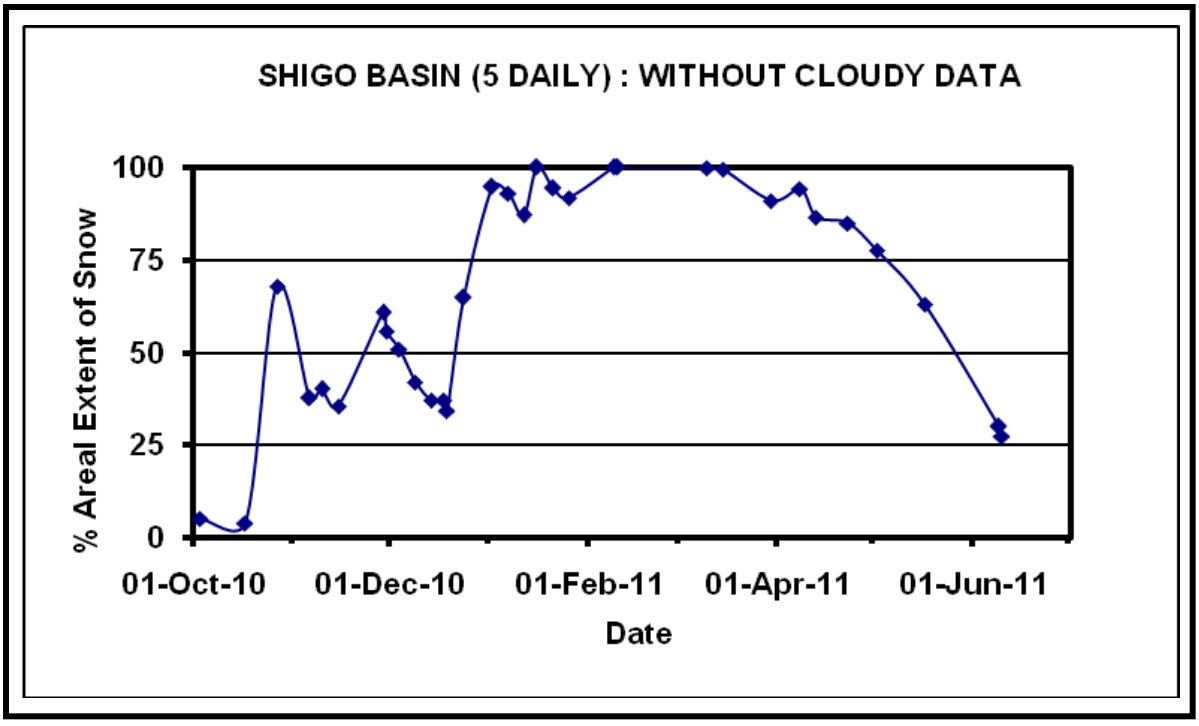
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2010							
1	03-Oct-10	279	5	3	22-Oct-10	5538	100
2	17-Oct-10	213	4	4	27-Oct-10	3753	68
November 2010							
5	06-Nov-10	2081	38	8	29-Nov-10	3366	61
6	10-Nov-10	2221	40	9	30-Nov-10	3087	56
7	15-Nov-10	1962	35				
December 2010							
10	04-Dec-10	2813	51	14	18-Dec-10	2048	37
11	09-Dec-10	2324	42	15	19-Dec-10	1896	34
12	13-Dec-10	2116	38	16	24-Dec-10	3589	65
13	14-Dec-10	2046	37	17	28-Dec-10	3412	62
January 2011							
1	2-Jan-11	5251	95	5	17-jan-11	5528	100
2	7-Jan-11	5150	93	6	21-jan-11	5223	94
3	12-Jan-11	4819	87	7	26-jan-11	5084	92
4	16-jan-11	5535	100	8	31-Jan-11	5459	99
February 2011							
9	5-Feb-11	5492	99	11	10-Feb-11	5537	100
10	9-Feb-11	5539	100	12	19-Feb-11	5535	100
March 2011							
13	5-Mar-11	5527	100	15	15-Mar-11	5502	99
14	10-Mar-11	5527	100	16	30-Mar-11	5034	91
April 2011							
1	8-Apr-11	5210	94	3	18-Apr-11	4677	84
2	13-Apr-11	4785	86	4	23-Apr-11	4700	85
May 2011							
1	2-May-11	4291	77	3	17-May-11	3482	63
2	12-May-11	3445	62				
June 2011							
1	9-Jun-11	1655	30	3	14-Jun-11	1065	19
2	10-Jun-11	1513	27	4	19-Jun-11	737	13

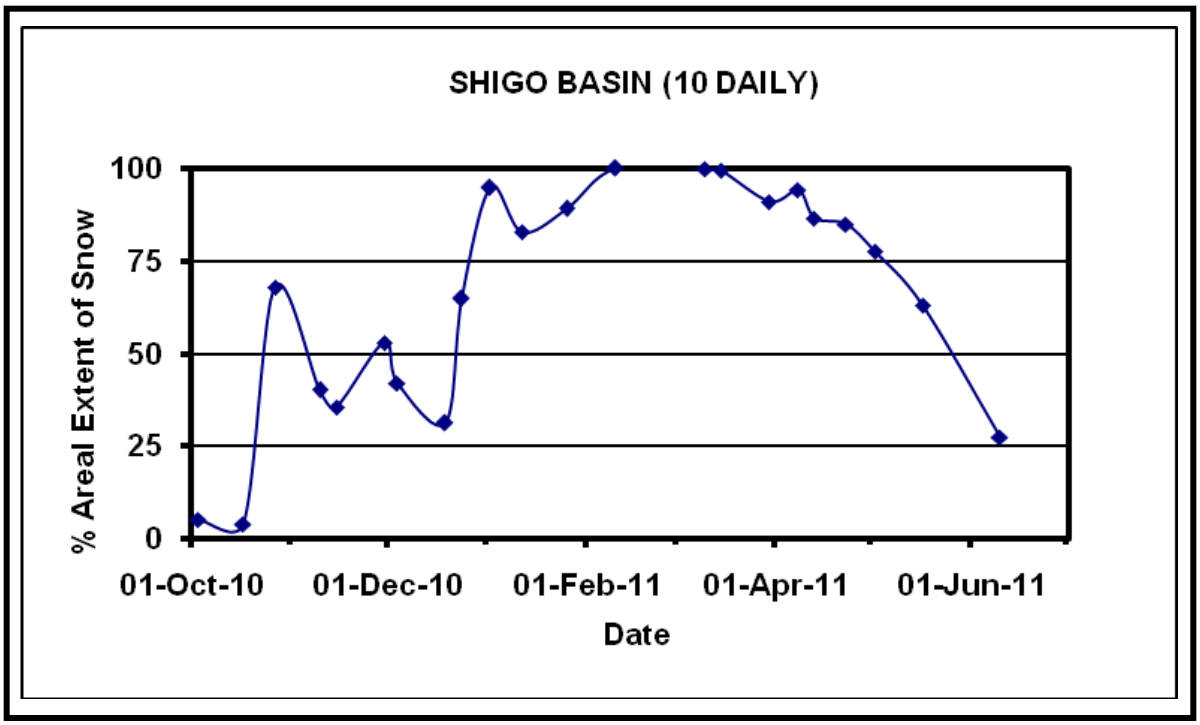
AREAL EXTENT OF SNOW (10 DAILY)

BASIN NAME: SHIGO **BASIN AREA: 5539 sq. km**

S. No	Date	Snow cover (sq. km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	3-Oct-10	279	4				
2	17-Oct-10	213	5				
3	27-Oct-10	3753	68				
November 2010							
4	10-Nov-10	2221	40				
5	15-Nov-10	1962	35				
6	30-Nov-10	2929	53				
December 2010							
7	4-Dec-10	2323	42				
8	19-Dec-10	1727	31				
9	24-Dec-10	3589	65				
January 2011							
1	2-Jan-11	5251	95				
2	12-Jan-11	4586	83				
3	26-jan-11	4929	89				
February 2011							
4	10-Feb-11	5536	100				
March 2011							
5	10-Mar-11	5527	100				
6	15-Mar-11	5502	99				
7	30-Mar-11	5034	91				
April 2011							
1	8-Apr-11	5210	94				
2	13-Apr-11	4785	86				
3	23-Apr-11	4700	85				
May 2011							
1	2-May-11	4291	77				
2	17-May-11	3482	63				
June 2011							
1	10-Jun-11	1513	27				

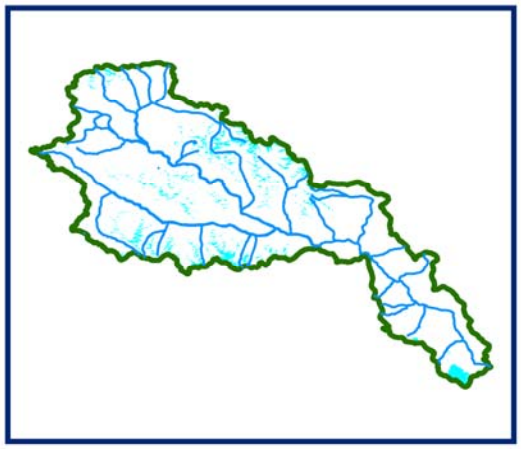

SHIGO BASIN (5 DAILY) : WITH CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


SHIGO BASIN (5 DAILY) : WITHOUT CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

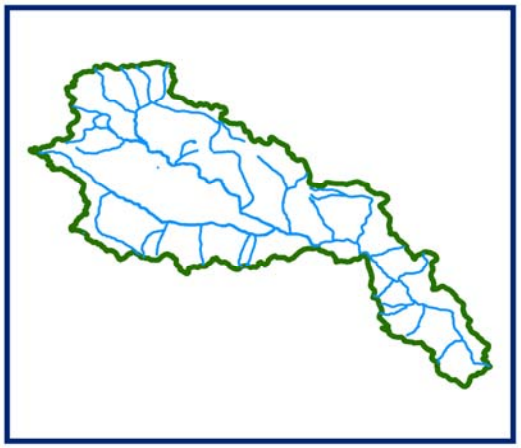

SHIGO BASIN (10 DAILY)
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

SNOW COVER MAP

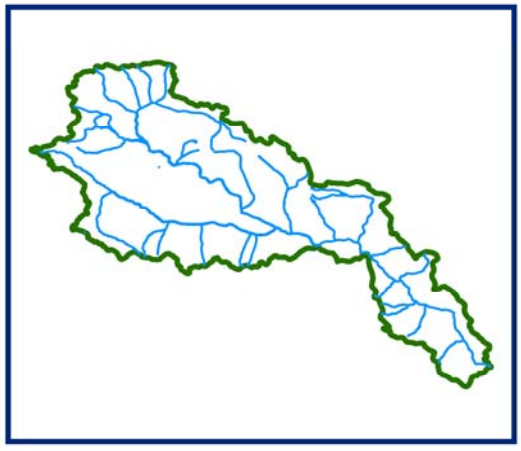
SNOW COVER MAP: **SHIGO BASIN**



03 OCTOBER 2010



DATA NOT AVAILABLE



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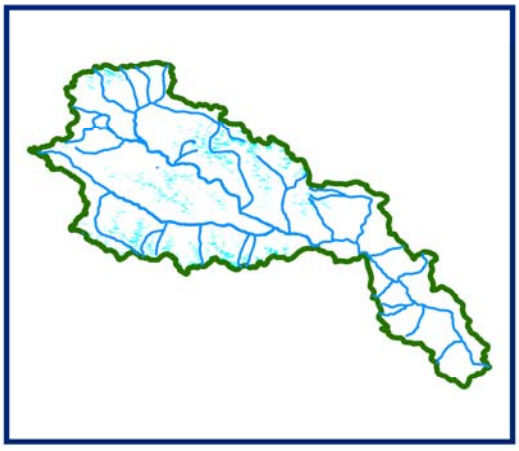
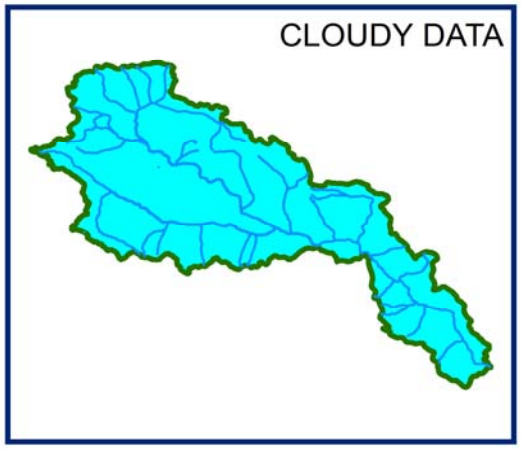
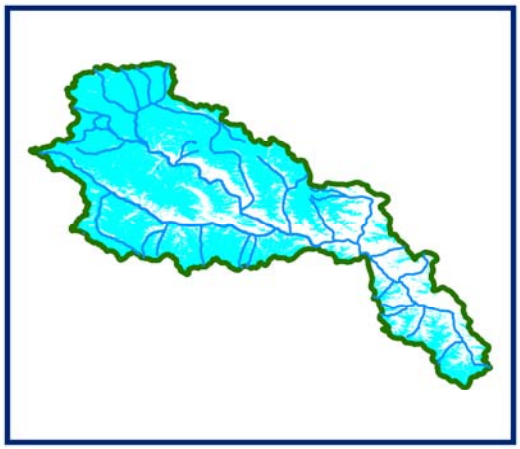


17 OCTOBER 2010



22 OCTOBER 2010



27 OCTOBER 2010

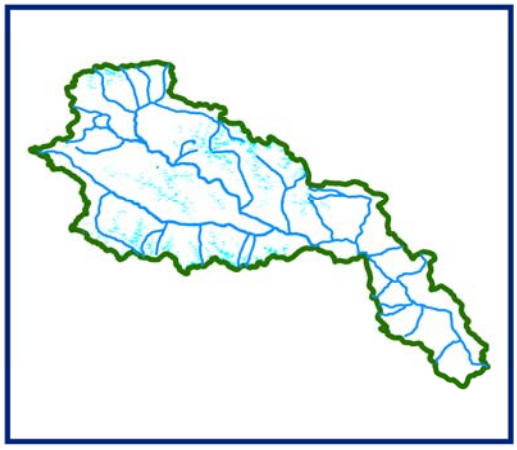
SNOW

0 15 30 60 90 120

Kilometers

10 DAILY SNOW COVER MAP: SHIGO BASIN

DATA USED
03 OCTOBER 2010



DATA USED
17 OCTOBER 2010

DATA USED
27 OCTOBER 2O10

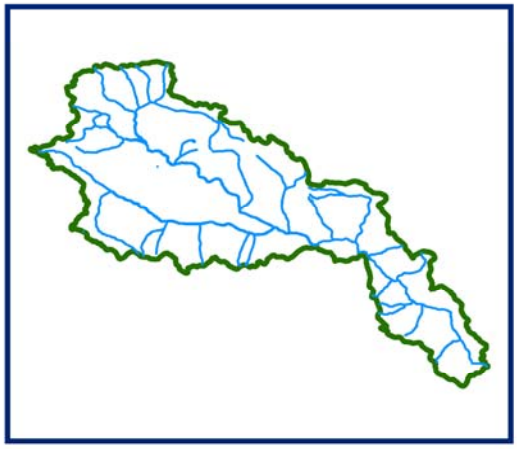
SNOW

0 15 30 60 90 120
Kilometers

SNOW COVER MAP: **SHIGO BASIN**

06 NOVEMBER 2010

10 NOVEMBER 2010



DATA NOT AVAILABLE

15 NOVEMBER 2010

29 NOVEMBER 2010

30 NOVEMBER 2010

SNOW

0 15 30 60 90 120

Kilometers

10 DAILY SNOW COVER MAP: SHIGO BASIN

DATA USED
06 NOVEMBER 2010
10 NOVEMBER 2010

DATA USED
15 NOVEMBER 2010

DATA USED
30 NOVEMBER 2010

SNOW

0 15 30 60 90 120
Kilometers

SNOW COVER MAP: **SHIGO BASIN**

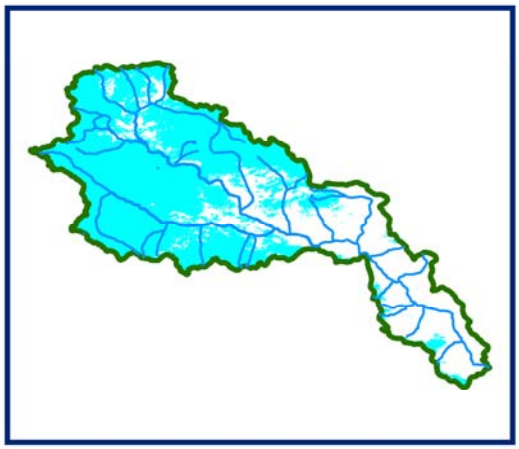
04 DECEMBER 2010

09 DECEMBER 2010

14 DECEMBER 2010

19 DECEMBER 2010

24 DECEMBER 2010



28 DECEMBER 2010

SNOW

0 15 30 60 90 120

Kilometers

10 DAILY SNOW COVER MAP: SHIGO BASIN

DATA USED
04 DECEMBER 2010
09 DECEMBER 2010

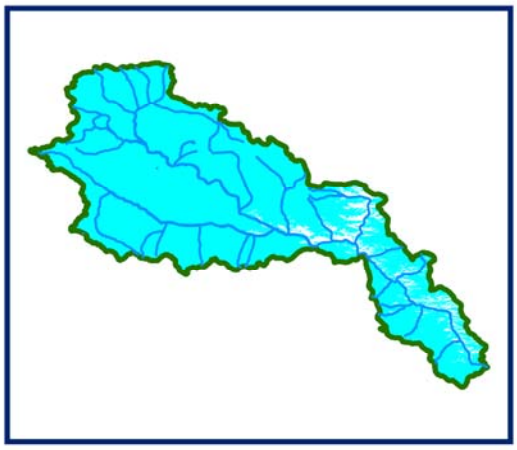
DATA USED
14 DECEMBER 2010
19 DECEMBER 2010

DATA USED
24 DECEMBER 2010

SNOW

0 15 30 60 90 120
Kilometers

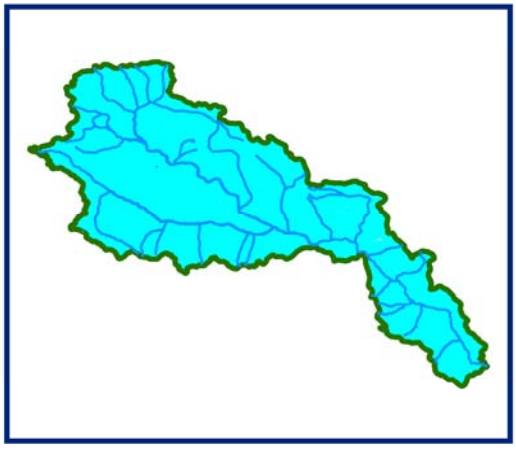
SNOW COVER MAP: **SHIGO BASIN**



02 JANUARY 2011

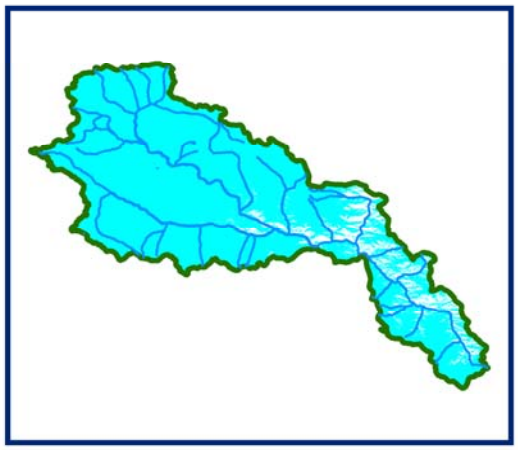
07 JANUARY 2011

12 JANUARY 2011



16 JANUARY 2011

21 JANUARY 2011



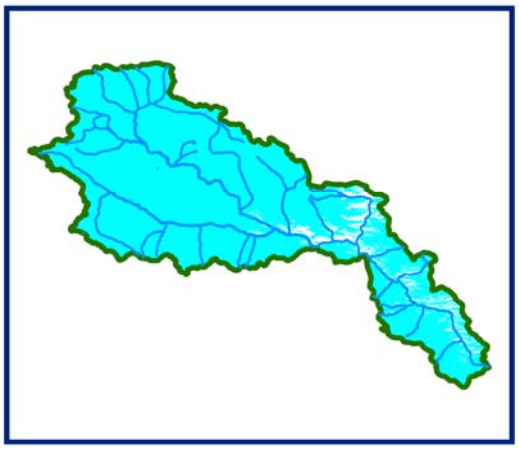
26 JANUARY 2011

SNOW

0 15 30 60 90 120

Kilometers

10 DAILY SNOW COVER MAP: SHIGO BASIN



DATA USED
02 JANUARY 2011
07 JANUARY 2011

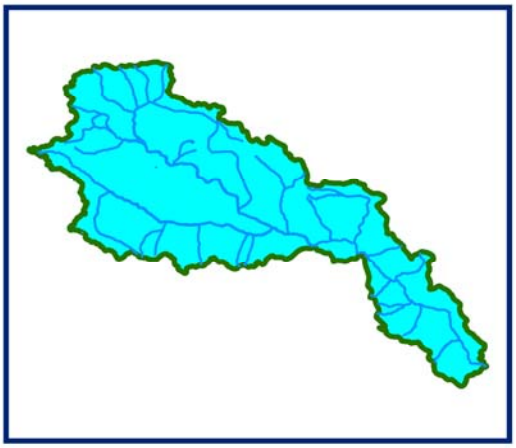
DATA USED
12 JANUARY 2011
16 JANUARY 2011

DATA USED
21 JANUARY 2011
26 JANUARY 2011

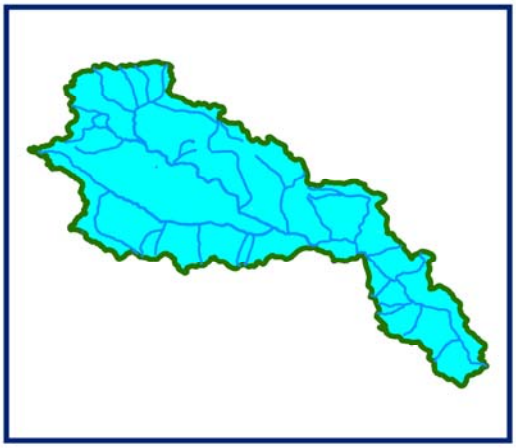
SNOW

0 15 30 60 90 120
Kilometers

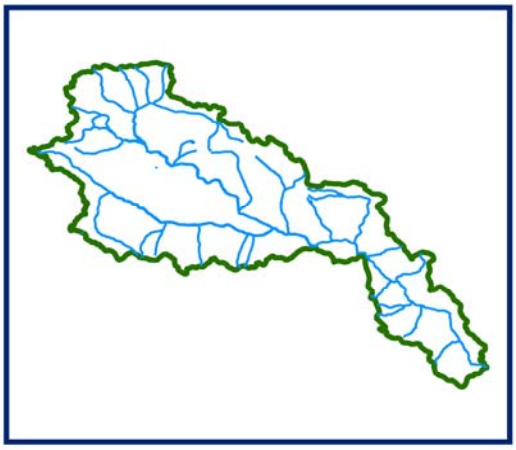
SNOW COVER MAP: **SHIGO BASIN**



09 FEBRUARY 2011



10 FEBRUARY 2011



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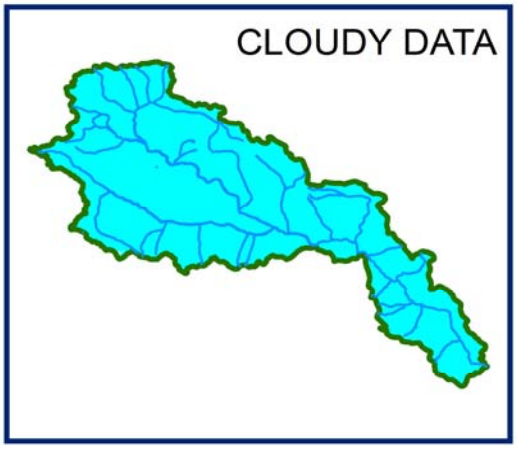
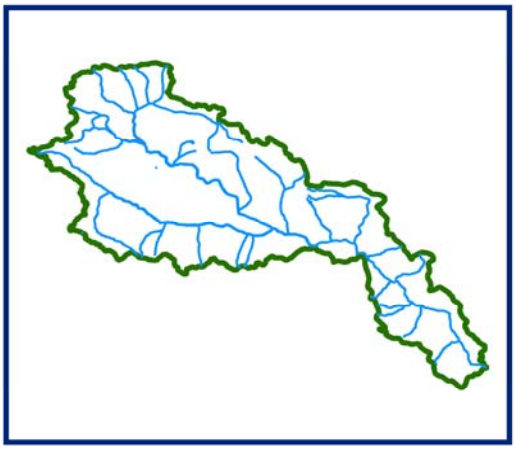
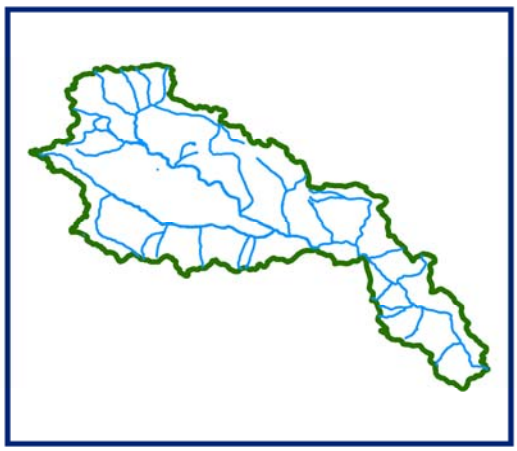


19 FEBRUARY 2011



DATA NOT AVAILABLE



DATA NOT AVAILABLE

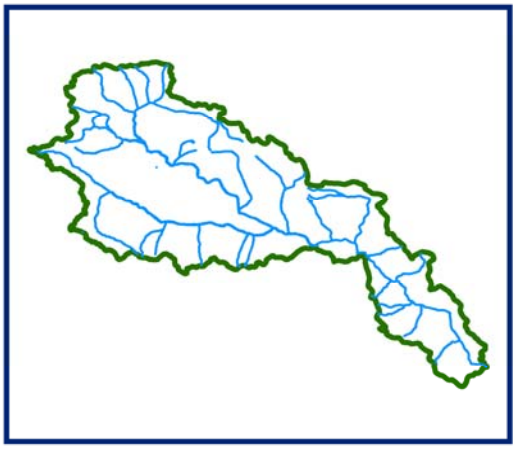
SNOW

0 15 30 60 90 120

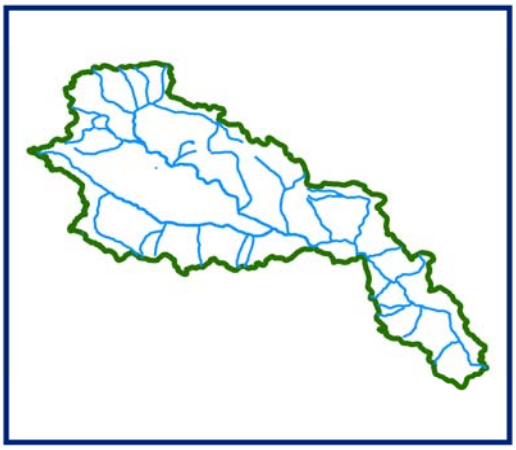
Kilometers

10 DAILY SNOW COVER MAP: SHIGO BASIN

DATA USED
10 FEBRUARY 2011



DATA USED
DATA NOT AVAILABLE

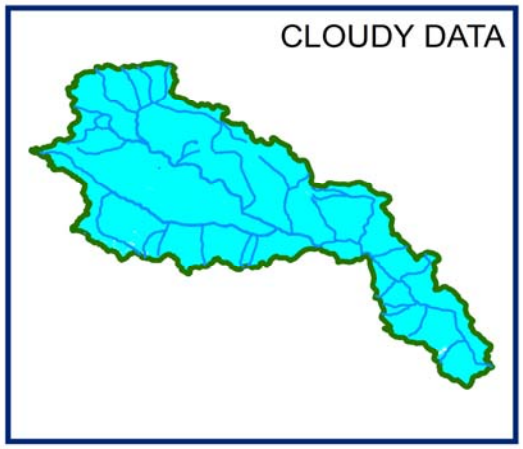


DATA USED
DATA NOT AVAILABLE

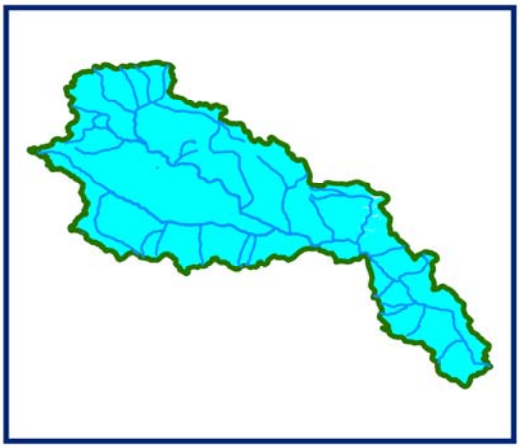
SNOW

0 15 30 60 90 120
Kilometers

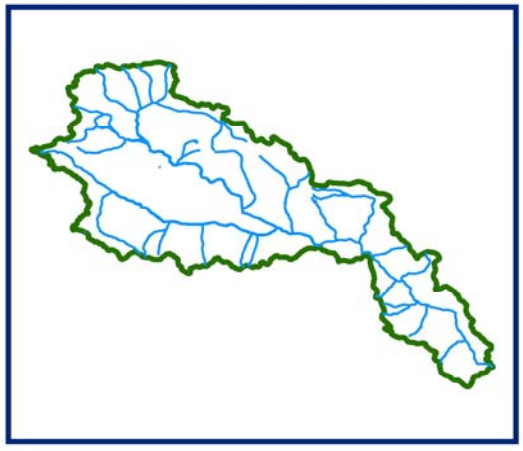
SNOW COVER MAP: **SHIGO BASIN**



05 MARCH 2011



10 MARCH 2011



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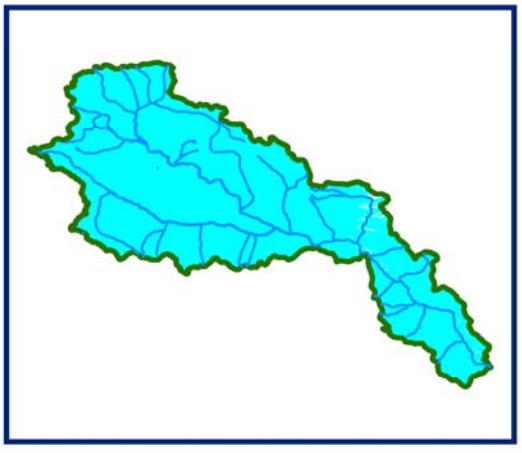
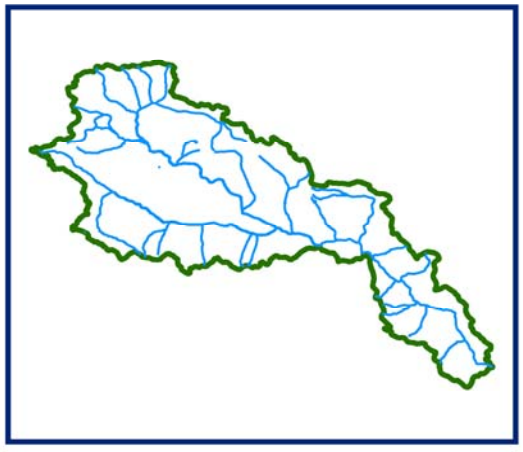
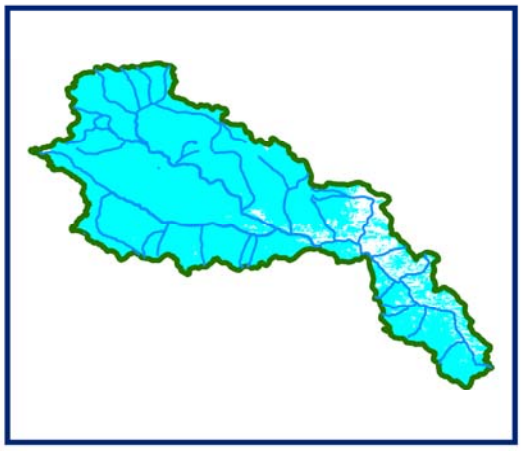


15 MARCH 2011



DATA NOT AVAILABLE



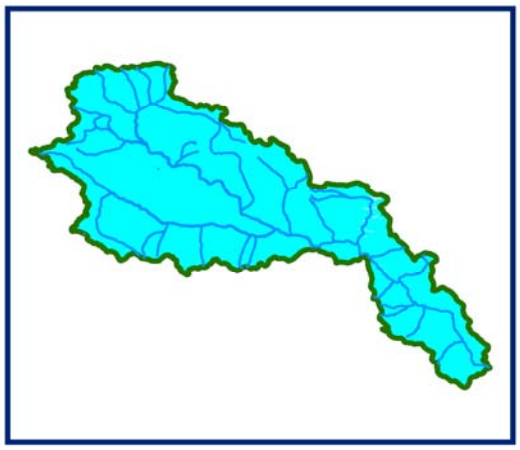
30 MARCH 2011

SNOW

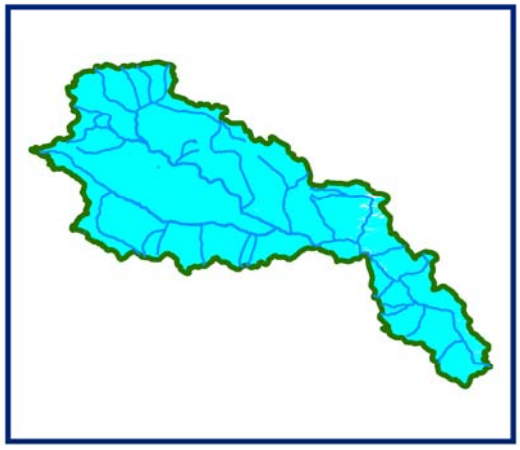
0 15 30 60 90 120

Kilometers

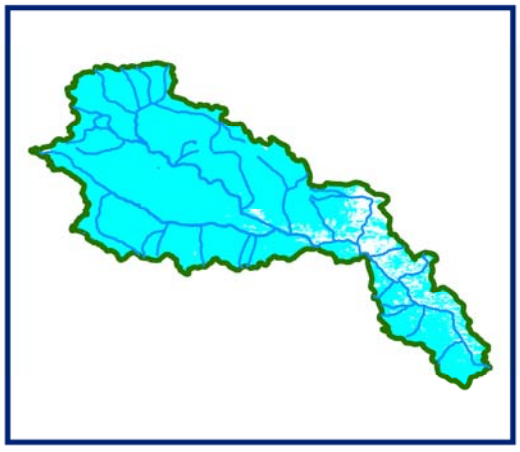
10 DAILY SNOW COVER MAP: SHIGO BASIN



DATA USED
10 MARCH 2011



DATA USED
15 MARCH 2011

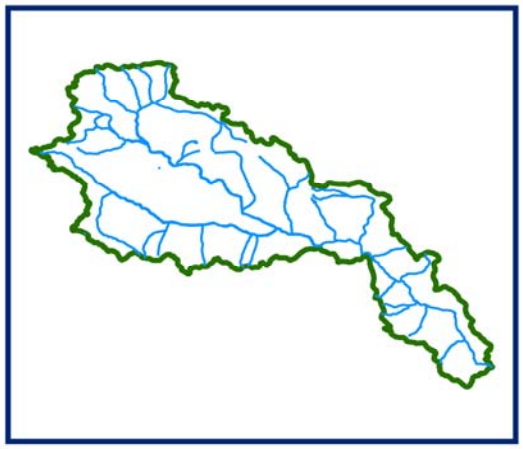


DATA USED
30 MARCH 2011

SNOW

0 15 30 60 90 120
Kilometers

SNOW COVER MAP: **SHIGO BASIN**



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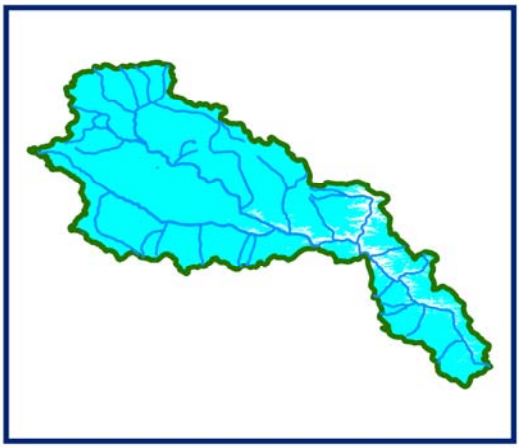
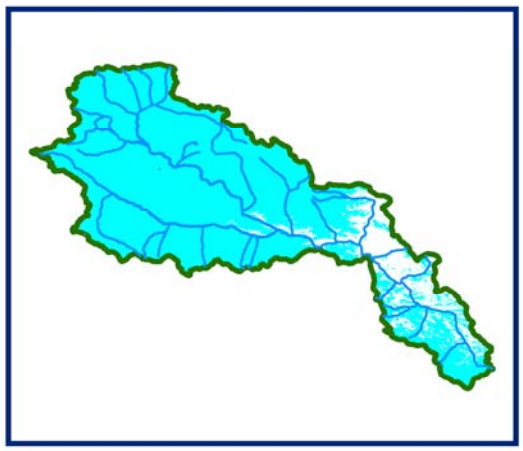
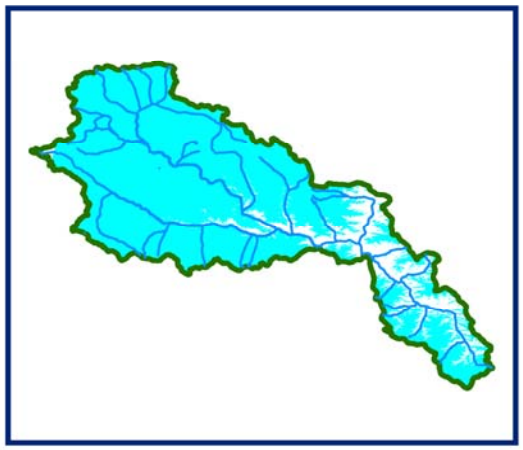


08 APRIL 2011

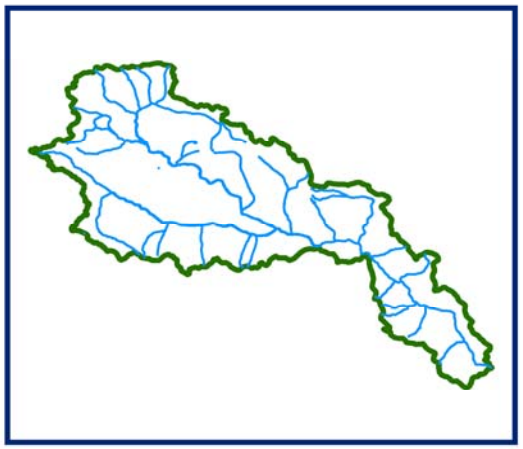


13 APRIL 2011

18 APRIL 2011



23 APRIL 2011



DATA NOT AVAILABLE

SNOW

0 15 30 60 90 120

Kilometers

10 DAILY SNOW COVER MAP: SHIGO BASIN

DATA USED
08 APRIL 2011

DATA USED
13 APRIL 2011

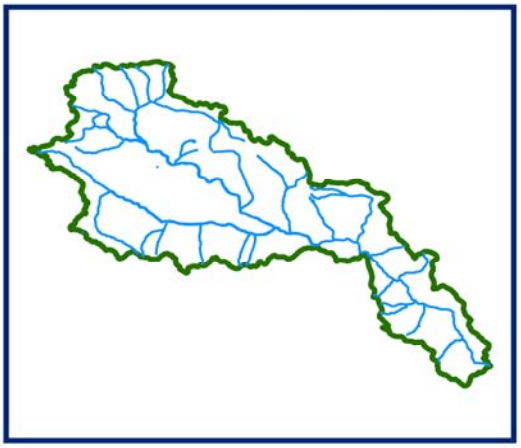
DATA USED
23 APRIL 2011

SNOW

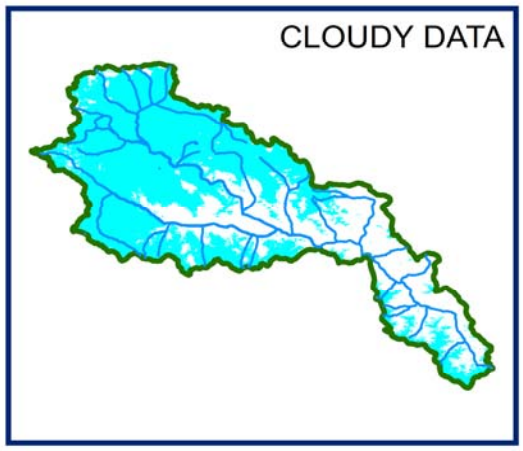
0 15 30 60 90 120
Kilometers

SNOW COVER MAP: **SHIGO BASIN**

02 MAY 2011

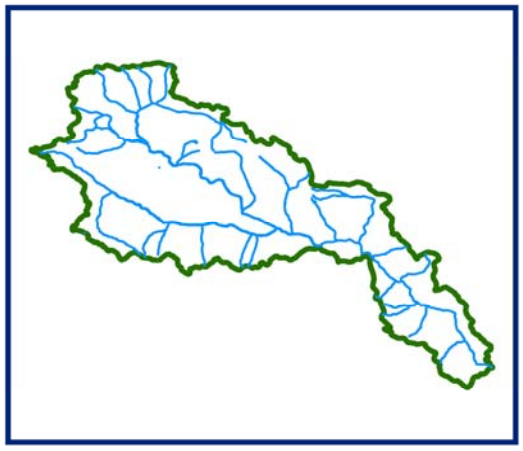


DATA NOT AVAILABLE

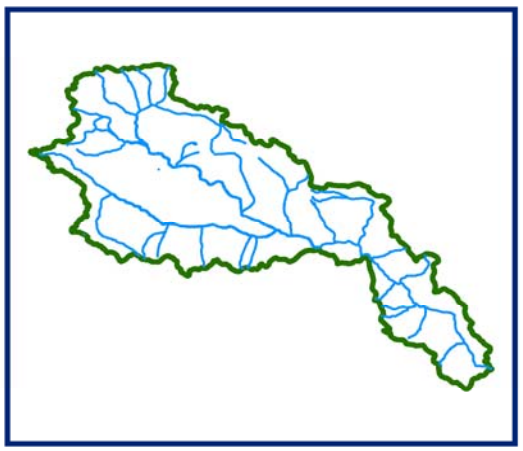


12 MAY 2011

17 MAY 2011



DATA NOT AVAILABLE



DATA NOT AVAILABLE

SNOW

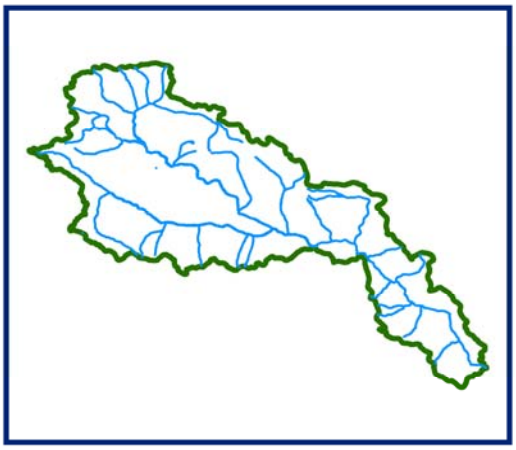
0 15 30 60 90 120

Kilometers

10 DAILY SNOW COVER MAP: SHIGO BASIN

DATA USED
02 MAY 2011

DATA USED
17 MAY 2011



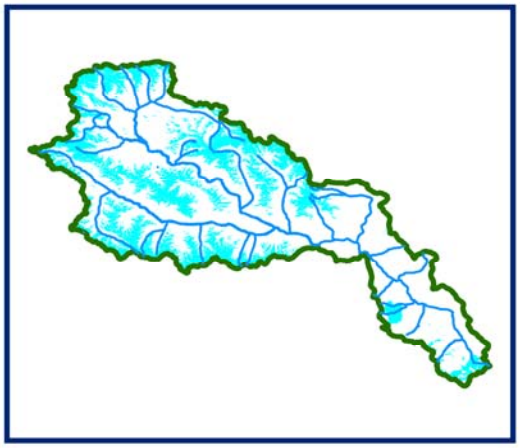
DATA USED
DATA NOT AVAILABLE

SNOW

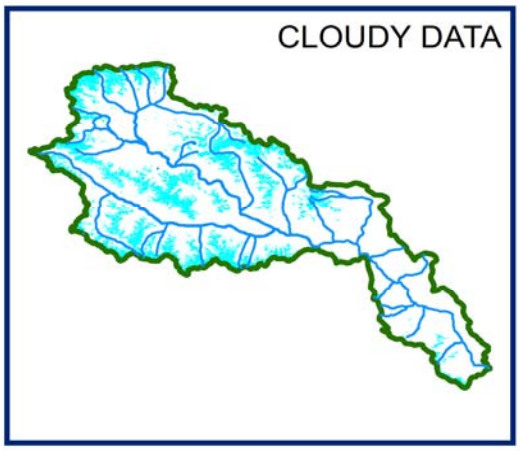
0 15 30 60 90 120
Kilometers

SNOW COVER MAP: **SHIGO BASIN**

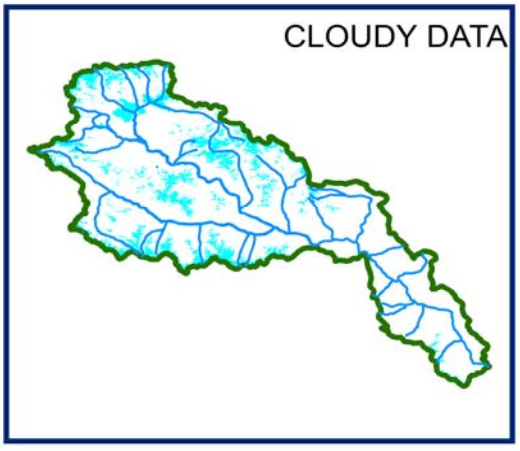
09 JUNE 2011



10 JUNE 2011



14 JUNE 2011



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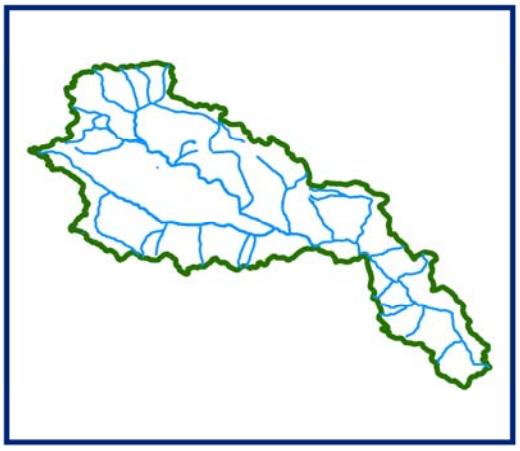

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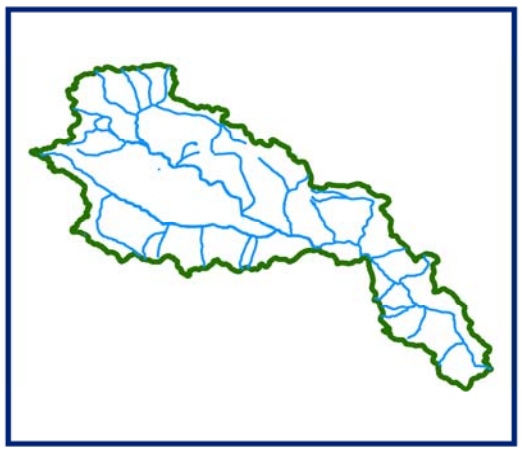


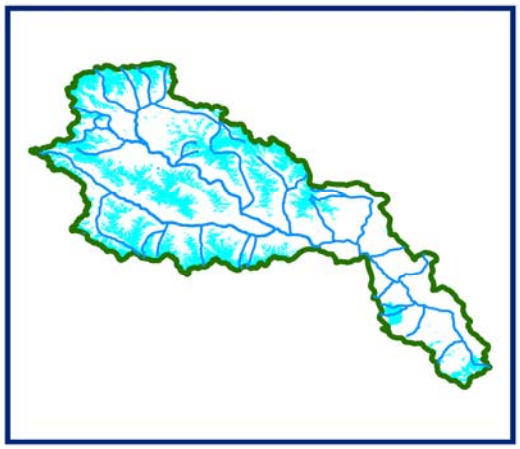
DATA NOT AVAILABLE

SNOW

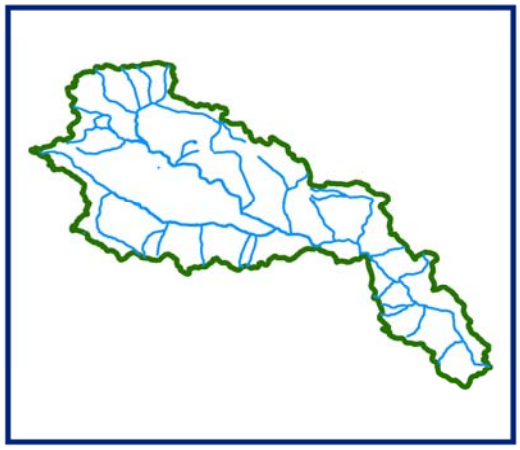
0 15 30 60 90 120

Kilometers

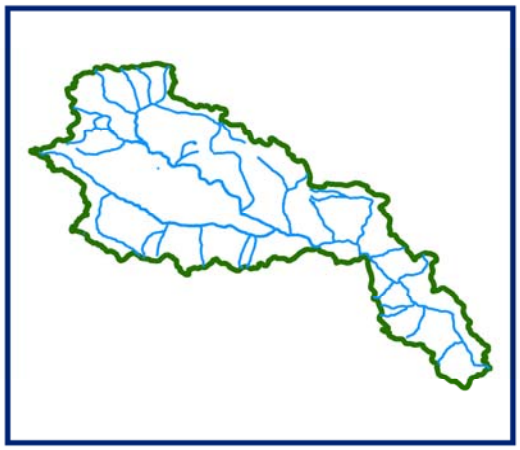
10 DAILY SNOW COVER MAP: SHIGO BASIN



DATA USED
09 JUNE 2011
10 JUNE 2011



DATA USED
DATA NOT AVAILABLE



DATA USED
DATA NOT AVAILABLE

SNOW

0 15 30 60 90 120
Kilometers

DRAS BASIN

AREAL EXTENT OF SNOW (5 DAILY)

BASIN NAME: DRASS **BASIN AREA: 1683 sq km**

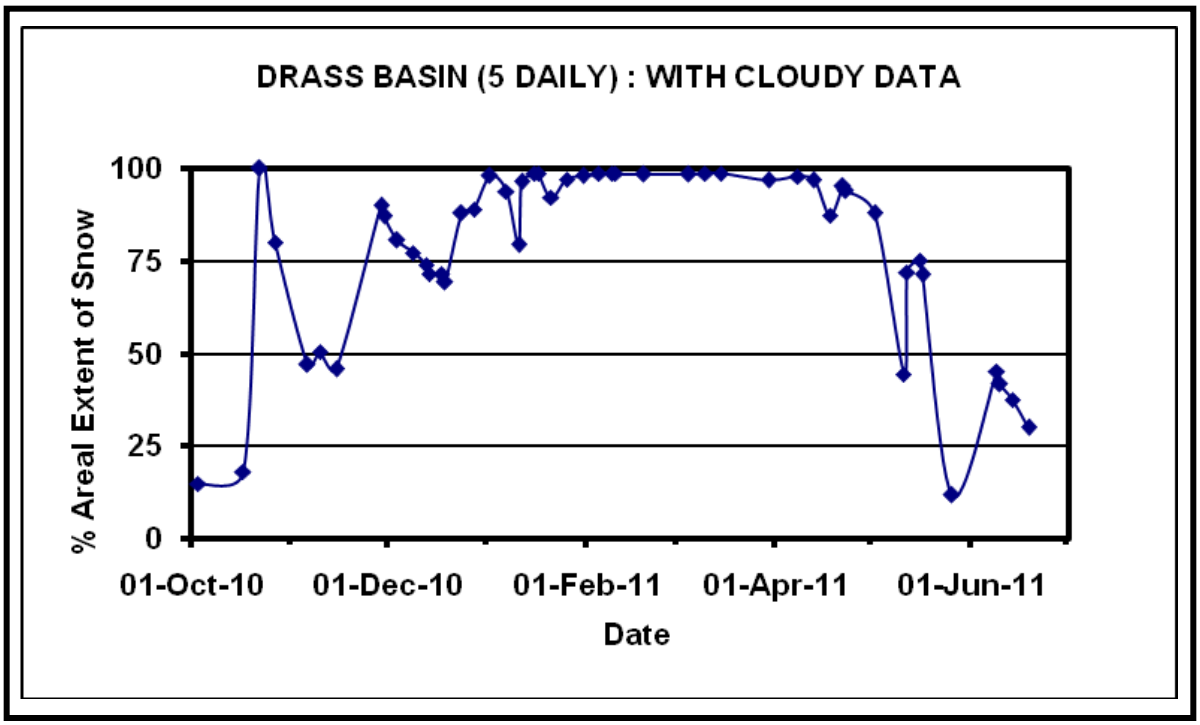
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2010							
1	03-Oct-10	246	15	3	22-Oct-10	1658	98
2	17-Oct-10	301	18	4	27-Oct-10	1344	80
November 2010							
5	06-Nov-10	789	47	8	29-Nov-10	1513	90
6	10-Nov-10	848	50	9	30-Nov-10	1463	87
7	15-Nov-10	769	46				
December 2010							
10	04-Dec-10	1354	80	14	18-Dec-10	1204	72
11	09-Dec-10	1299	77	15	19-Dec-10	1165	69
12	13-Dec-10	1244	74	16	24-Dec-10	1479	88
13	14- Dec-10	1200	71	17	28-Dec-10	1496	89
January 2011							
1	2-Jan-11	1649	98	6	17-Jan-11	1658	99
2	7-Jan-11	1576	94	7	21-Jan-11	1548	92
3	11-Jan-11	1336	79	8	26-Jan-11	1632	97
4	12-Jan-11	1621	96	9	31-Jan-11	1649	98
5	16-Jan-11	1657	98				
February 2011							
10	5-Feb-11	1657	98	12	10-Feb-11	1657	98
11	9-Feb-11	1658	99	13	19-Feb-11	1654	98
March 2011							
14	5-Mar-11	1654	98	16	15-Mar-11	1658	99
15	10-Mar-11	1658	99	17	30-Mar-11	1629	97
April 2011							
1	8-Apr-11	1644	98	3	18-Apr-11	1470	87
2	13-Apr-11	1627	97	4	22-Apr-11	1600	95
				5	23-Apr-11	1581	94
May 2011							
1	2-May-11	1478	88	4	16-May-11	1262	75
2	11-May-11	744	44	5	17-May-11	1198	71
3	12-May-11	1211	72	6	26-May-11	197	12

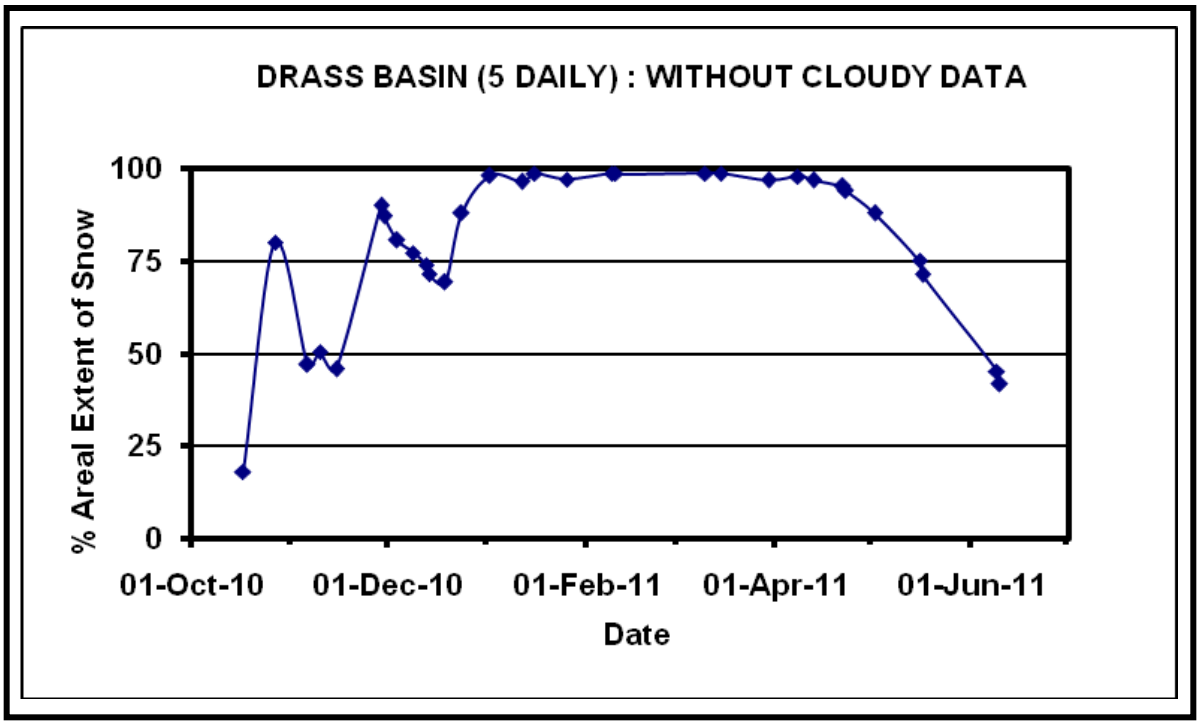
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
June 2011							
1	9-Jun-11	758	45	3	14-Jun-11	631	38
2	10-Jun-11	702	42	4	19-Jun-11	503	30

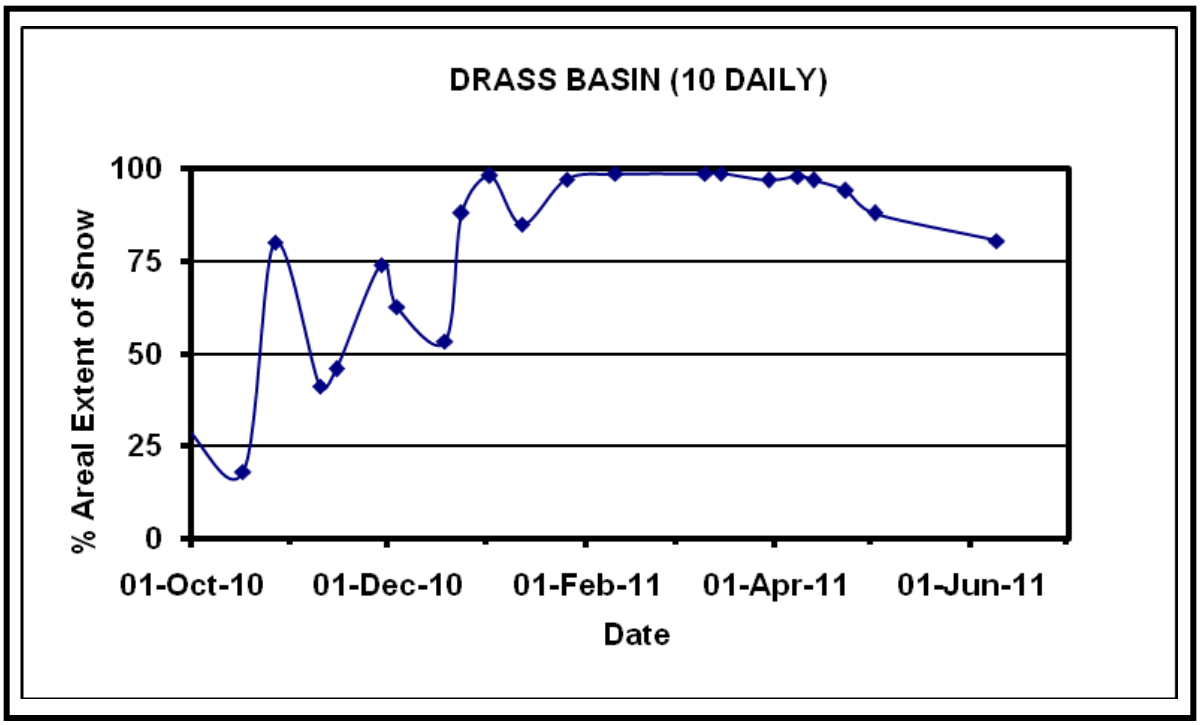
AREAL EXTENT OF SNOW (10 DAILY)

BASIN NAME: DRASS **BASIN AREA: 1683 sq. km**

S. No	Date	Snow cover (sq. km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	2-Oct-10	328	19				
2	17-Oct-10	301	18				
3	27-Oct-10	1344	80				
November 2010							
4	10-Nov-10	691	41				
5	15-Nov-10	769	46				
6	29-Nov-10	1243	74				
December 2010							
7	4-Dec-10	1050	62				
8	19-Dec-10	894	53				
9	24-Dec-10	1479	88				
January 2011							
1	2-Jan-11	1649	98	3	26-Jan-11	1632	97
2	12-Jan-11	1428	85				
February 2011							
4	10-Feb-11	1657	98				
March 2011							
5	10-Mar-11	1658	99	7	30-Mar-11	1629	97
6	15-Mar-11	1658	99				
April 2011							
1	8-Apr-11	1644	98				
2	13-Apr-11	1627	97				
3	23-Apr-11	1581	94				
May 2011							
1	2-May-11	1478	88				
June 2011							
1	9-June-11	1351	80				

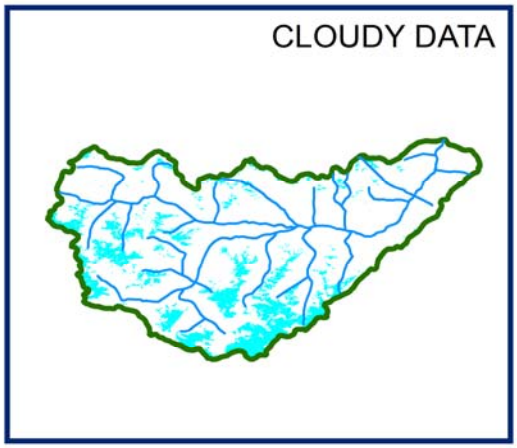

DRASS BASIN (5 DAILY) : WITH CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


DRASS BASIN (5 DAILY) : WITHOUT CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

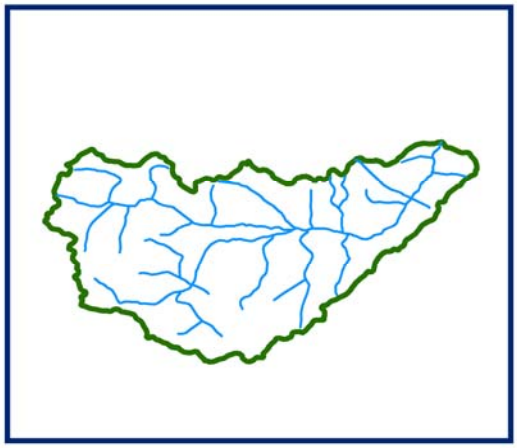

DRASS BASIN (10 DAILY)
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

SNOW COVER MAP

SNOW COVER MAP: **DRASS BASIN**



03 OCTOBER 2010



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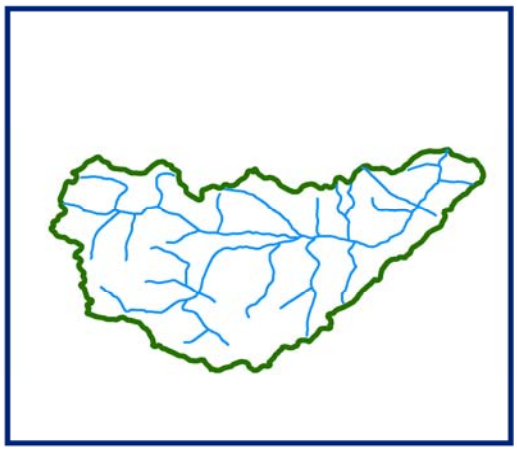
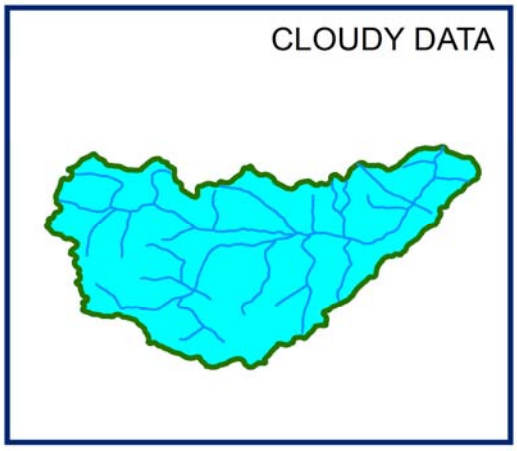
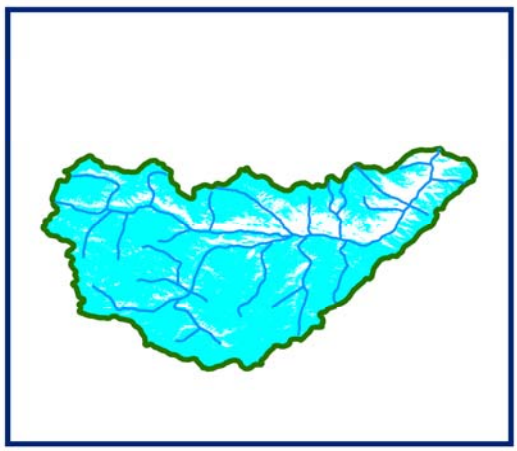


DATA NOT AVAILABLE

17 OCTOBER 2010



22 OCTOBER 2010



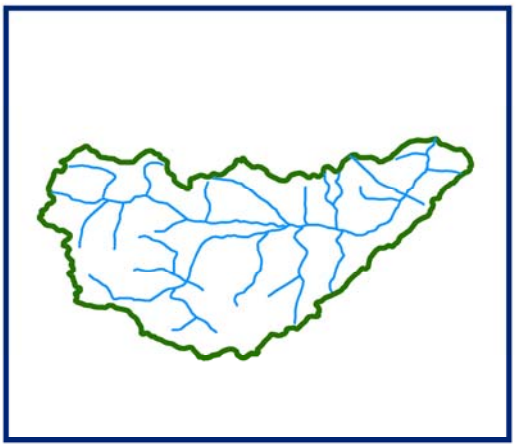
27 OCTOBER 2010

SNOW

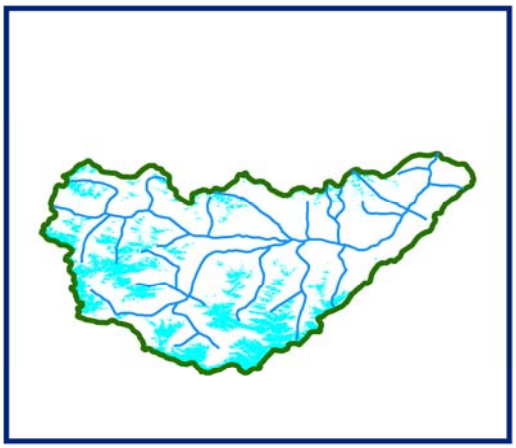
0 10 20 40 60 80

Kilometers

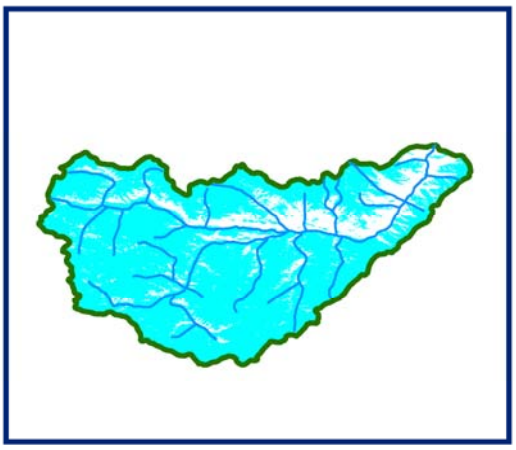
10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
DATA NOT AVAILABLE



DATA USED
17 OCTOBER 2010

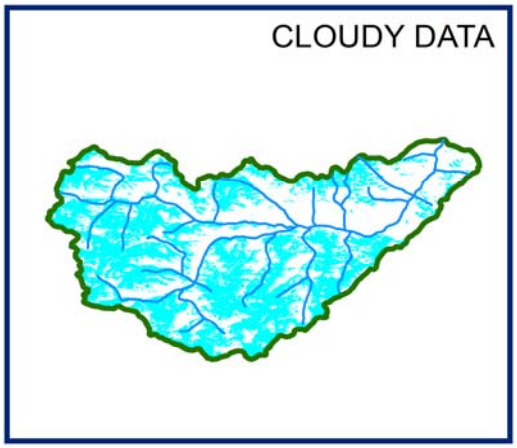


DATA USED
27 OCTOBER 2010

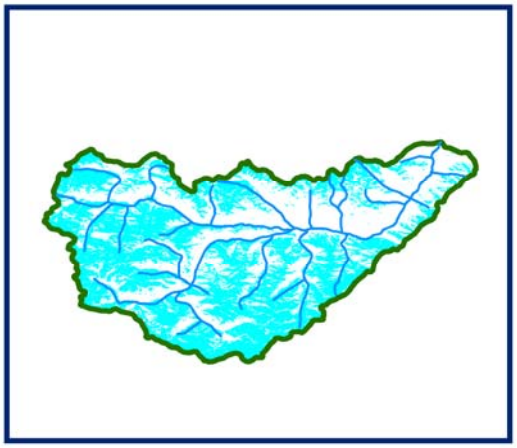
SNOW

0 12.5 25 50 75 100
Kilometers

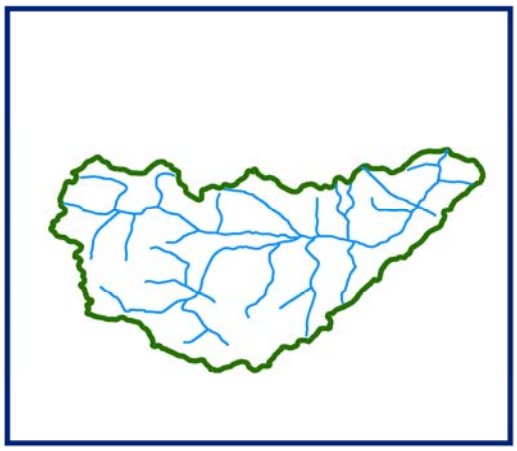
SNOW COVER MAP: **DRASS BASIN**



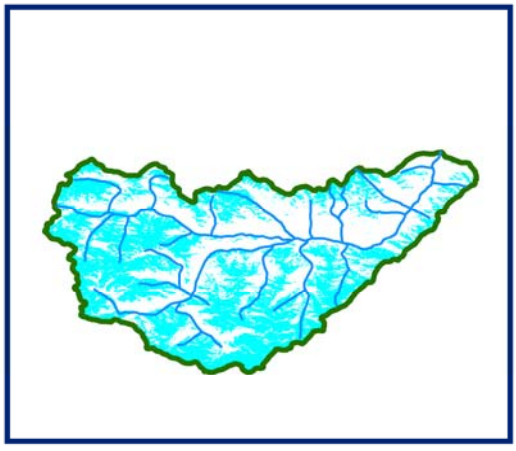
06 NOVEMBER 2010



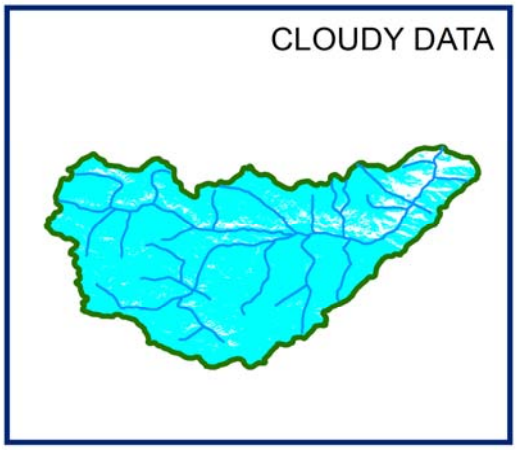
10 NOVEMBER 2010



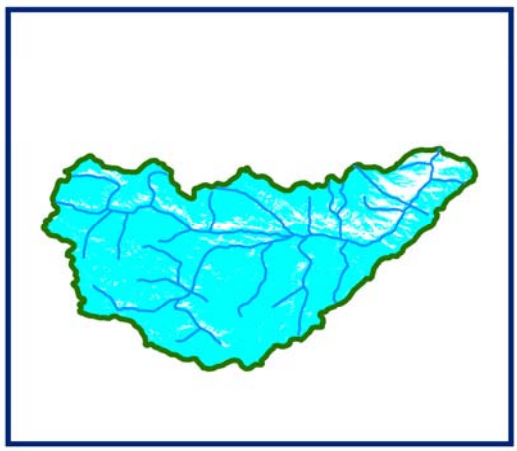
DATA NOT AVAILABLE



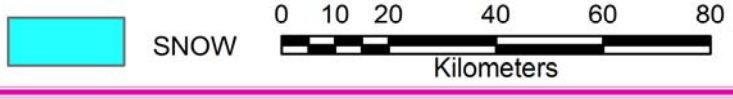
15 NOVEMBER 2010



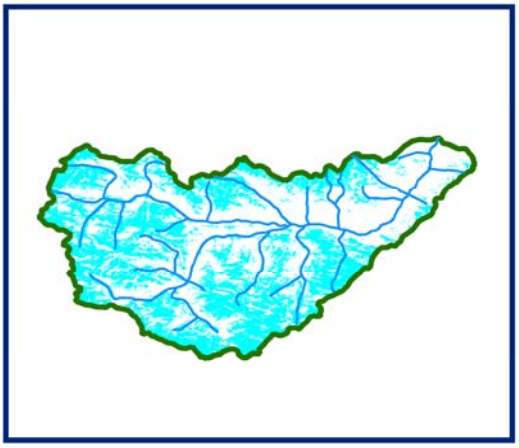
29 NOVEMBER 2010



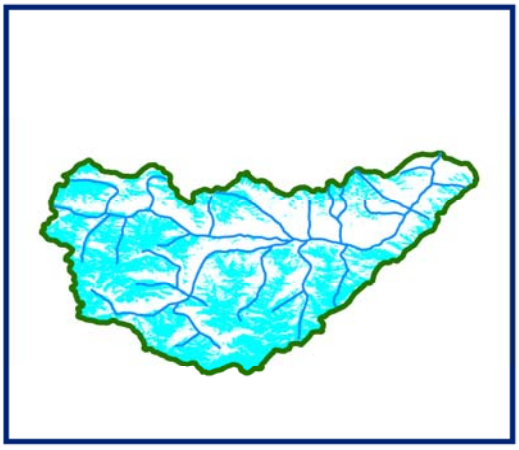
30 NOVEMBER 2010



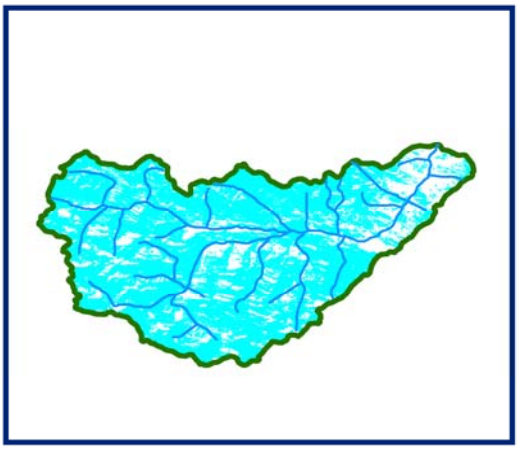
10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
06 NOVEMBER 2010
10 NOVEMBER 2010



DATA USED
15 NOVEMBER 2010

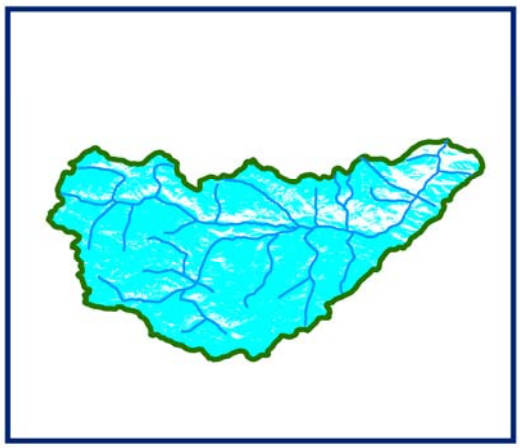


DATA USED
29 NOVEMBER 2010
30 NOVEMBER 2010

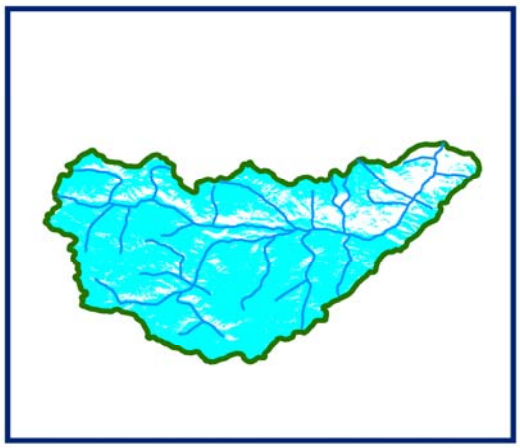
SNOW

0 12.5 25 50 75 100
Kilometers

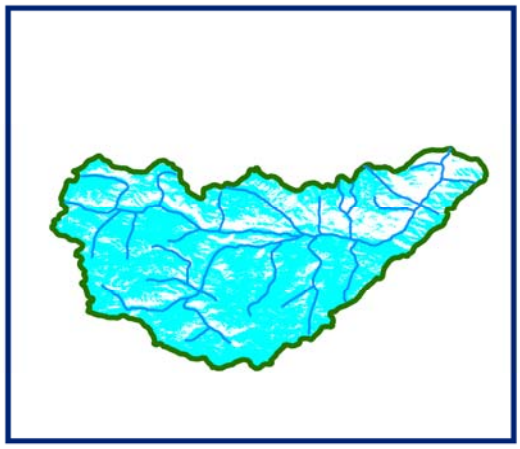
SNOW COVER MAP: **DRASS BASIN**



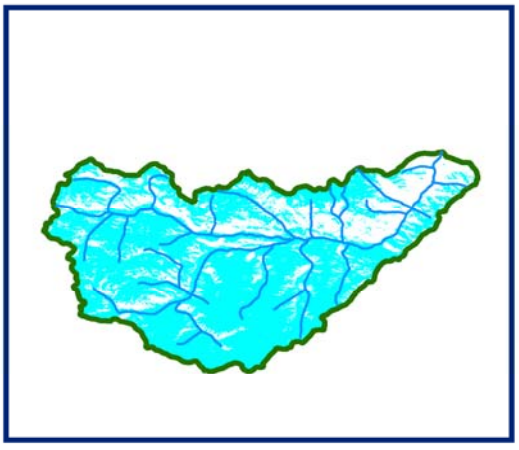
04 DECEMBER 2010



09 DECEMBER 2010

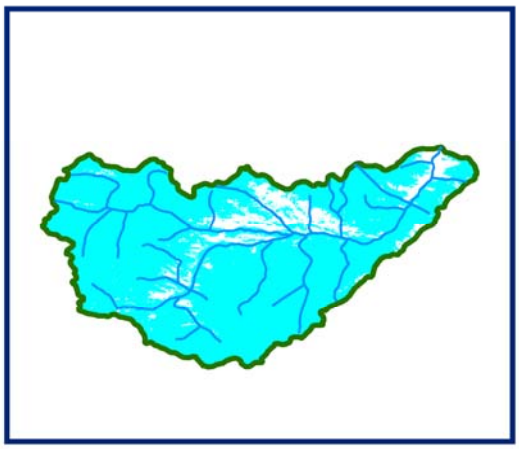


14 DECEMBER 2010



19 DECEMBER 2010

DATA NOT AVAILABLE



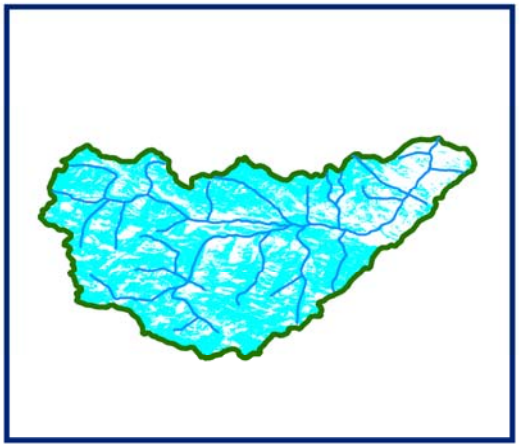
24 DECEMBER 2010

SNOW

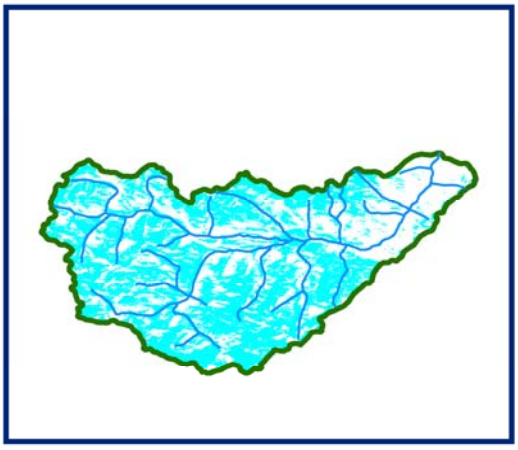
0 10 20 40 60 80

Kilometers

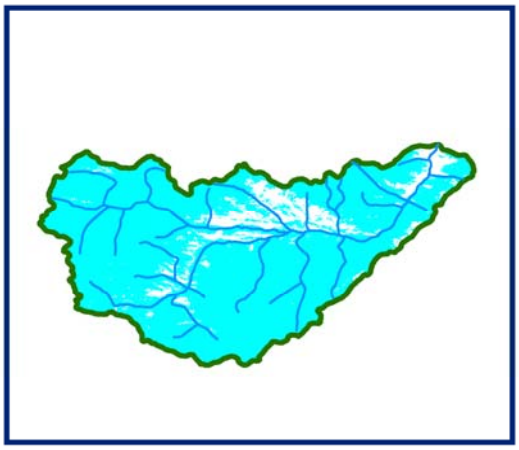
10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
04 DECEMBER 2010
09 DECEMBER 2010



DATA USED
14 DECEMBER 2010
19 DECEMBER 2010



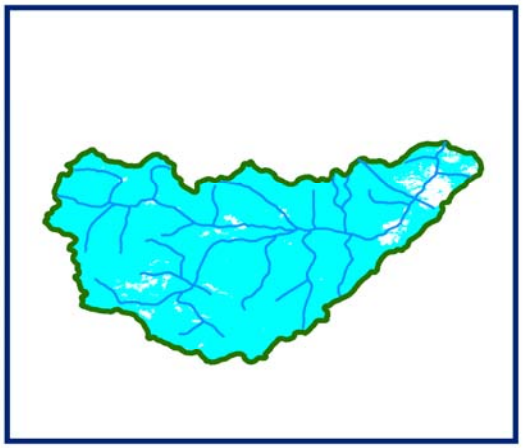
DATA USED
24 DECEMBER 2010

SNOW

0 12.5 25 50 75 100
Kilometers

SNOW COVER MAP: **DRASS BASIN**

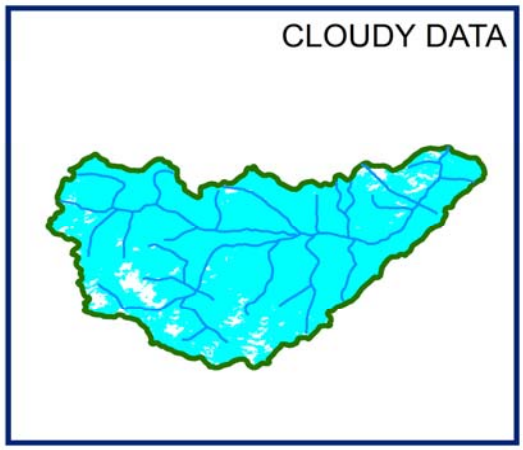
02 JANUARY 2011



07 JANUARY 2011

12 JANUARY 2011

16 JANUARY 2011



21 JANUARY 2011

26 JANUARY 2011

SNOW

0 10 20 40 60 80

Kilometers

10 DAILY SNOW COVER MAP: DRASS BASIN

DATA USED
02 JANUARY 2011

DATA USED
12 JANUARY 2011
16 JANUARY 2011

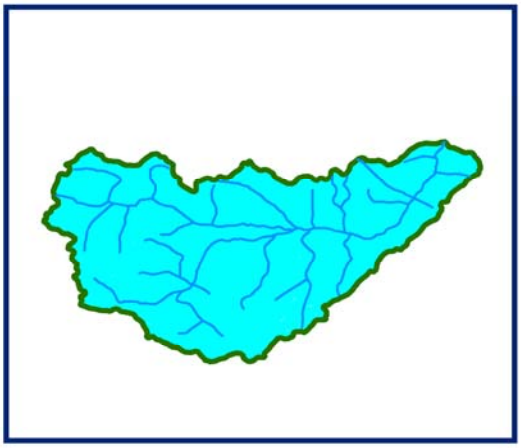
DATA USED
26 JANUARY 2011

SNOW

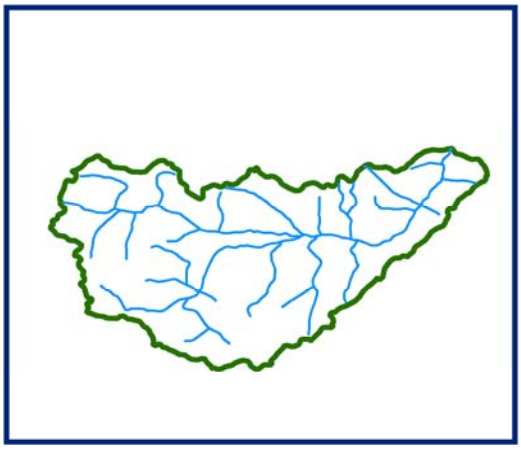
0 12.5 25 50 75 100
Kilometers

SNOW COVER MAP: **DRASS BASIN**

09 FEBRUARY 2011



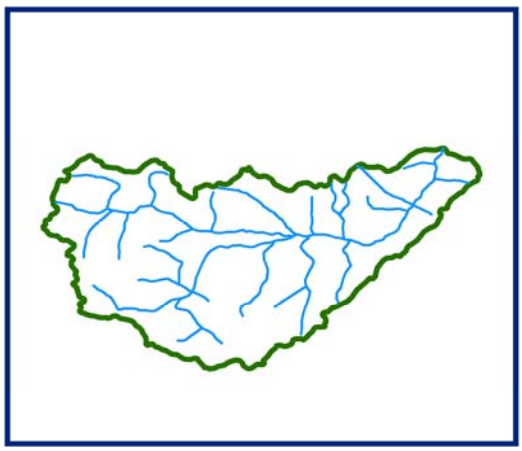
10 FEBRUARY 2011



DATA NOT AVAILABLE

19 FEBRUARY 2011

DATA NOT AVAILABLE



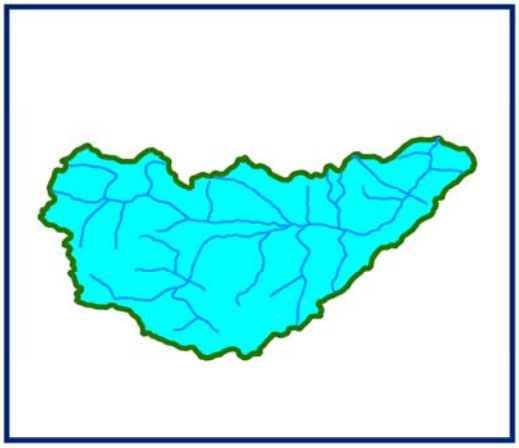
DATA NOT AVAILABLE

SNOW

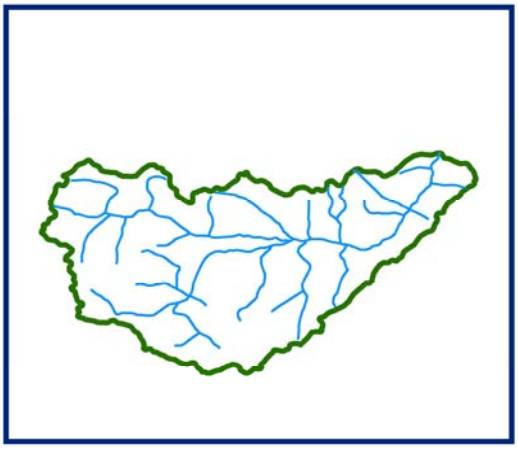
0 10 20 40 60 80

Kilometers

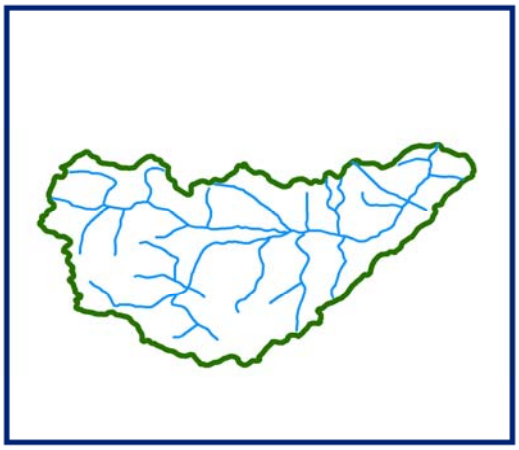
10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
09 FEBRUARY 2011
10 FEBRUARY 2011



DATA USED
DATA NOT AVAILABLE

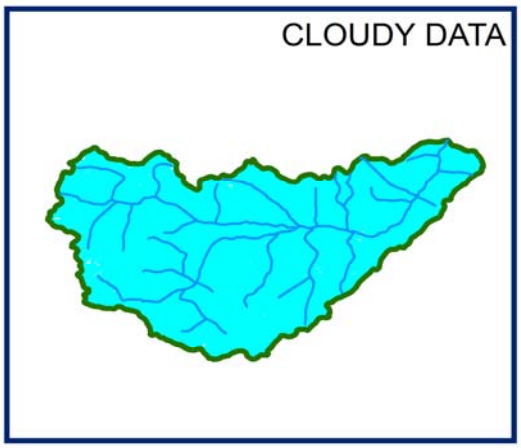


DATA USED
DATA NOT AVAILABLE

SNOW

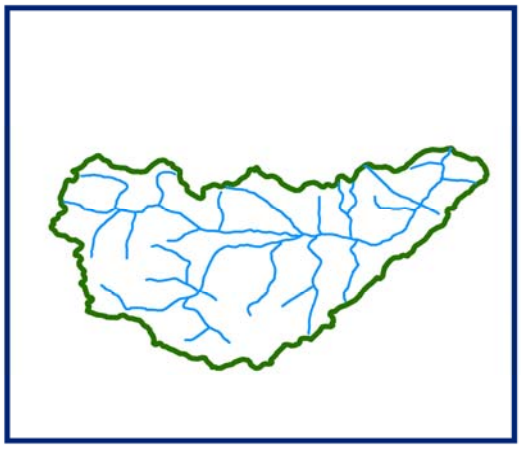
0 12.5 25 50 75 100
Kilometers

SNOW COVER MAP: **DRASS BASIN**



05 MARCH 2011

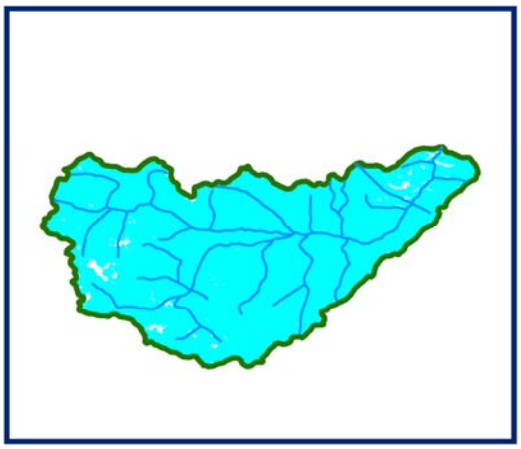
10 MARCH 2011



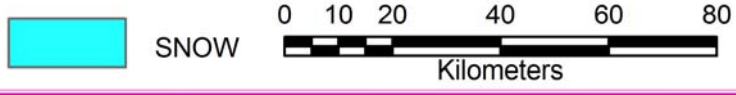
DATA NOT AVAILABLE

15 MARCH 2011

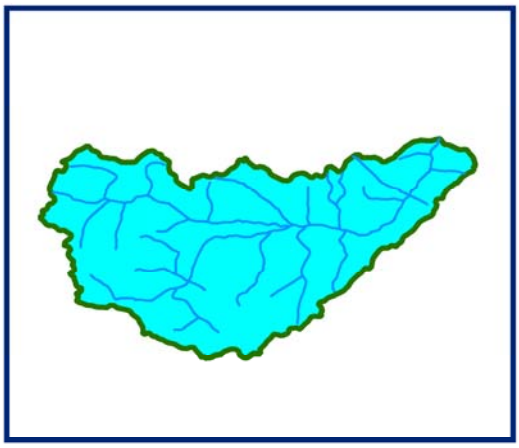
DATA NOT AVAILABLE



30 MARCH 2011



10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
10 MARCH 2011

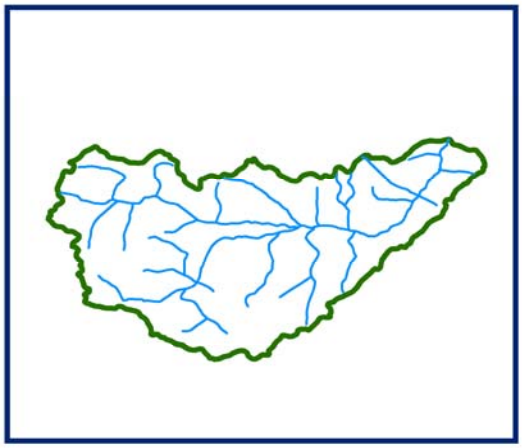
DATA USED
15 MARCH 2011

DATA USED
30 MARCH 2011

SNOW

0 12.5 25 50 75 100
Kilometers

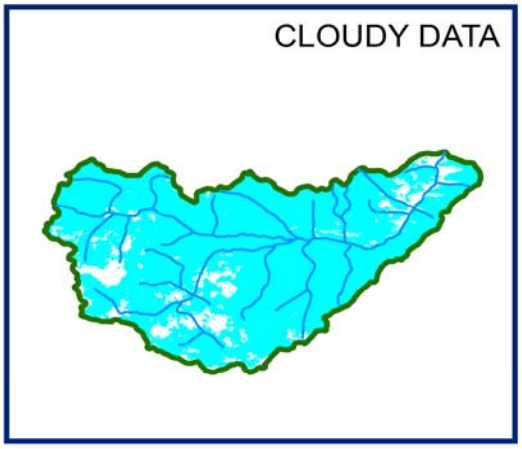
SNOW COVER MAP: **DRASS BASIN**



DATA NOT AVAILABLE

08 APRIL 2011

13 APRIL 2011



18 APRIL 2011

22 APRIL 2011

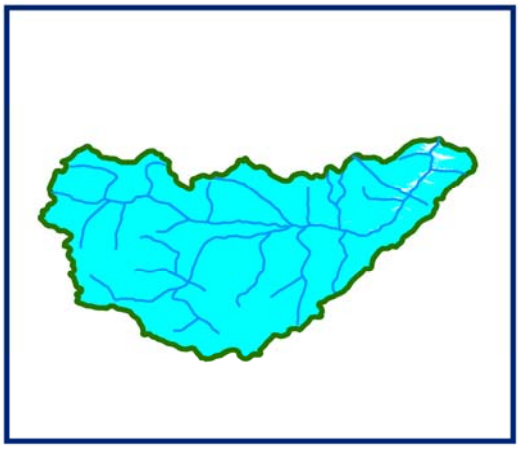
23 APRIL 2011

SNOW

0 10 20 40 60 80

Kilometers

10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
08 APRIL 2011

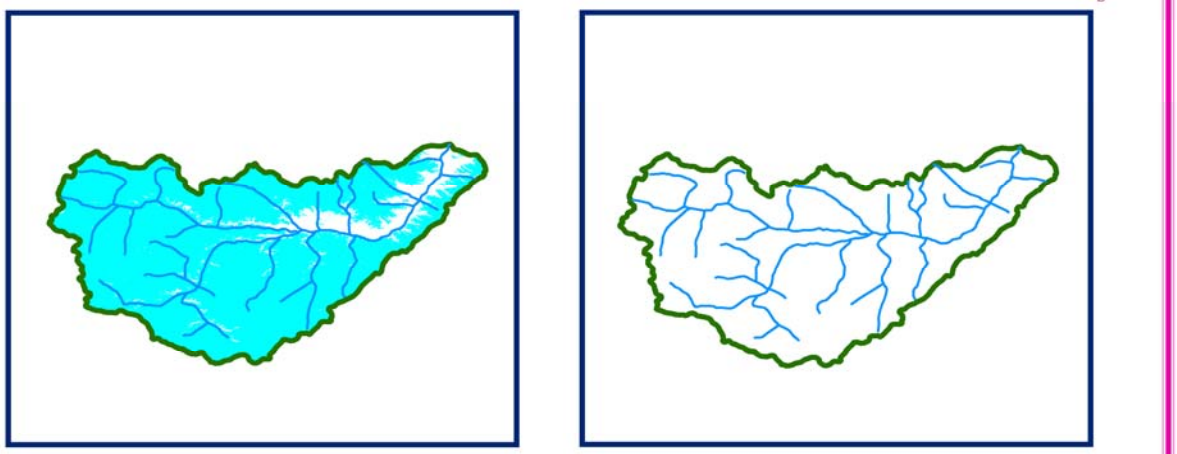
DATA USED
13 APRIL 2011

DATA USED
22 APRIL 2011
23 APRIL 2011

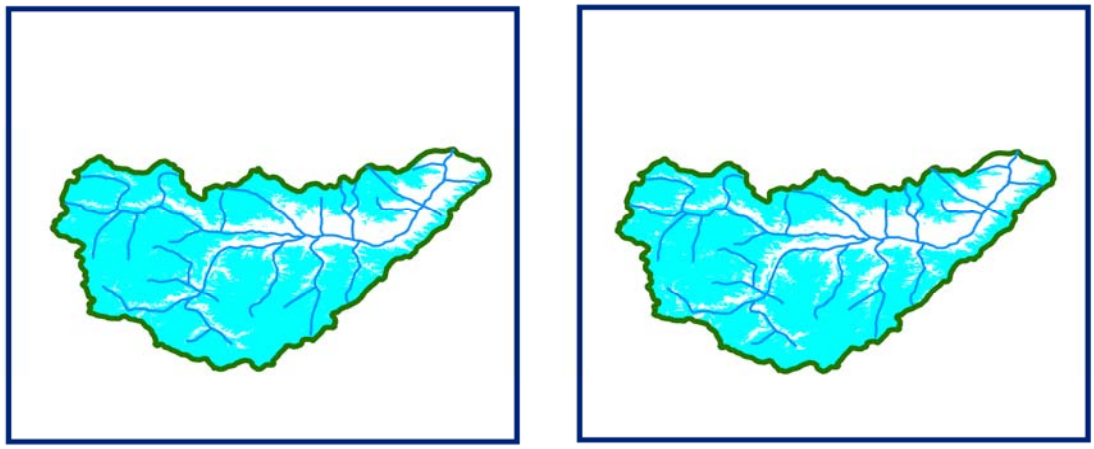
SNOW

0 12.5 25 50 75 100
Kilometers

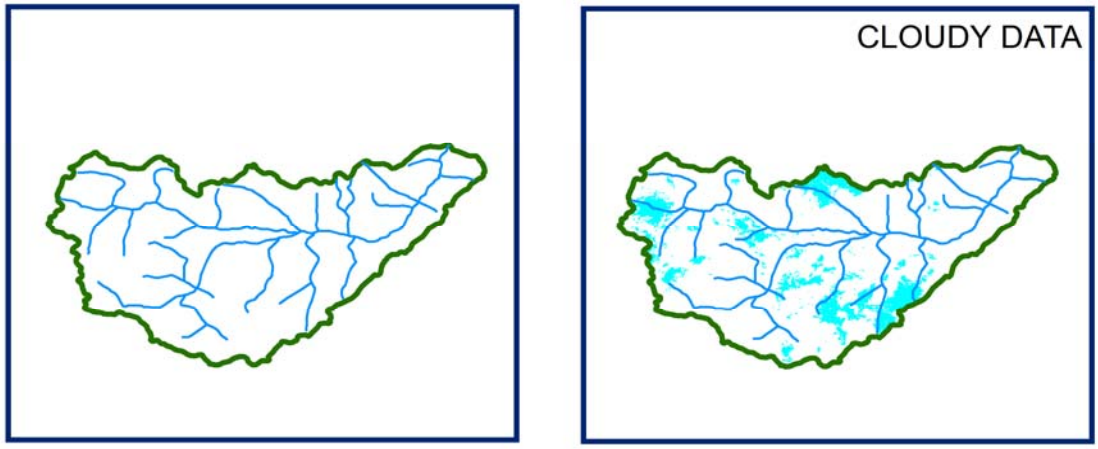
SNOW COVER MAP: **DRASS BASIN**



02 MAY 2011 DATA NOT AVAILABLE



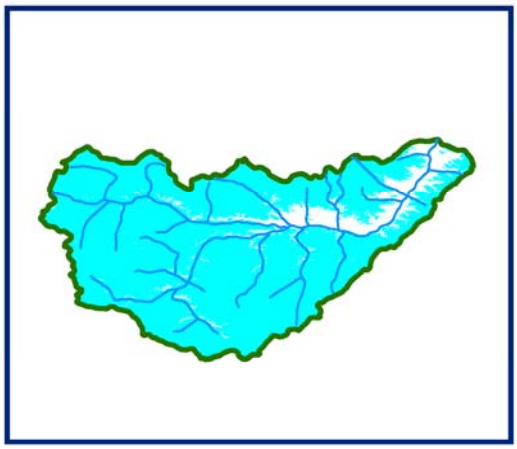
16 MAY 2011 17 MAY 2011



DATA NOT AVAILABLE 26 MAY 2011

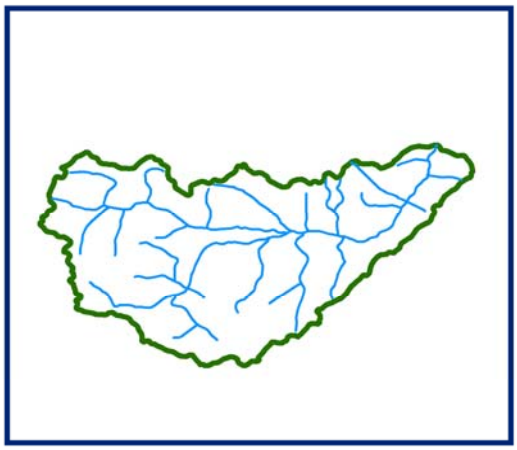
SNOW 0 10 20 40 60 80 Kilometers

10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
02 MAY 2011

DATA USED
DATA NOT AVAILABLE

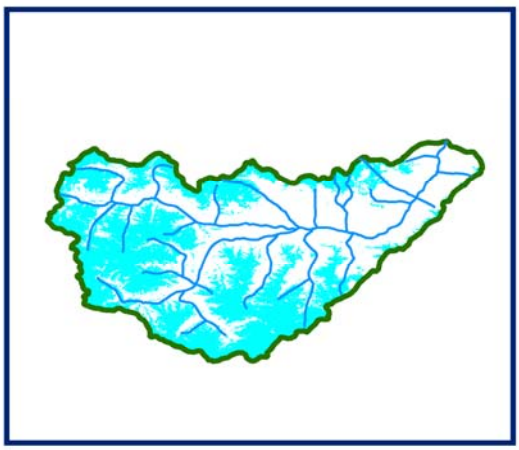


DATA USED
DATA NOT AVAILABLE

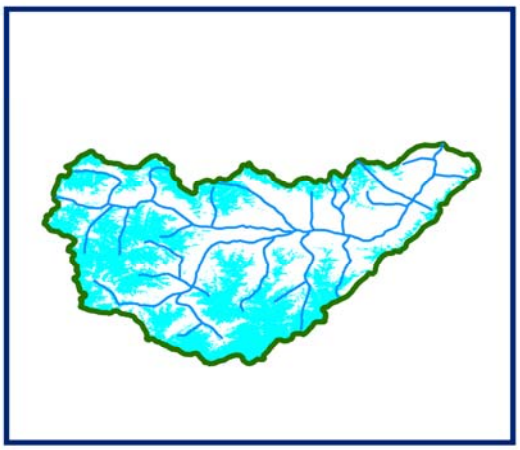
SNOW

0 12.5 25 50 75 100
Kilometers

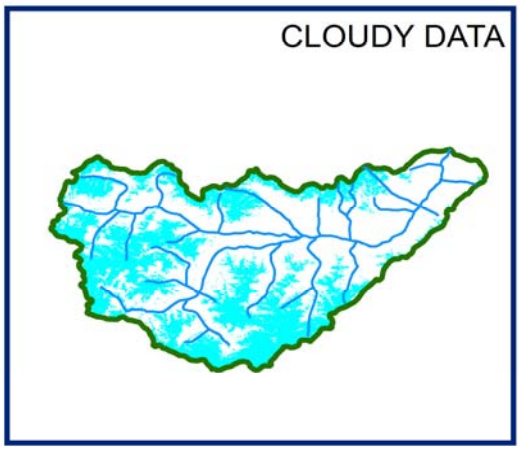
SNOW COVER MAP: **DRASS BASIN**



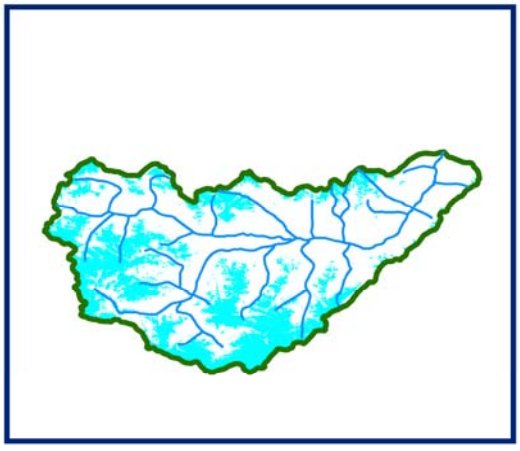
09 JUNE 2011



10 JUNE 2011

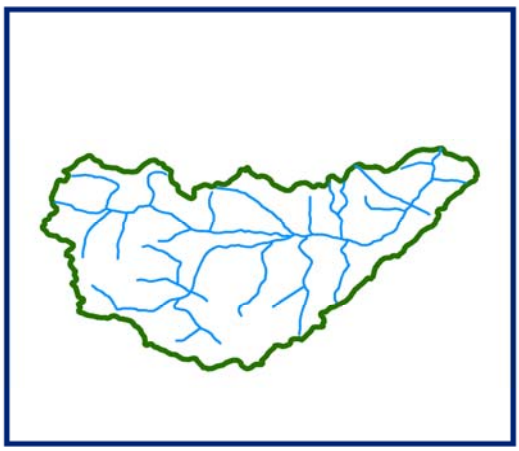


14 JUNE 2011



19 JUNE 2011

DATA NOT AVAILABLE



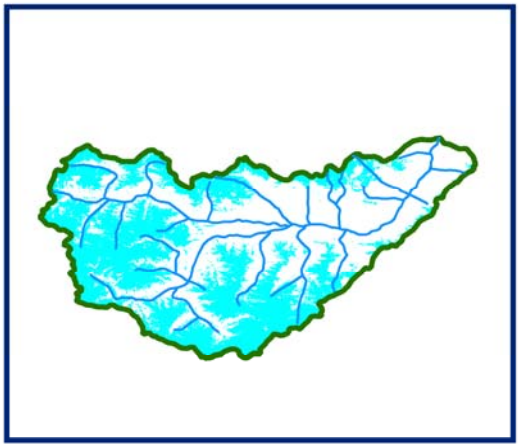
DATA NOT AVAILABLE

SNOW

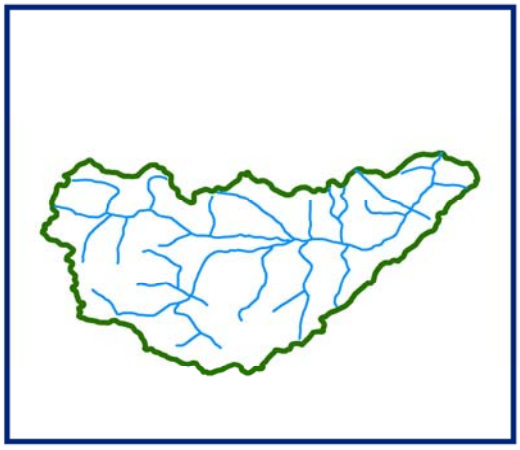
0 10 20 40 60 80

Kilometers

10 DAILY SNOW COVER MAP: DRASS BASIN



DATA USED
09 JUNE 2011
10 JUNE 2011



DATA USED
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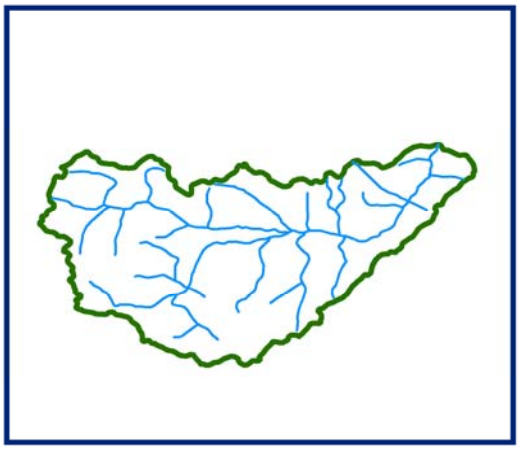


DATA USED
DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100
Kilometers

SURU BASIN

AREAL EXTENT OF SNOW (5 DAILY)

BASIN NAME: SURU **BASIN AREA: 3575 sq km**

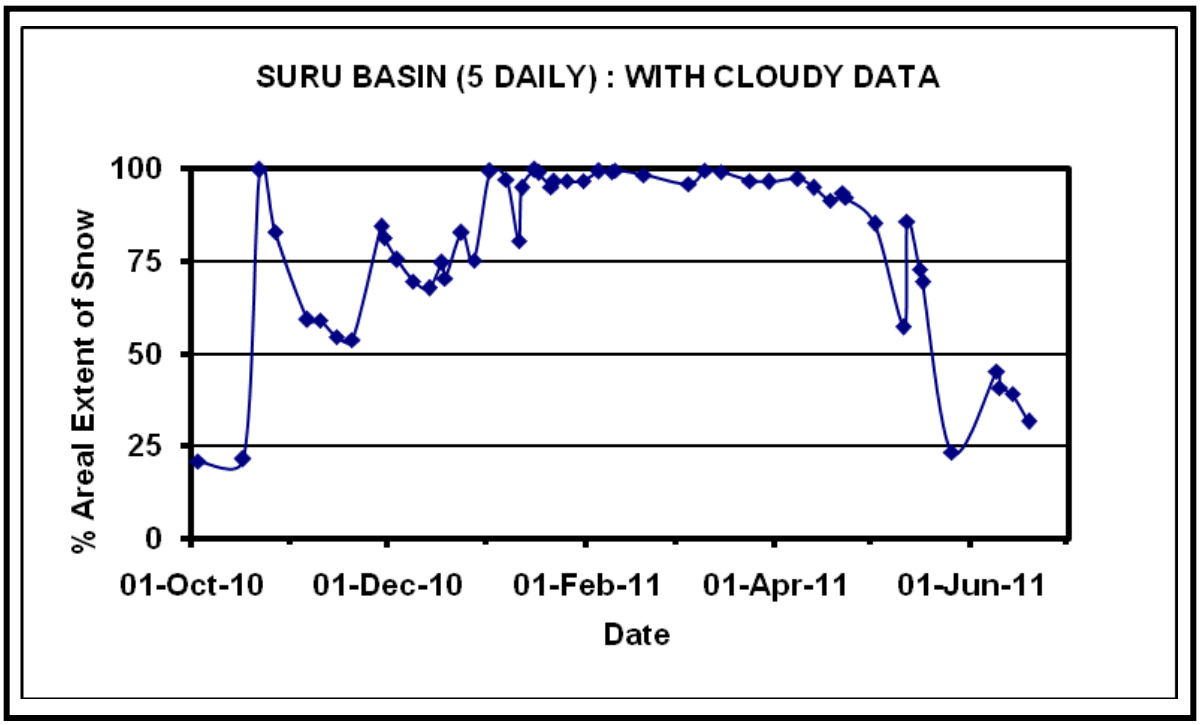
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2010							
1	03-Oct-10	747	21	3	22-Oct-10	3563	100
2	17-Oct-10	768	21	4	27-Oct-10	2958	83
November 2010							
5	06-Nov-10	2114	59	8	20-Nov-10	1914	54
6	10-Nov-10	2102	59	9	29-Nov-10	3009	84
7	15-Nov-10	1943	54	10	30-Nov-10	2902	81
December 2010							
11	04-Dec-10	2689	75	15	19-Dec-10	2508	70
12	09-Dec-10	2482	69	16	24-Dec-10	2949	83
13	14-Dec-10	2419	68	17	28-Dec-10	2681	75
14	18-Dec-10	2660	74				
January 2011							
1	02-jan-11	3543	99	6	17-jan-11	3531	99
2	07-jan-11	3465	97	7	21-jan-11	3391	95
3	11-Jan-11	2871	80	8	22-Jan-11	3446	96
4	12-jan-11	3387	95	9	26-Jan-11	3449	96
5	16-jan-11	3559	100	10	31-Jan-11	3449	96
February 2011							
11	5-Feb-11	3547	99	13	10-Feb-11	3551	99
12	9-Feb-11	3537	99	14	19-Feb-11	3507	98
March 2011							
15	5-Mar-11	3426	96	18	24-Mar-11	3450	97
16	10-Mar-11	3555	99	19	30-Mar-11	3445	96
17	15-Mar-11	3539	99				
April 2011							
1	8-Apr-11	3475	97	4	22-Apr-11	3331	93
2	13-Apr-11	3384	95	5	23-Apr-11	3288	92
3	18-Apr-11	3262	91				
May 2011							
1	2-May-11	3038	85	5	17-May-11	2474	69
2	11-May-11	2041	57	6	26-May-11	827	23
3	12-May-11	3064	86				
4	16-May-11	2599	73				

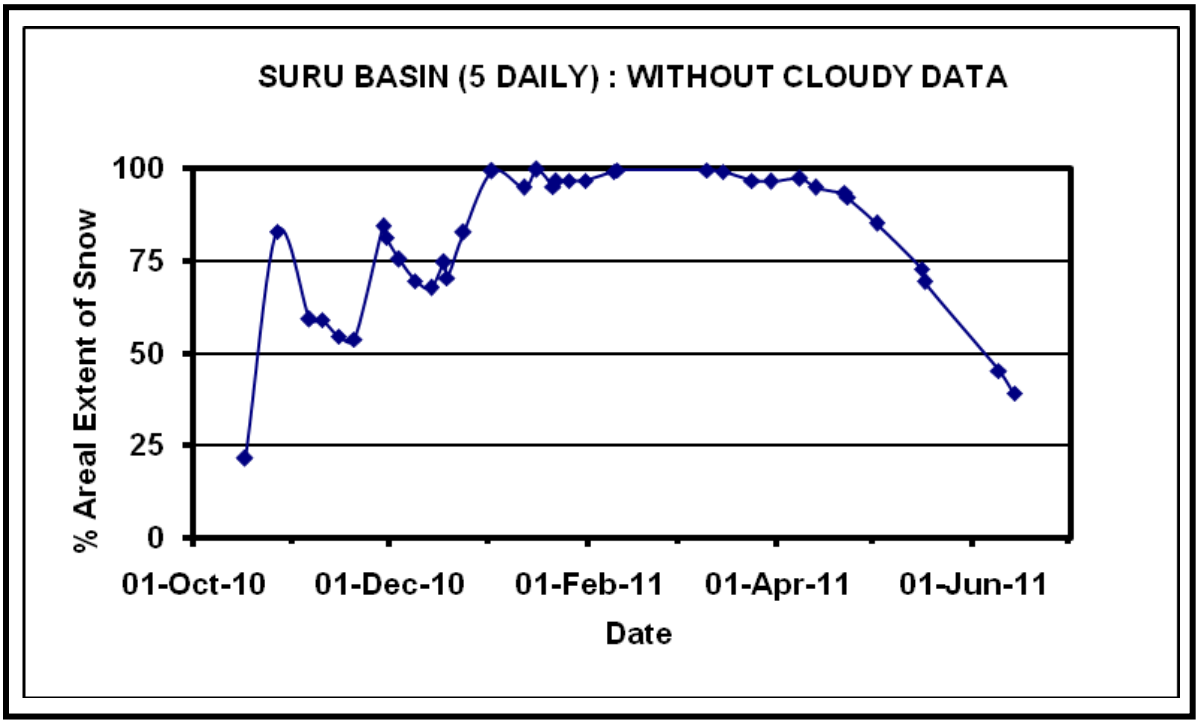
June 2011							
1	9-Jun-11	1612	45				
2	10-Jun-11	1454	41				
3	14-Jun-11	1391	39				
4	19-Jun-11	1129	32				

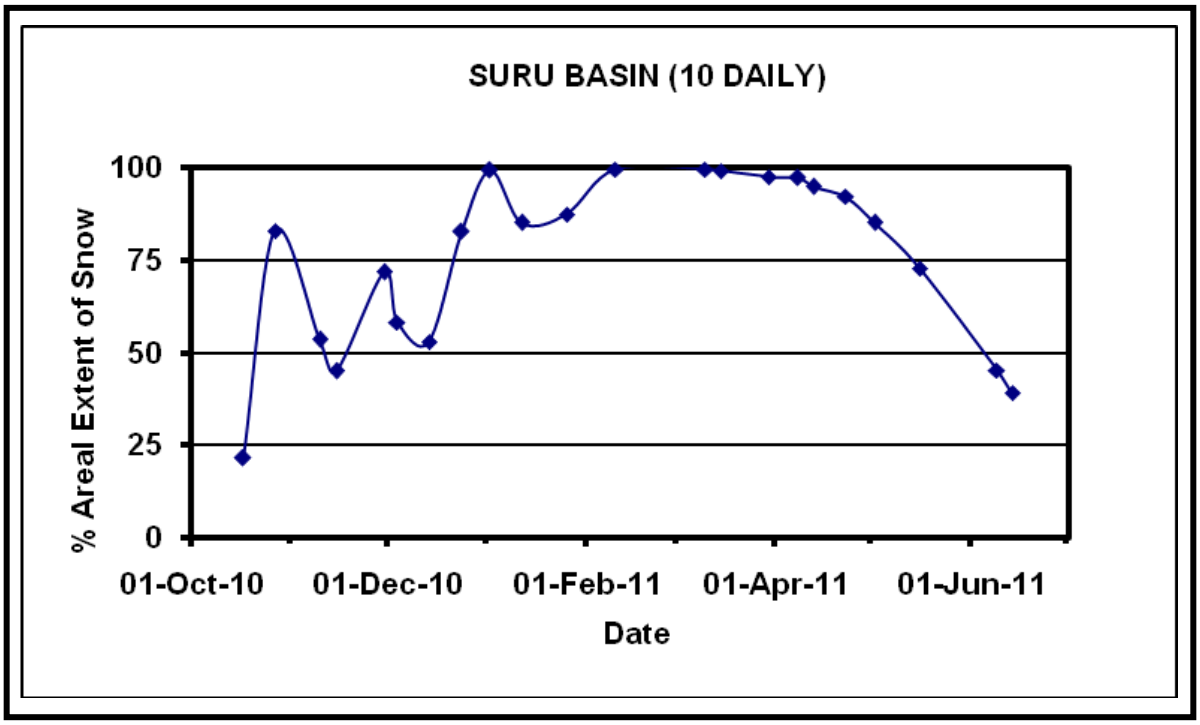
AREAL EXTENT OF SNOW (10 DAILY)

BASIN NAME: SURU **BASIN AREA: 3575 sq. km**

S. No	Date	Snow cover (sq. km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	17-Oct-10	768	21				
2	27-Oct-10	2958	83				
November 2010							
3	10-Nov-10	1908	53				
4	15-Nov-10	1608	45				
5	30-Nov-10	2558	72				
December 2010							
6	4-Dec-10	2078	58				
7	14-Dec-10	1888	53				
8	24-Dec-10	2949	83				
January 2011							
1	02-jan-11	3543	99				
2	12-jan-11	3037	85				
3	31-Jan-11	3122	87				
February 2011							
4	10-Feb-11	3551	99				
March 2011							
5	10-Mar-11	3555	99				
6	15-Mar-11	3539	99				
7	30-Mar-11	3481	97				
April 2011							
1	8-Apr-11	3475	97				
2	23-Apr-11	3288	92				
May 2011							
1	16-May-11	2599	73				
2	26-May-11	827	23				
June 2011							
1	9-Jun-11	1612	45				
2	14-Jun-11	1391	39				

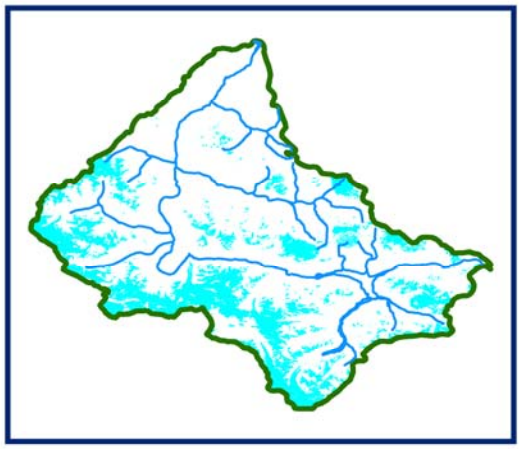

SURU BASIN (5 DAILY) : WITH CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


SURU BASIN (5 DAILY) : WITHOUT CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

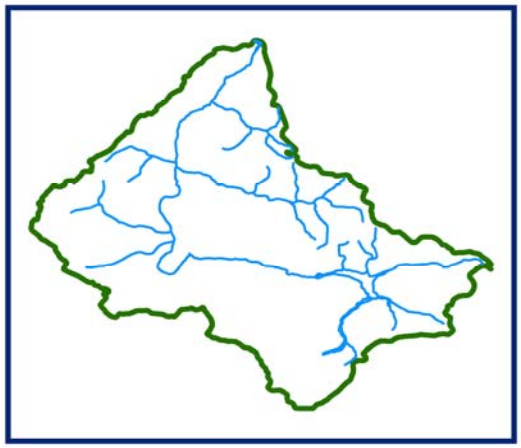

SURU BASIN (10 DAILY)
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

SNOW COVER MAP

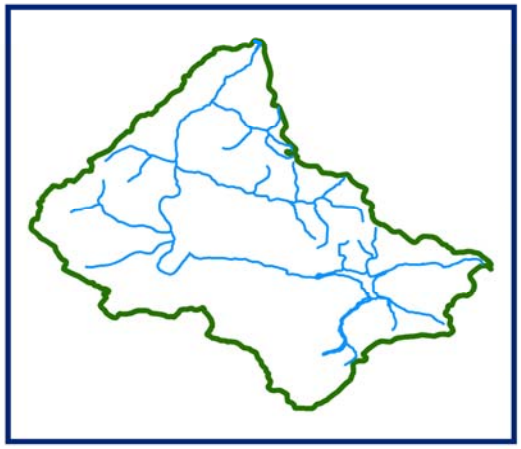
SNOW COVER MAP: **SURU BASIN**



03 OCTOBER 2010

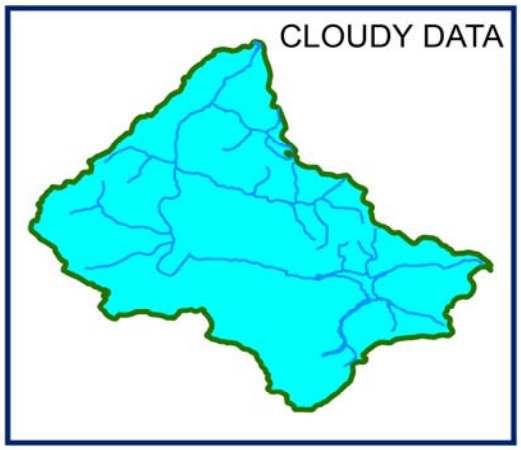


DATA NOT AVAILABLE

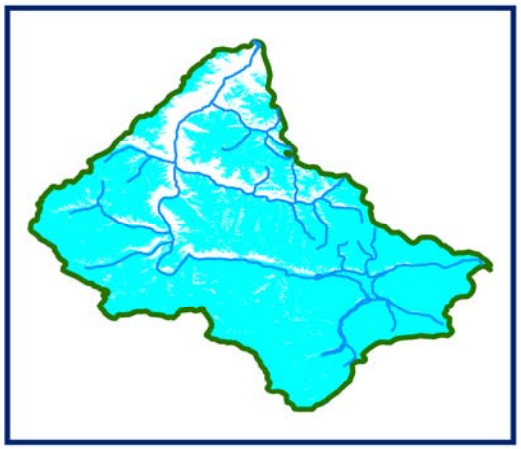


DATA NOT AVAILABLE

17 OCTOBER 2010



22 OCTOBER 2010



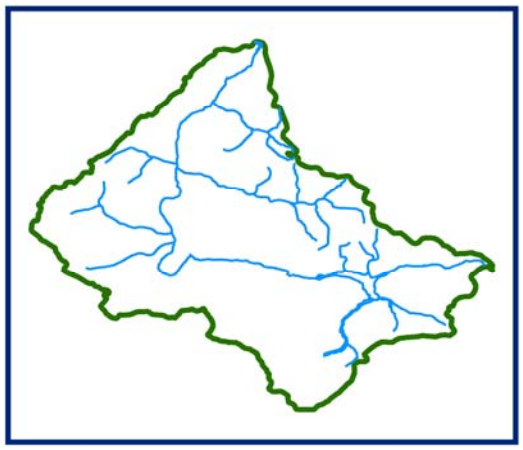
27 OCTOBER 2010

SNOW

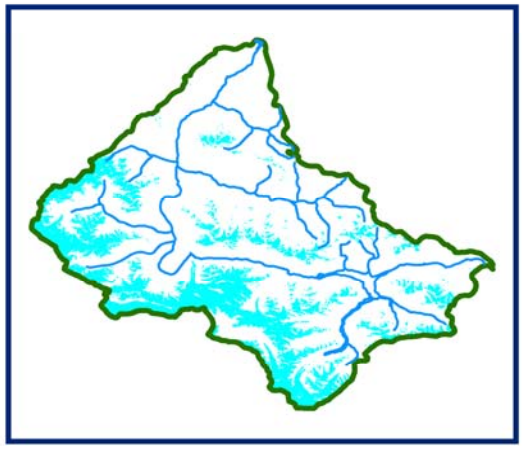
0 12.5 25 50 75 100

Kilometers

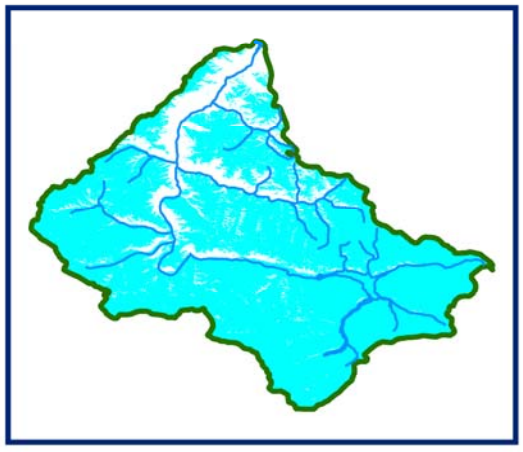
10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED
DATA NOT AVAILABLE



DATA USED
17 OCTOBER 2010

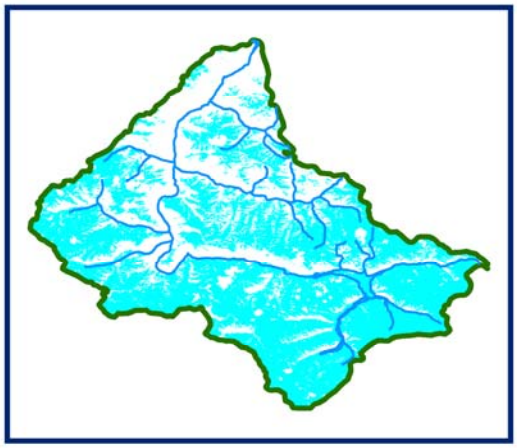


DATA USED
27 OCTOBER 2010

SNOW

0 12.5 25 50 75 100
Kilometers

SNOW COVER MAP: **SURU BASIN**

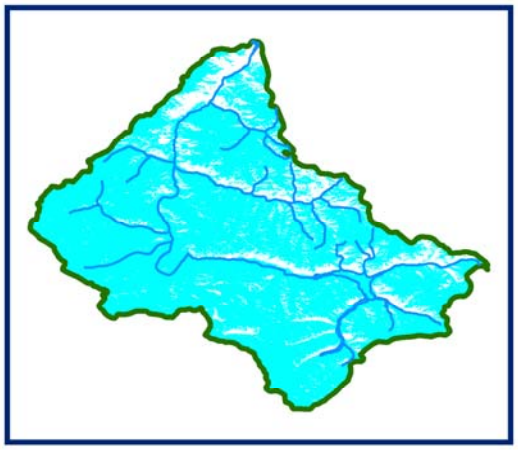


06 NOVEMBER 2010

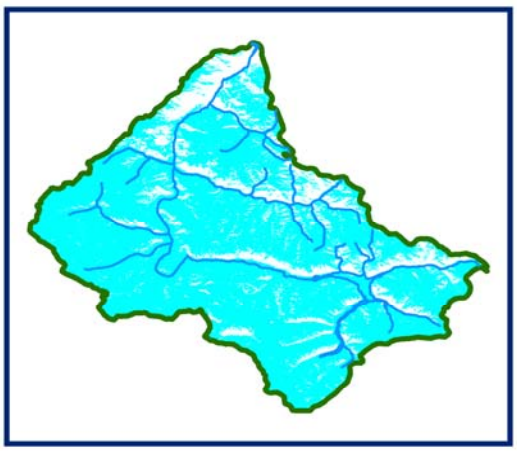
10 NOVEMBER 2010

15 NOVEMBER 2010

20 NOVEMBER 2010



29 NOVEMBER 2010



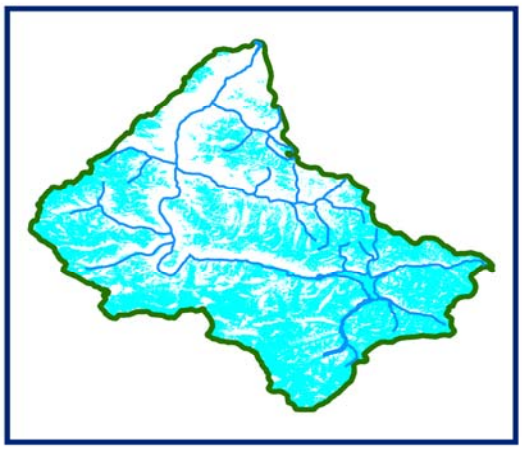
30 NOVEMBER 2010

SNOW

0 12.5 25 50 75 100

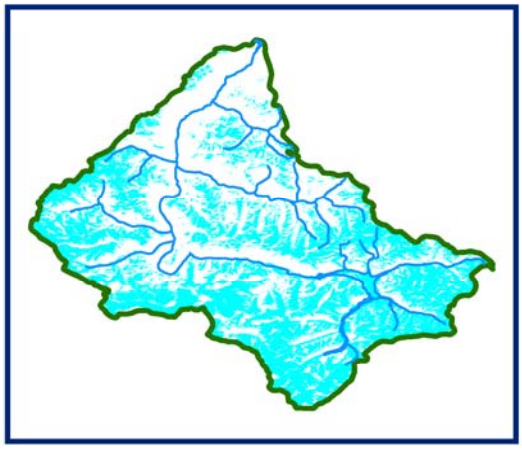
Kilometers

10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED

06 NOVEMBER 2010
10 NOVEMBER 2010



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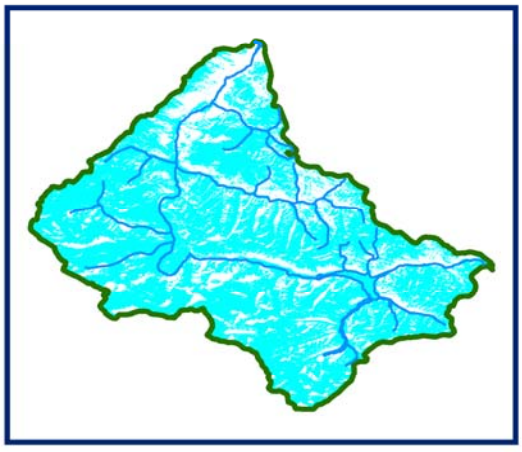
15 NOVEMBER 2010
20 NOVEMBER 2010



DATA USED

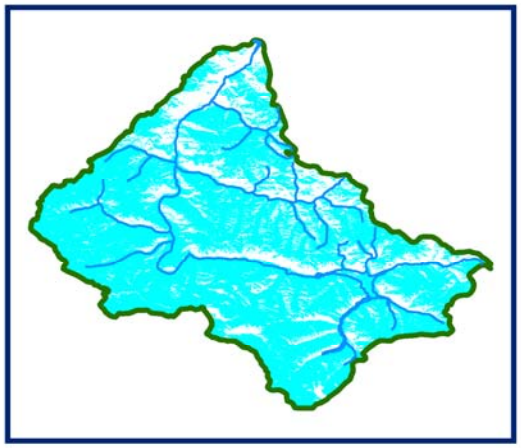
29 NOVEMBER 2010
30 NOVEMBER 2010

SNOW

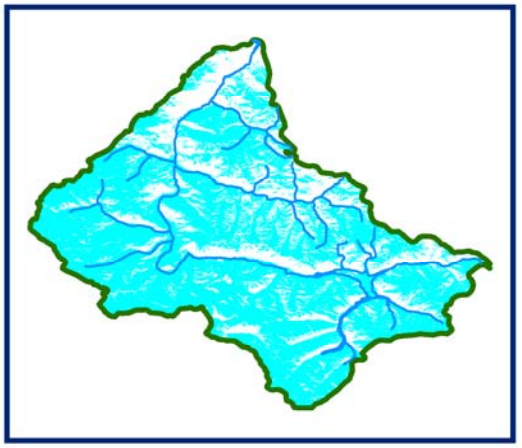
0 12.5 25 50 75 100

Kilometers

SNOW COVER MAP: **SURU BASIN**

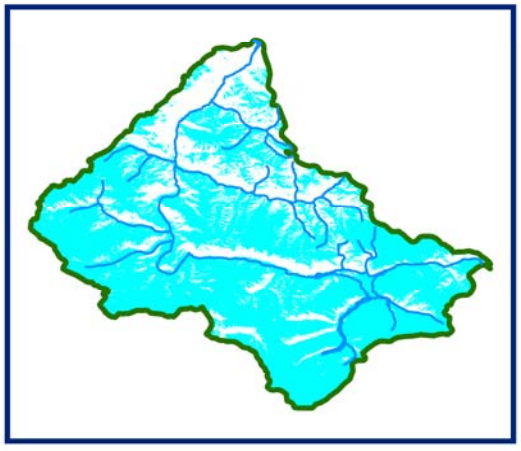


04 DECEMBER 2010

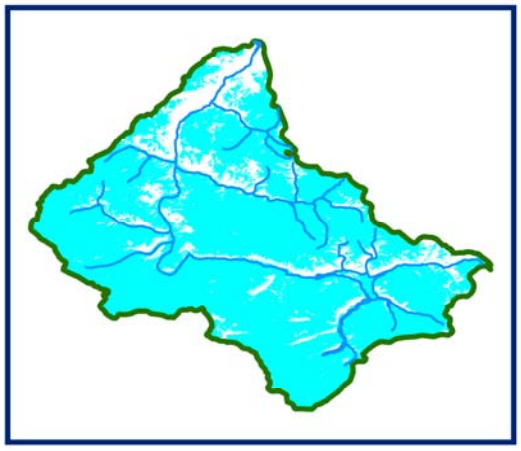


09 DECEMBER 2010

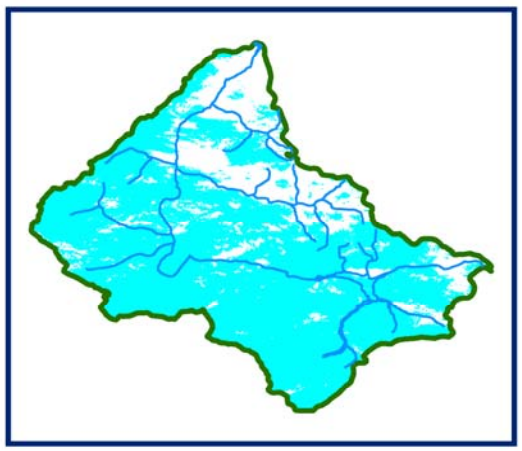
14 DECEMBER 2010



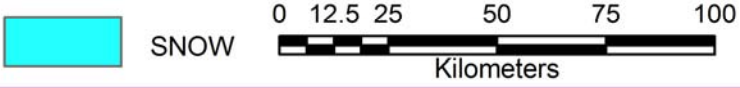
19 DECEMBER 2010



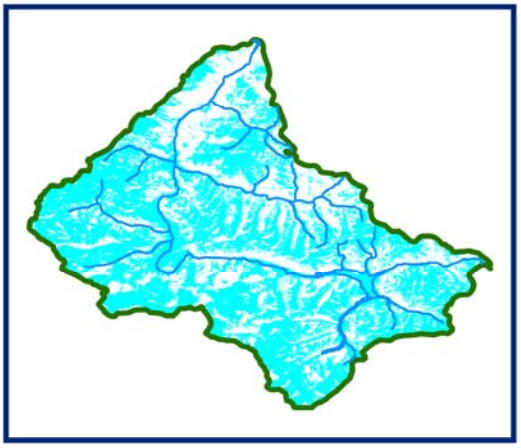
24 DECEMBER 2010



28 DECEMBER 2010

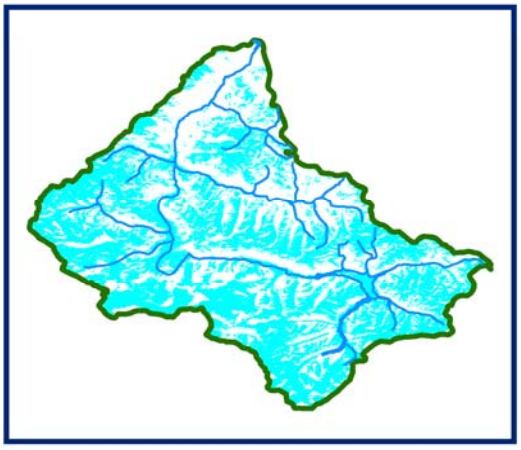


10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED

04 DECEMBER 2010
09 DECEMBER 2010



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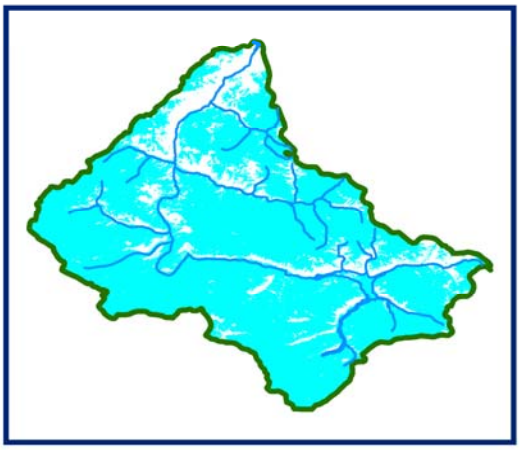
14 DECEMBER 2010
18 DECEMBER 2010
19 DECEMBER 2010



DATA USED

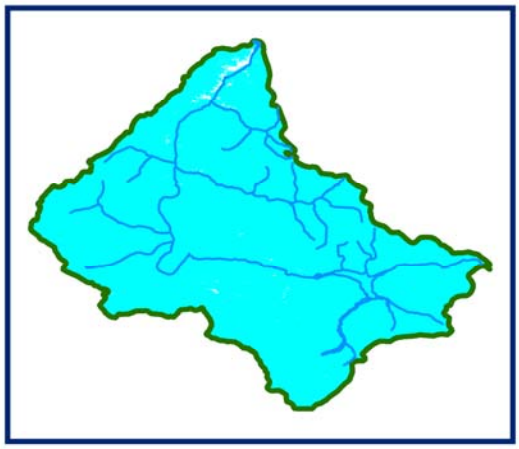
24 DECEMBER 2010

SNOW

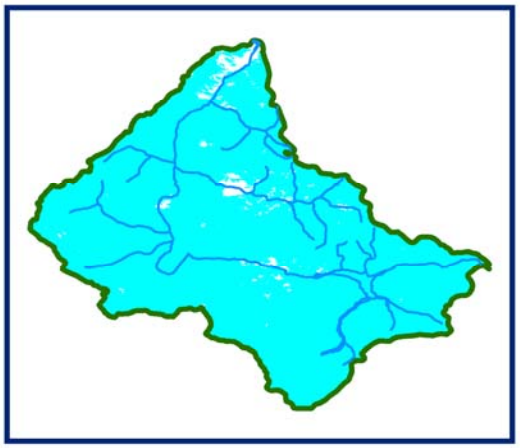
0 12.5 25 50 75 100

Kilometers

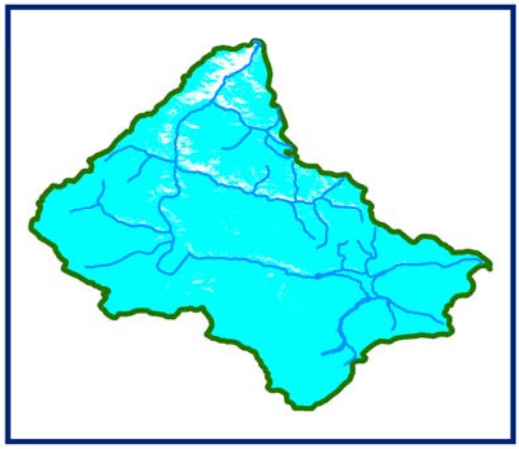
SNOW COVER MAP: **SURU BASIN**



02 JANUARY 2011



07 JANUARY 2011



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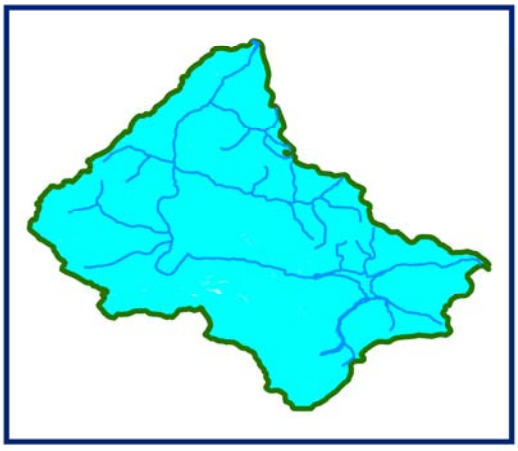
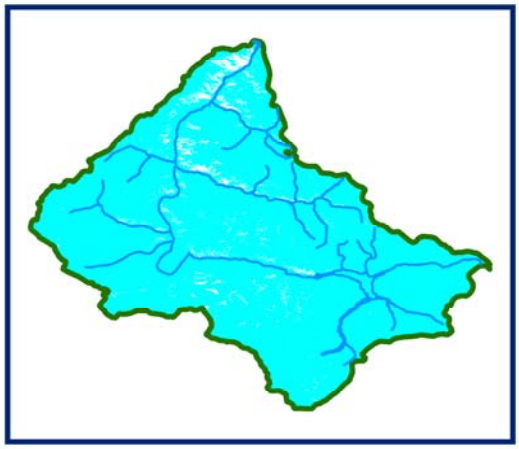
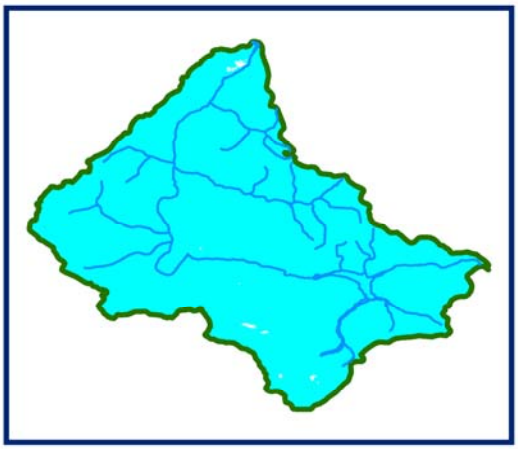


16 JANUARY 2011



26 JANUARY 2011



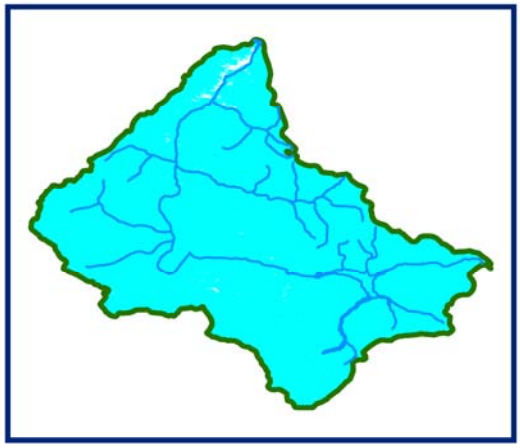
31 JANUARY 2011

SNOW

0 12.5 25 50 75 100

Kilometers

10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED

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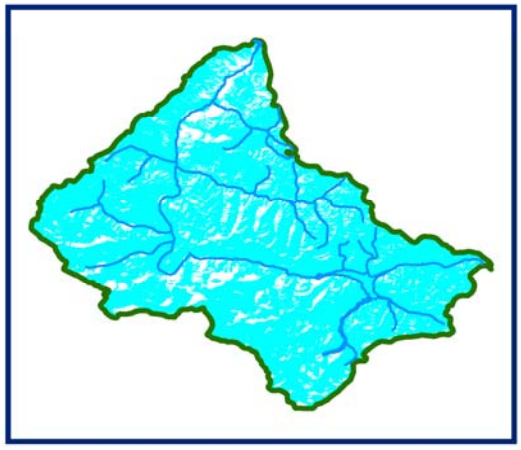

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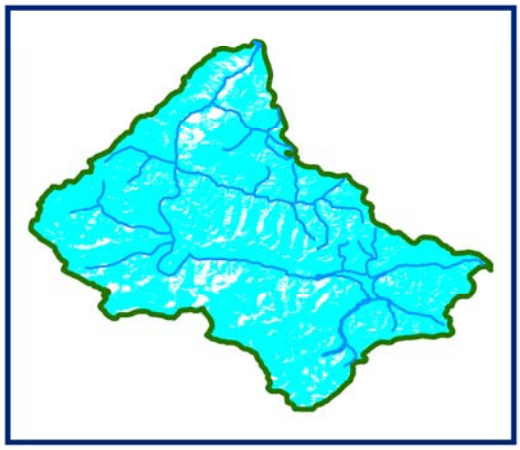
12 JANUARY 2011
16 JANUARY 2011



DATA USED

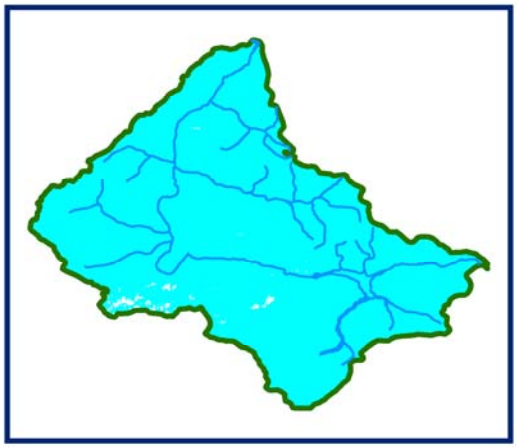
21 JANUARY 2011
26 JANUARY 2011
31 JANUARY 2011

SNOW

0 12.5 25 50 75 100

Kilometers

SNOW COVER MAP: **SURU BASIN**



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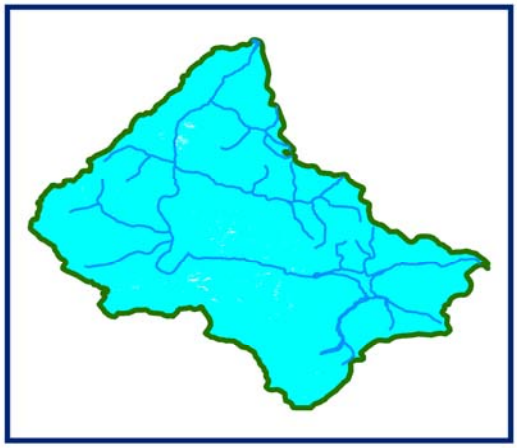

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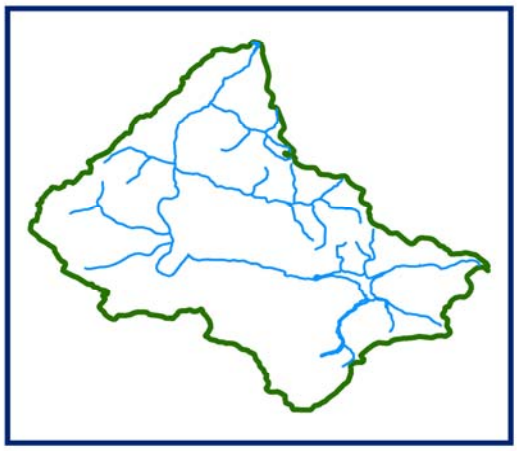

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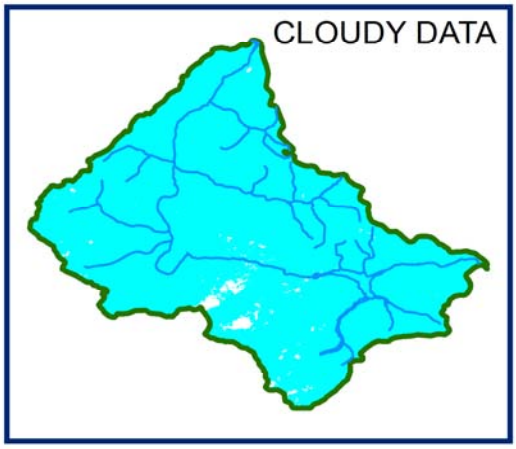

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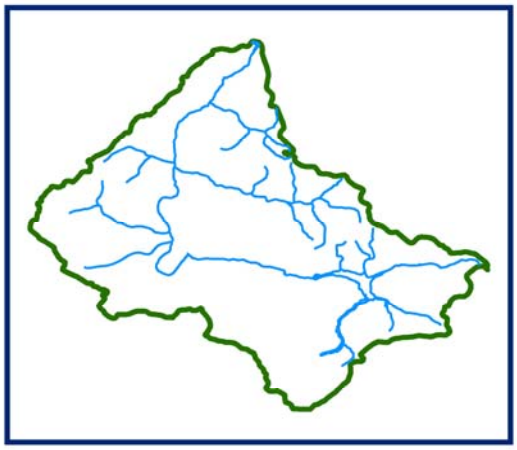

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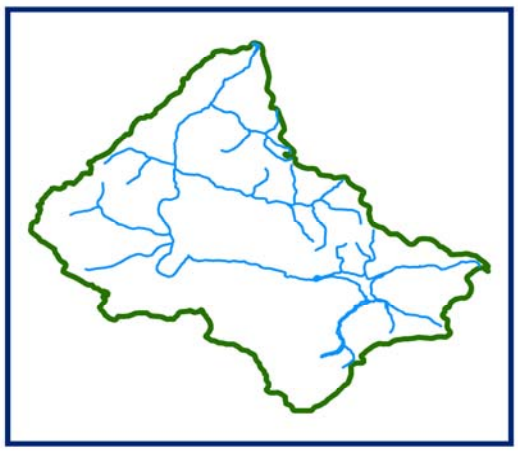


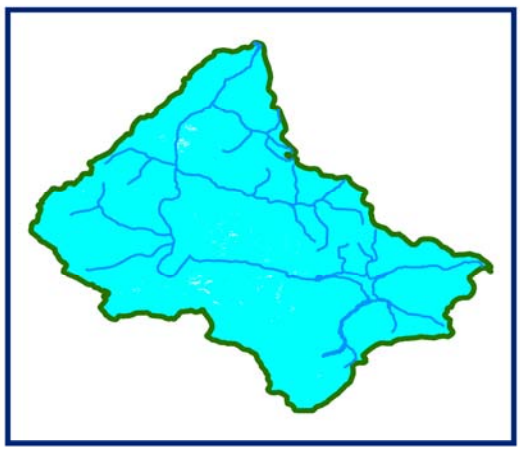
DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100

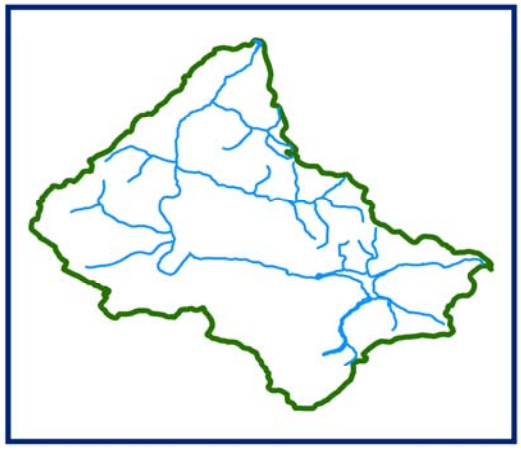
Kilometers

10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED

09 FEBRUARY 2011
10 FEBRUARY 2011



DATA USED

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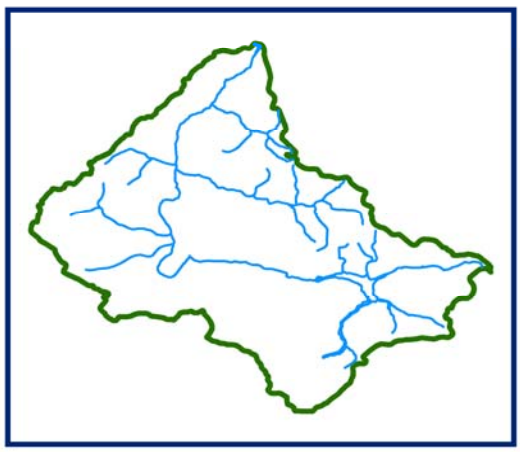


DATA USED

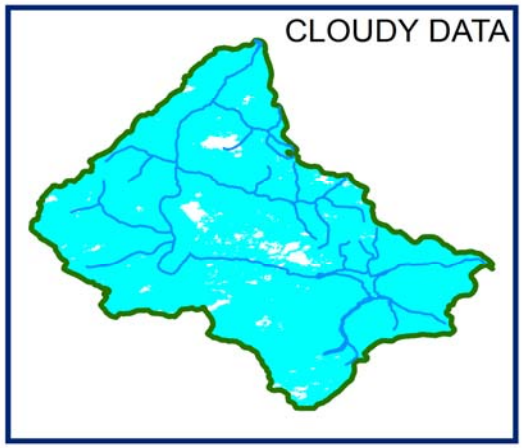
DATA NOT AVAILABLE

SNOW

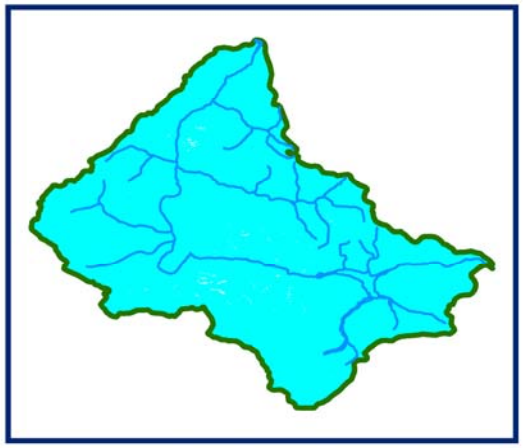
0 12.5 25 50 75 100

Kilometers

SNOW COVER MAP: **SURU BASIN**



05 MARCH 2011



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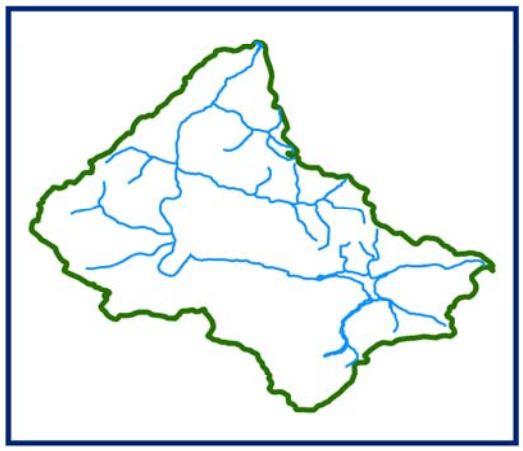

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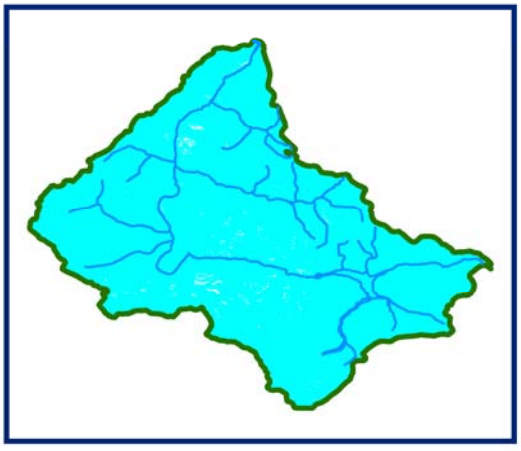
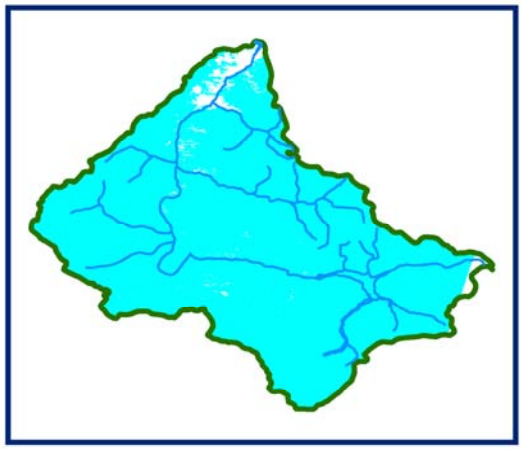
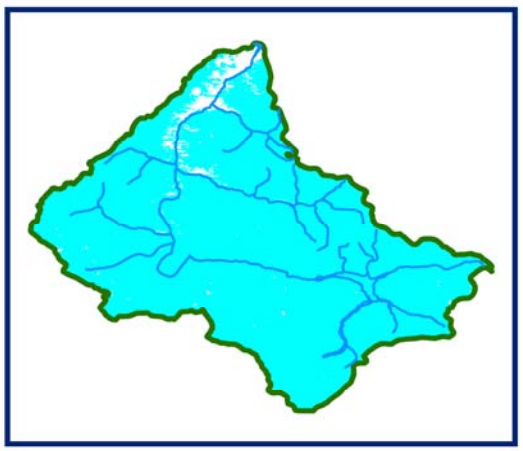


15 MARCH 2011



24 MARCH 2011



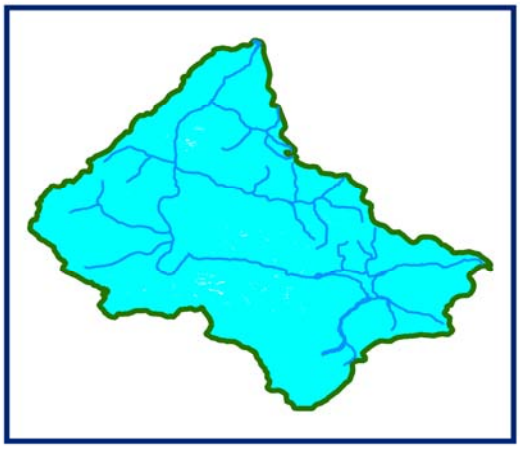
30 MARCH 2011

SNOW

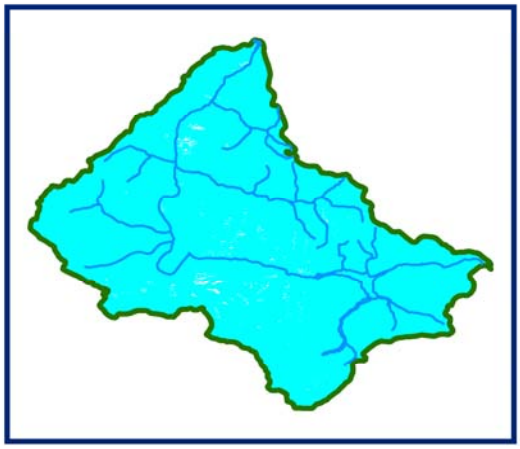
0 12.5 25 50 75 100

Kilometers

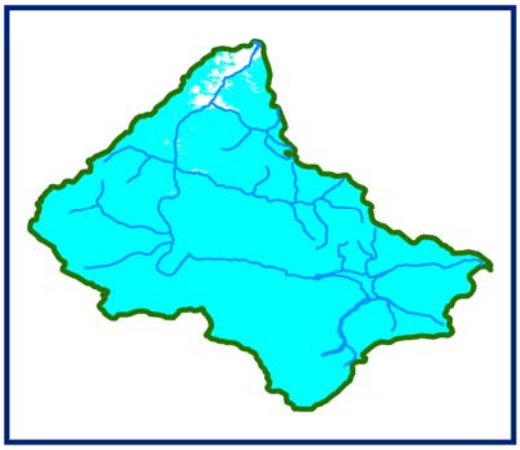
10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED
10 MARCH 2011



DATA USED
15 MARCH 2011

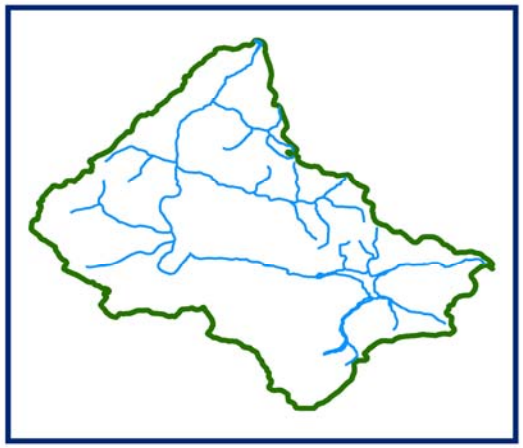


DATA USED
24 MARCH 2011
30 MARCH 2011

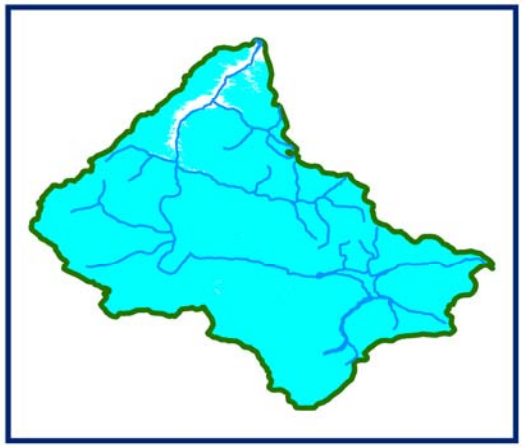
SNOW

0 12.5 25 50 75 100
Kilometers

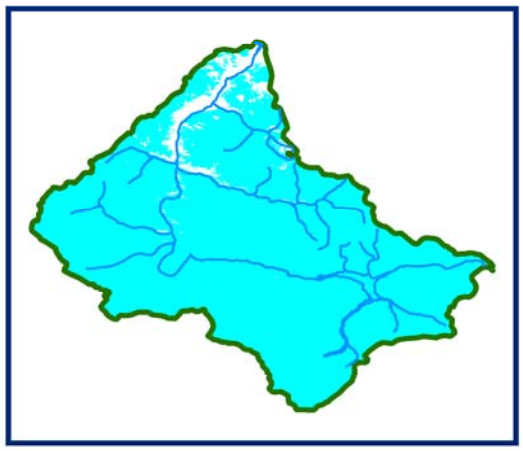
SNOW COVER MAP: **SURU BASIN**



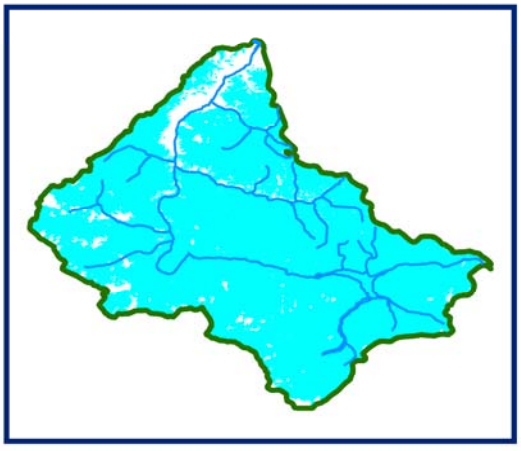
DATA NOT AVAILABLE



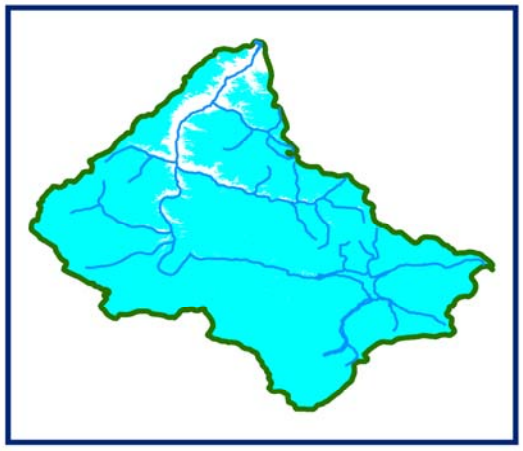
08 APRIL 2011



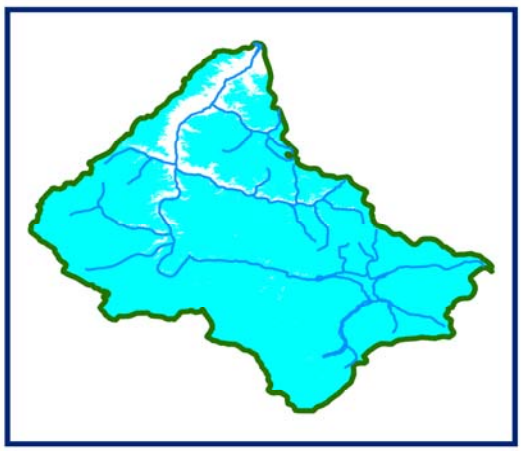
13 APRIL 2011



18 APRIL 2011



22 APRIL 2011



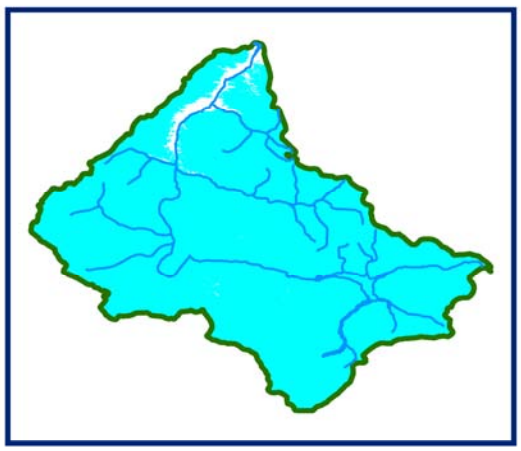
23 APRIL 2011

SNOW

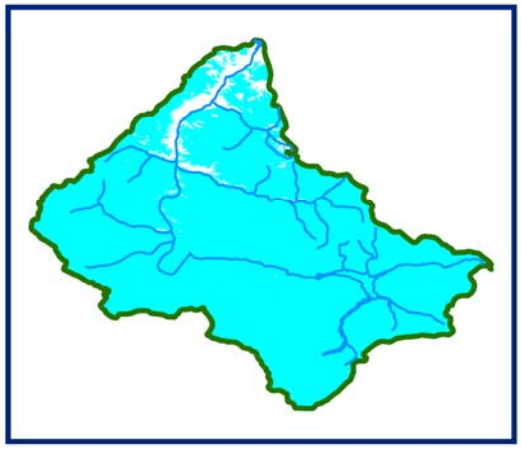
0 12.5 25 50 75 100

Kilometers

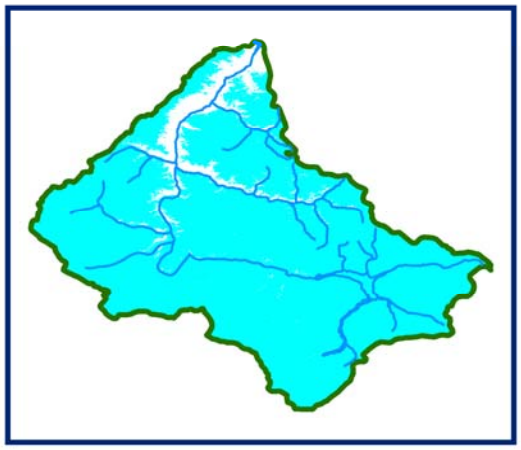
10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED
08 APRIL 2011



DATA USED
13 APRIL 2011



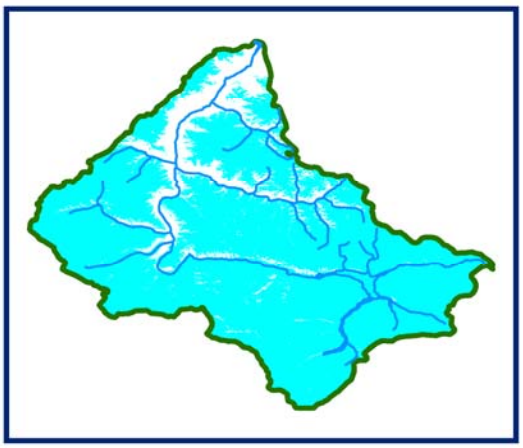
DATA USED
23 APRIL 2011

SNOW

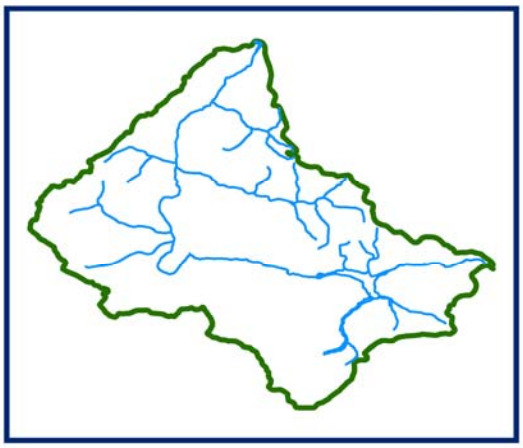
0 12.5 25 50 75 100

Kilometers

SNOW COVER MAP: **SURU BASIN**



02 MAY 2011



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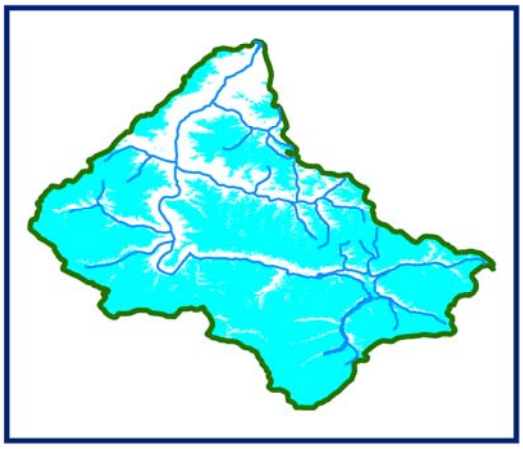
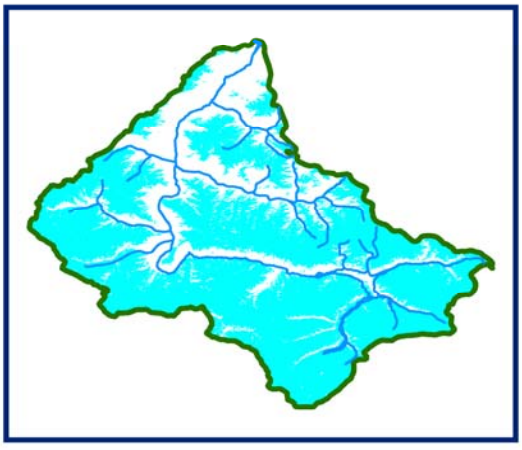
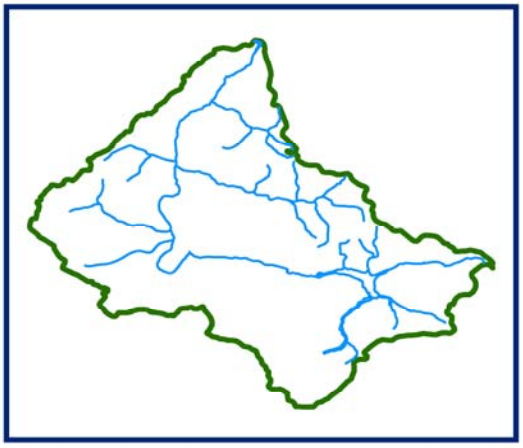


16 MAY 2011



17 MAY 2011



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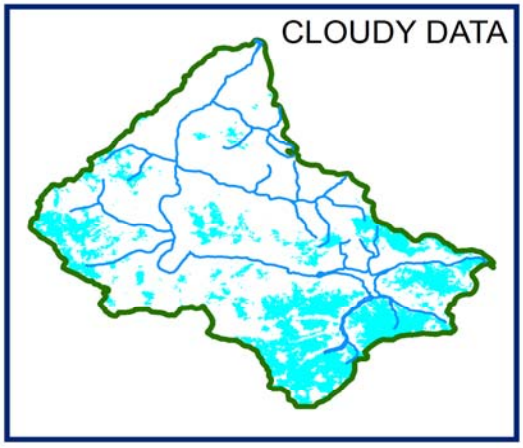


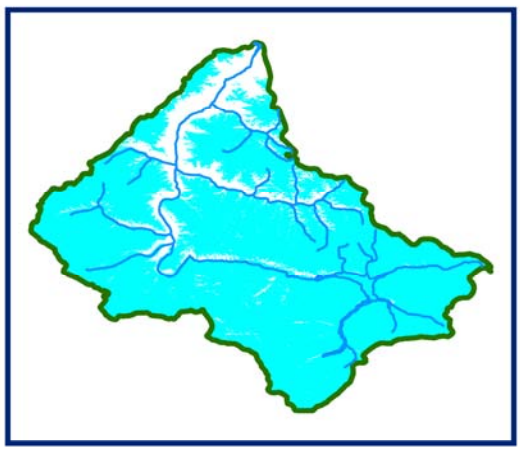
26 MAY 2011

SNOW

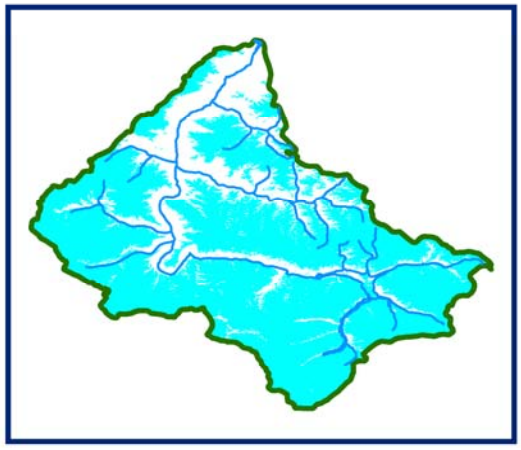
0 12.5 25 50 75 100

Kilometers

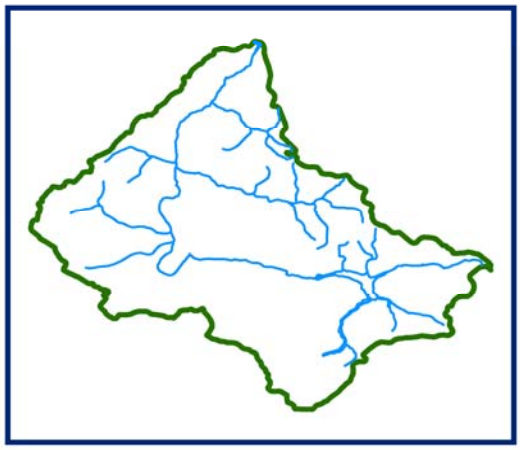
10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED
02 MAY 2011



DATA USED
16 MAY 2011



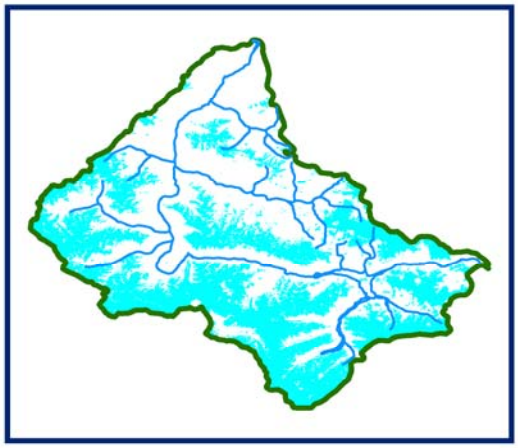
DATA USED
DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100
Kilometers

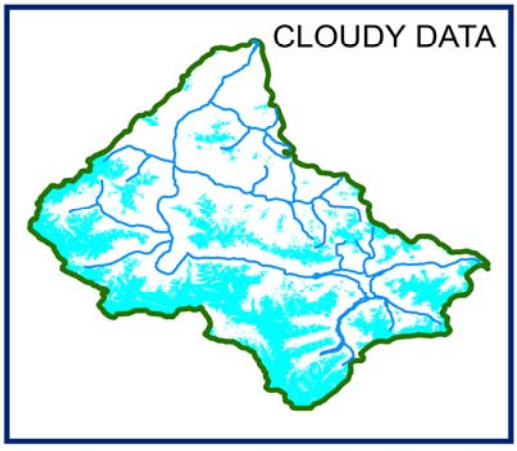
SNOW COVER MAP: **SURU BASIN**

09 JUNE 2011

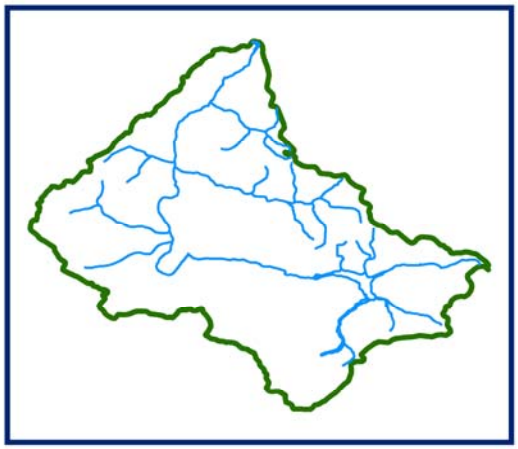


10 JUNE 2011

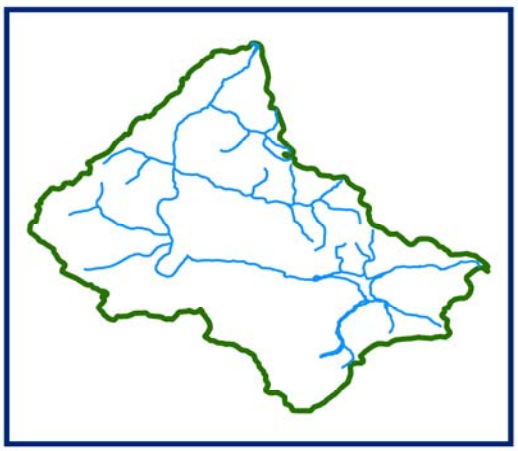
14 JUNE 2011



19 JUNE 2011



DATA NOT AVAILABLE



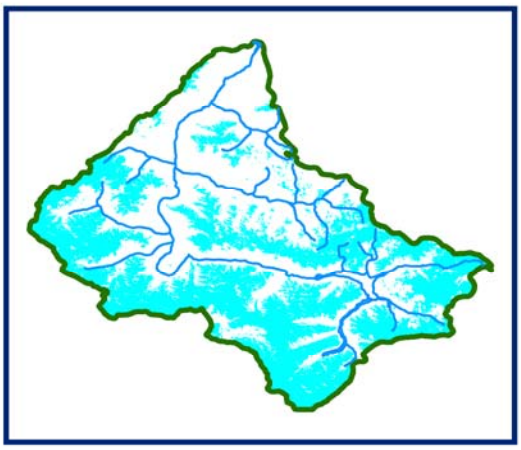
DATA NOT AVAILABLE

SNOW

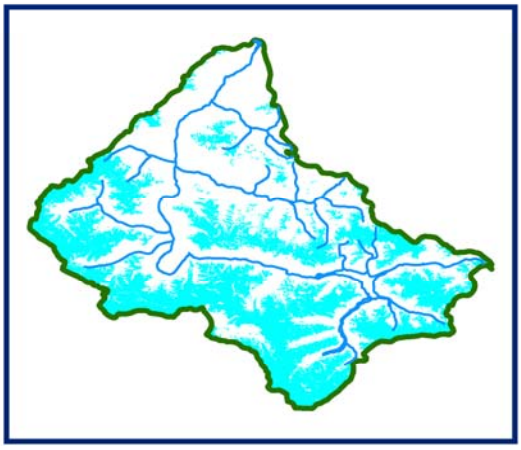
0 12.5 25 50 75 100

Kilometers

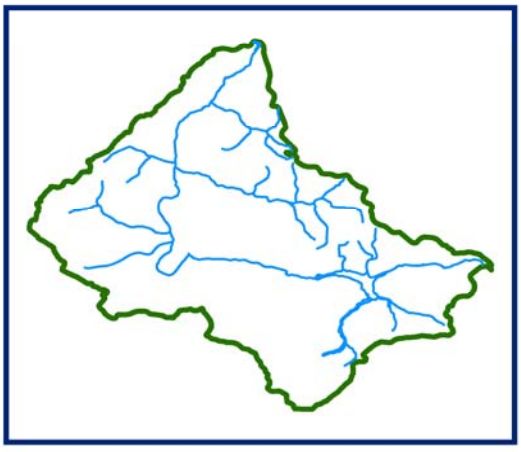
10 DAILY SNOW COVER MAP: SURU BASIN



DATA USED
09 JUNE 2011



DATA USED
14 JUNE 2011



DATA USED
DATA NOT AVAILABLE

SNOW

0 12.5 25 50 75 100
Kilometers

ZASKAR BASIN

AREAL EXTENT OF SNOW (5 DAILY)

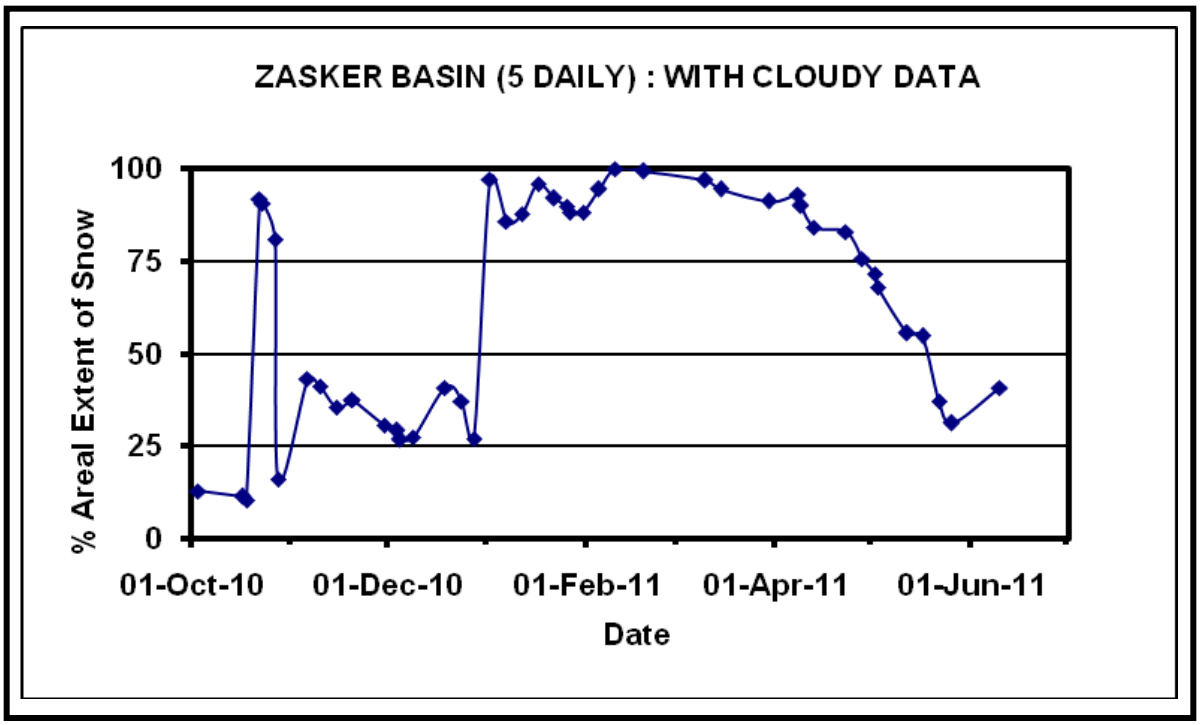
BASIN NAME: ZASKAR **BASIN AREA: 14914 sq km**

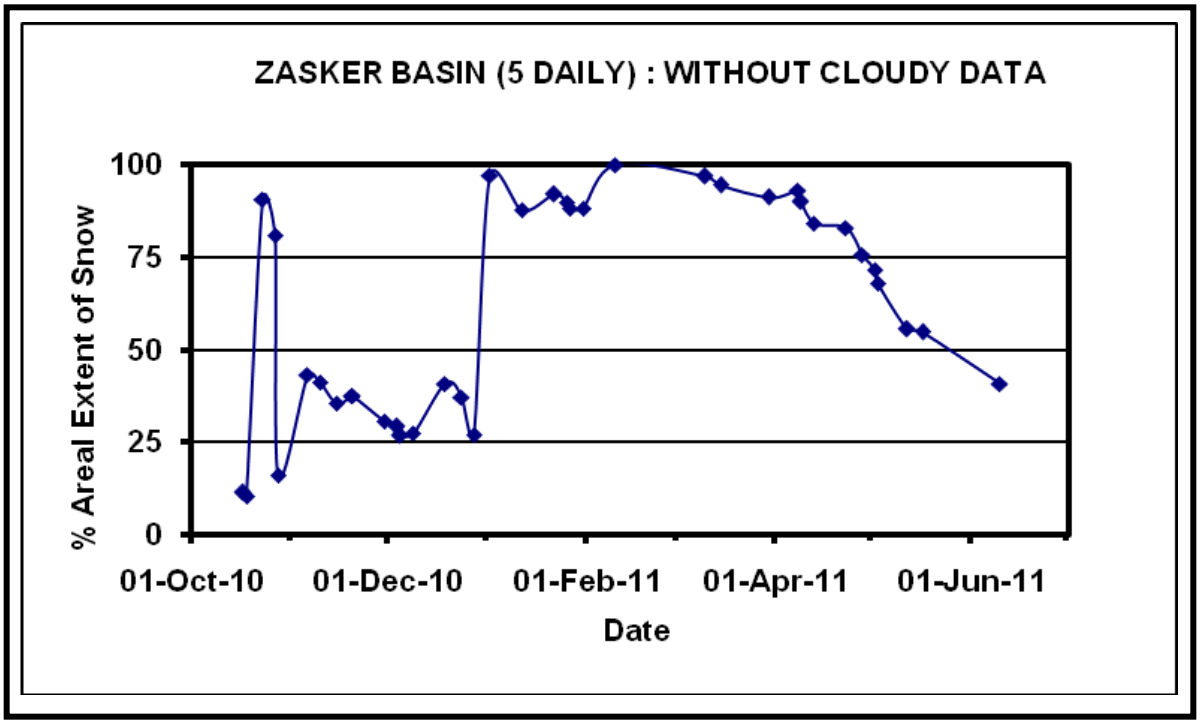
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2010							
1	3-Oct-10	1890	13	5	23-Oct-10	13503	91
2	17-Oct-10	1669	11	6	27-Oct-10	12041	81
3	18-Oct-10	1544	10	7	28-Oct-10	2392	16
4	22-Oct-10	13686	92				
November 2010							
8	6-Nov-10	6409	43	11	20-Nov-10	37	5566
9	10-Nov-10	6127	41	12	30-Nov-10	30	4542
10	15-Nov-10	5273	35				
December 2010							
13	4-Dec-10	4342	29	16	19-Dec-10	41	6072
14	5-Dec-10	3988	27	17	24-Dec-10	37	5526
15	9-Dec-10	4069	27	18	28-Dec-10	27	3990
January 2011							
1	02-jan-11	14450	97	5	22-Jan-11	13711	92
2	07-jan-11	12783	86	6	26-jan-11	13358	90
3	12-jan-11	13054	88	7	27-Jan-11	13132	88
4	17-jan-11	14269	96	8	31-Jan-11	13127	88
February 2011							
9	5-Feb-11	14062	94	11	19-Feb-11	14801	99
10	10-Feb-11	14898	100				
March 2011							
12	10-Mar-11	14431	97	14	30-Mar-11	13571	91
13	15-Mar-11	14076	94				
April 2011							
1	8-Apr-11	13852	93	4	23-Apr-11	12336	83
2	9-Apr-11	13402	90	5	28-Apr-11	11244	75
3	13-Apr-11	12522	84				
May 2011							
1	2-May-11	10654	71	4	17-May-11	8144	55
2	3-May-11	10121	68	5	22-May-11	5522	37
3	12-May-11	8274	55	6	26-May-11	4652	31
June 2011							
1	10-Jun-11	6049	41				

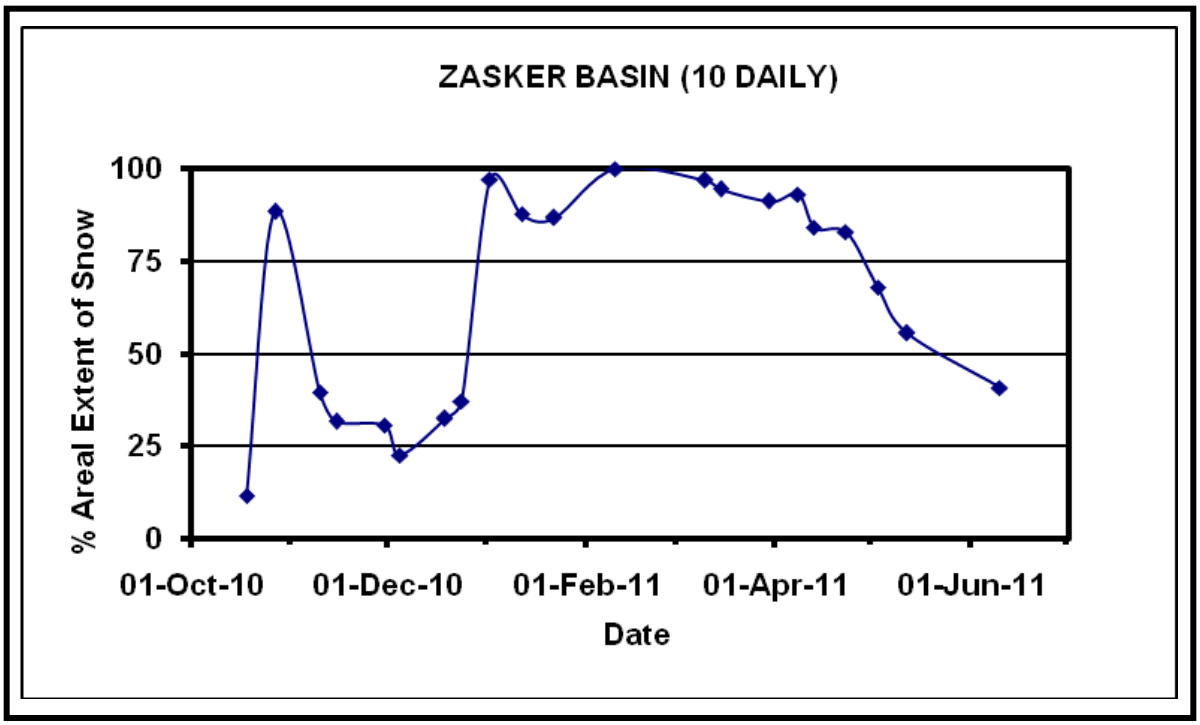
AREAL EXTENT OF SNOW (10 DAILY)

BASIN NAME: ZASKER **BASIN AREA: 14914 sq. km**

S. No	Date	Snow cover (sq. km)	Snow cover (%)	S. No	Date	Snow cover (sq. km)	Snow cover (%)
October 2010							
1	18-Oct-10	1694	11				
2	27-Oct-10	13169	88				
November 2010							
3	10-Nov-10	5881	39				
4	15-Nov-10	4705	32				
5	30-Nov-10	4542	30				
December 2010							
6	5-Dec-10	3349	22				
7	19-Dec-10	4819	32				
8	24-Dec-10	5526	37				
January 2011							
1	2-Jan-11	14450	97				
2	12-Jan-11	13054	88				
3	22-Jan-11	12916	87				
February 2011							
4	10-Feb-11	14898	100				
March 2011							
5	10-Mar-11	14431	97				
6	15-Mar-11	14076	94				
7	30-Mar-11	13571	91				
April 2011							
1	8-Apr-11	13852	93				
2	13-Apr-11	12522	84				
3	23-Apr-11	12336	83				
May 2011							
1	3-May-11	10121	68				
2	12-May-11	8274	55				
June 2011							
1	10-Jun-11	6049	41				

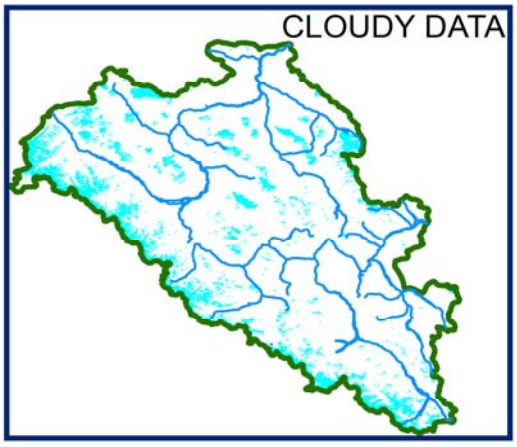

ZASKER BASIN (5 DAILY) : WITH CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date


ZASKER BASIN (5 DAILY) : WITHOUT CLOUDY DATA
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

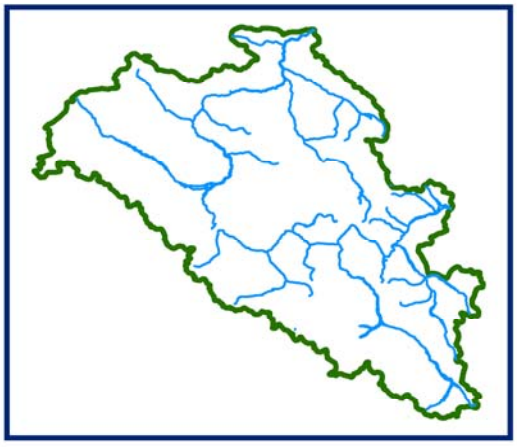

ZASKER BASIN (10 DAILY)
% Areal Extent of Snow
100
75
50
25
0
01-Oct-10
01-Dec-10
01-Feb-11
01-Apr-11
01-Jun-11
Date

SNOW COVER MAP

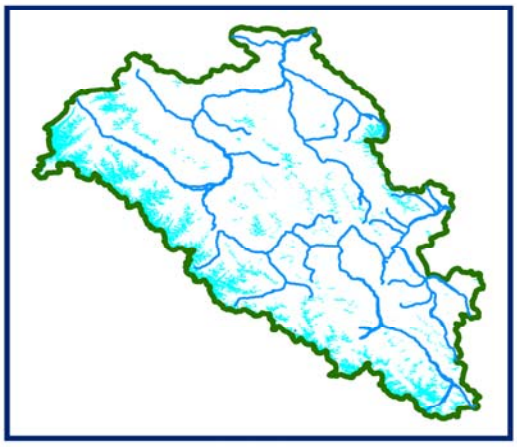
SNOW COVER MAP: **ZASKER BASIN**



03 OCTOBER 2010



DATA NOT AVAILABLE



17 OCTOBER 2010

18 OCTOBER 2010

23 OCTOBER 2010

27 OCTOBER 2010

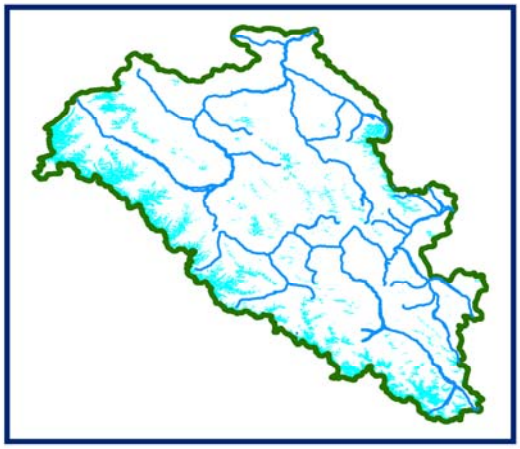
SNOW

0 20 40 80 120 160

Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN

DATA USED
DATA NOT AVAILABLE



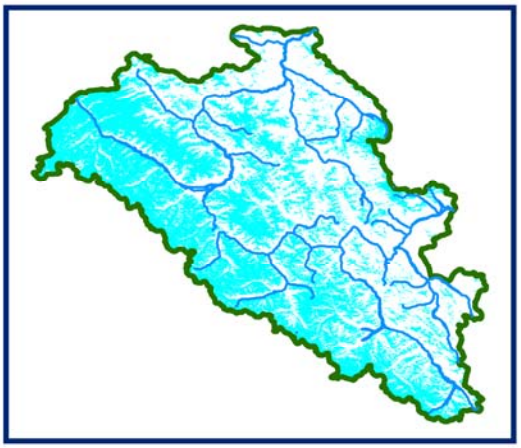
DATA USED
17 OCTOBER 2010
18 OCTOBER 2010

DATA USED
23 OCTOBER 2010
27 OCTOBER 2010
28 OCTOBER 2010

SNOW

0 20 40 80 120 160
Kilometers

SNOW COVER MAP: **ZASKER BASIN**

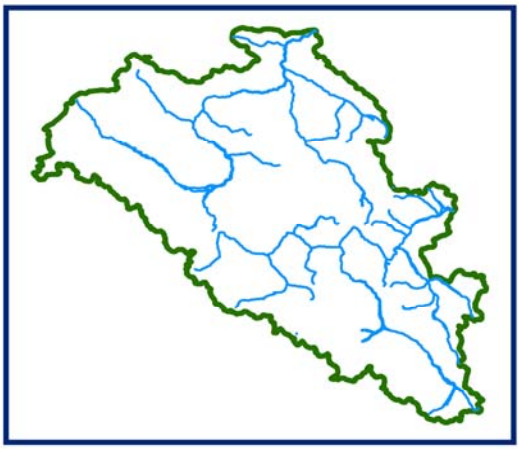


06 NOVEMBER 2010

10 NOVEMBER 2010

15 NOVEMBER 2010

20 NOVEMBER 2010



DATA NOT AVAILABLE

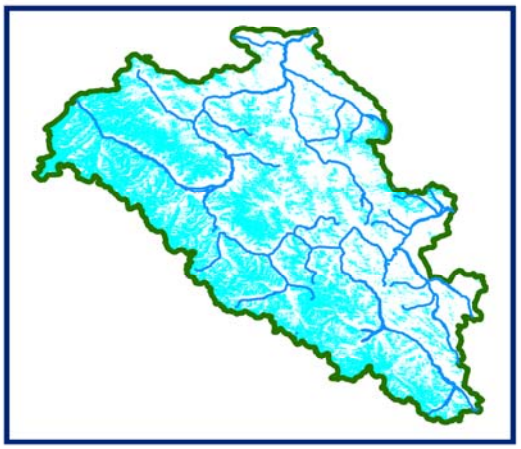
30 NOVEMBER 2010

SNOW

0 20 40 80 120 160

Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN



DATA USED
06 NOVEMBER 2010
10 NOVEMBER 2010

DATA USED
15 NOVEMBER 2010
20 NOVEMBER 2010

DATA USED
30 NOVEMBER 2010

SNOW

0 20 40 80 120 160
Kilometers

SNOW COVER MAP: **ZASKER BASIN**

04 DECEMBER 2010

09 DECEMBER 2010

DATA NOT AVAILABLE

19 DECEMBER 2010

24 DECEMBER 2010

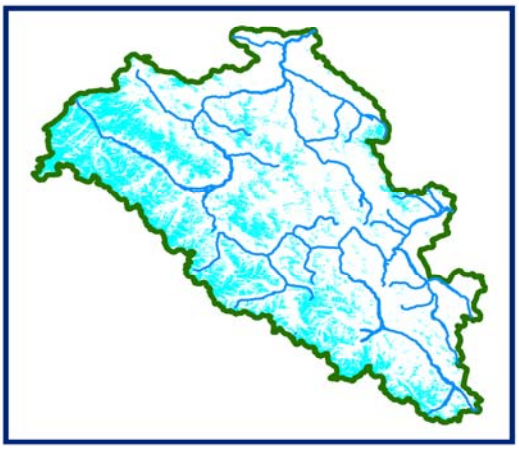
28 DECEMBER 2010

SNOW

0 20 40 80 120 160

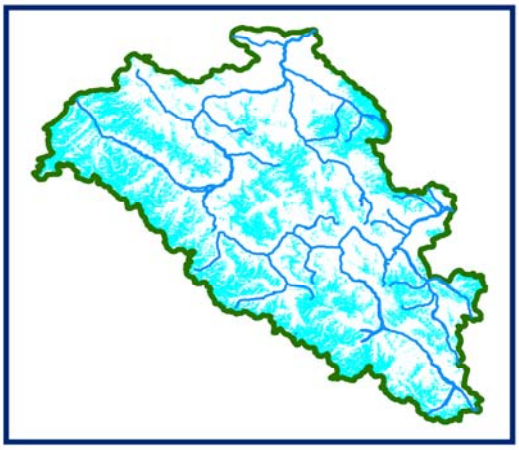
Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN



DATA USED

04 DECEMBER 2010
05 DECEMBER 2010
09 DECEMBER 2010



DATA USED

19 DECEMBER 2010

DATA USED

24 DECEMBER 2010
28 DECEMBER 2010

SNOW

0 20 40 80 120 160

Kilometers

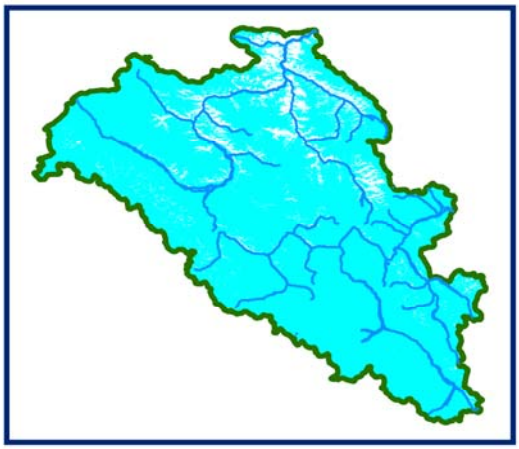
SNOW COVER MAP: **ZASKER BASIN**

02 JANUARY 2011

07 JANUARY 2011

12 JANUARY 2011

17 JANUARY 2011



22 JANUARY 2011

27 JANUARY 2011

SNOW

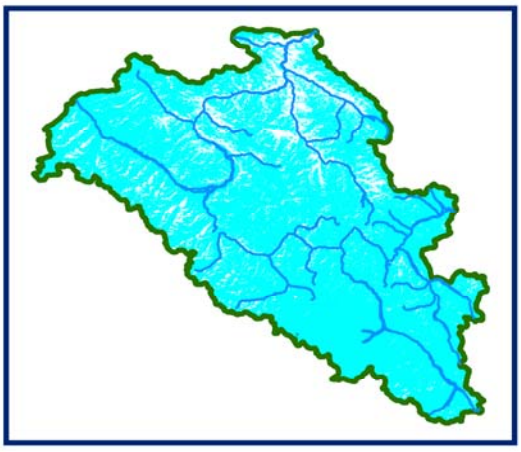
0 20 40 80 120 160

Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN

DATA USED
02 JANUARY 2011

DATA USED
12 JANUARY 2011

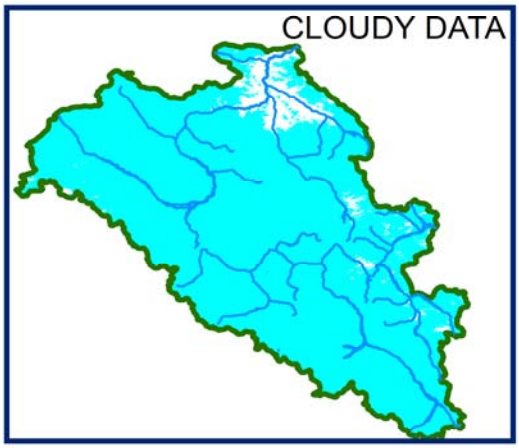


DATA USED
22 JANUARY 2011
26 JANUARY 2011
31 JANUARY 2011

SNOW

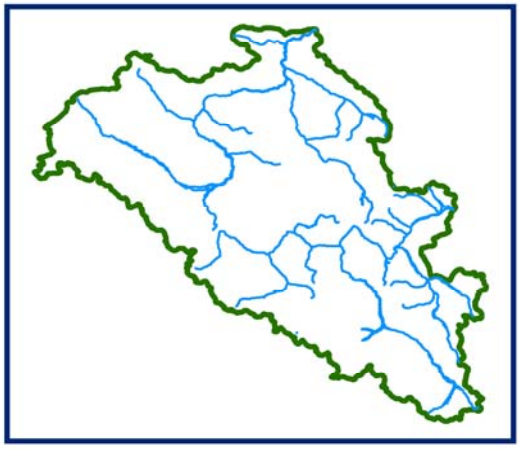
0 20 40 80 120 160
Kilometers

SNOW COVER MAP: **ZASKER BASIN**

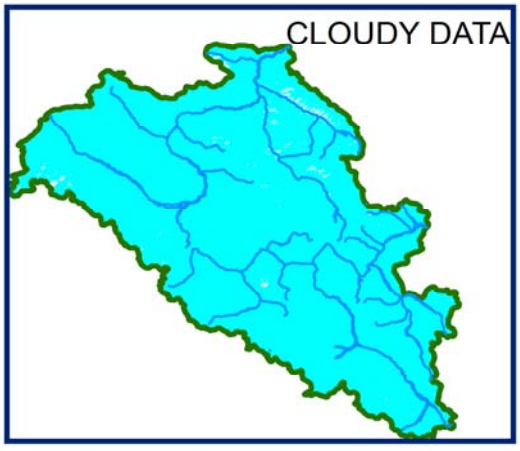


05 FEBRUARY 2011

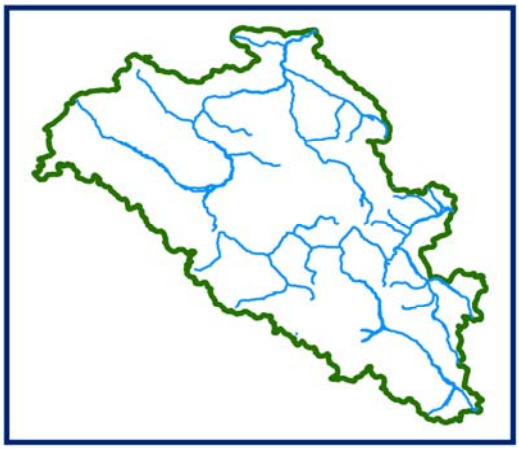
10 FEBRUARY 2011



DATA NOT AVAILABLE



19 FEBRUARY 2011



DATA NOT AVAILABLE

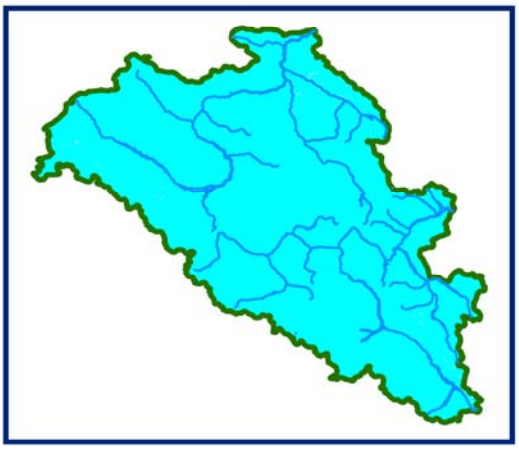
DATA NOT AVAILABLE

SNOW

0 20 40 80 120 160

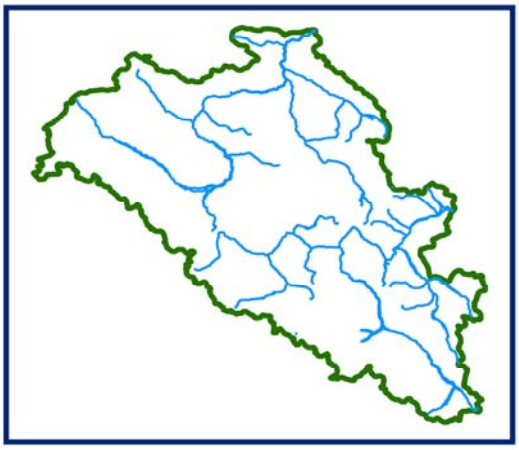
Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN



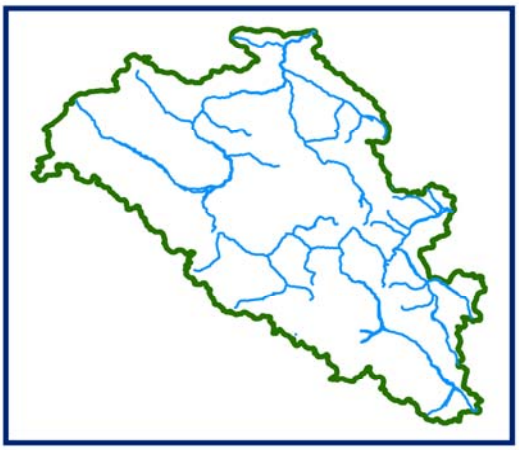
DATA USED

10 FEBRUARY 2011



DATA USED

DATA NOT AVAILABLE



DATA USED

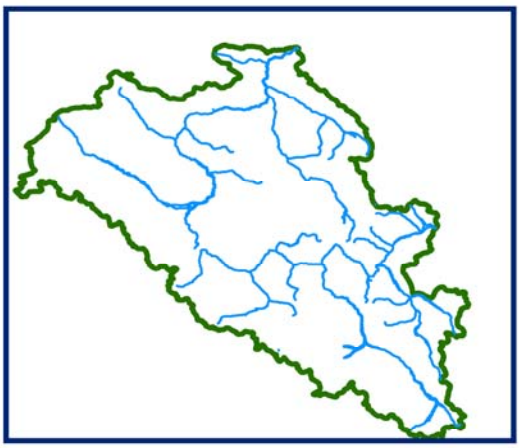
DATA NOT AVAILABLE

SNOW

0 20 40 80 120 160

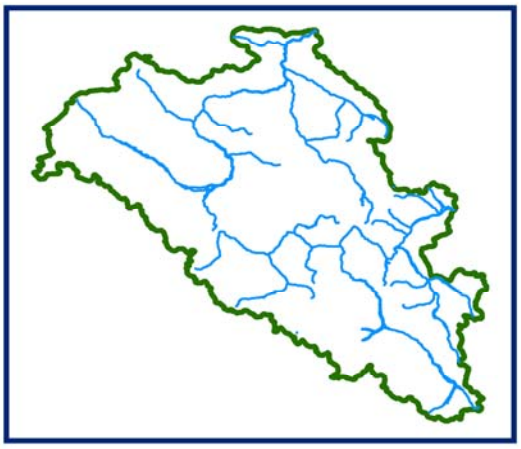
Kilometers

SNOW COVER MAP: **ZASKER BASIN**



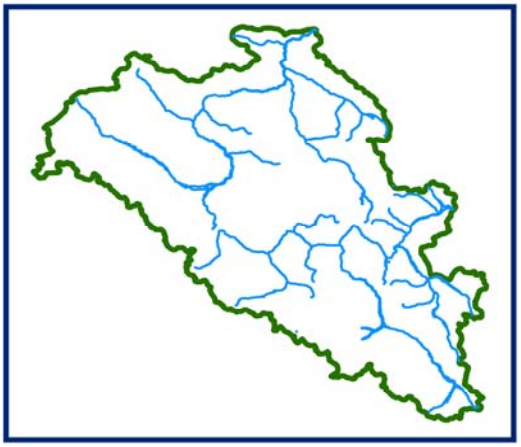
DATA NOT AVAILABLE

10 MARCH 2011

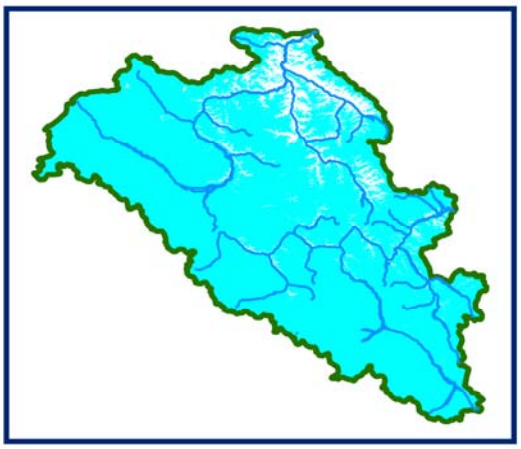


DATA NOT AVAILABLE

15 MARCH 2011



DATA NOT AVAILABLE



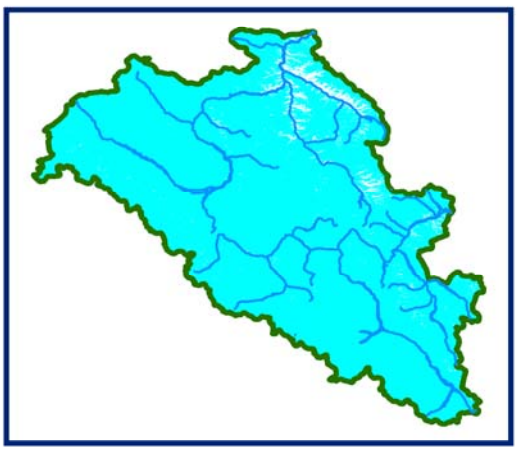
30 MARCH 2011

SNOW

0 20 40 80 120 160

Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN

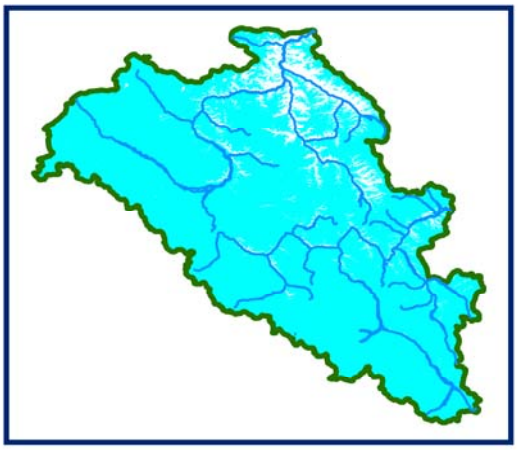


DATA USED

10 MARCH 2011

DATA USED

15 MARCH 2011



DATA USED

30 MARCH 2011

SNOW

0 20 40 80 120 160

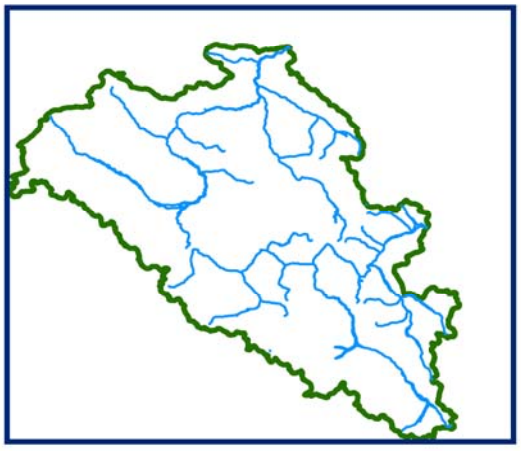
Kilometers

SNOW COVER MAP: **ZASKER BASIN**

08 APRIL 2011

09 APRIL 2011

13 APRIL 2011



DATA NOT AVAILABLE

23 APRIL 2011

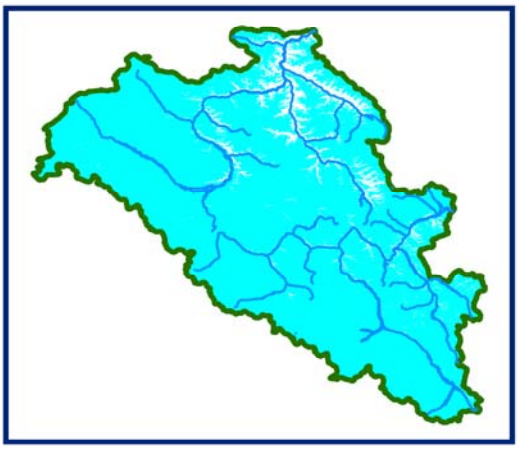
28 APRIL 2011

SNOW

0 20 40 80 120 160

Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN



DATA USED
08 APRIL 2011
09 APRIL 2011

DATA USED
13 APRIL 2011

DATA USED
23 APRIL 2011
28 APRIL 2011

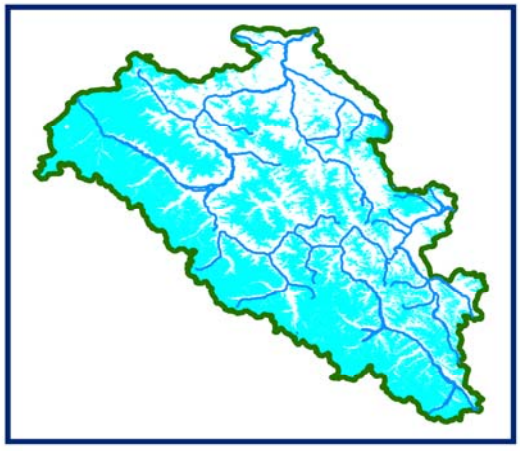
SNOW

0 20 40 80 120 160
Kilometers

SNOW COVER MAP: **ZASKER BASIN**

02 MAY 2011

03 MAY 2011



12 MAY 2011

17 MAY 2011

22 MAY 2011

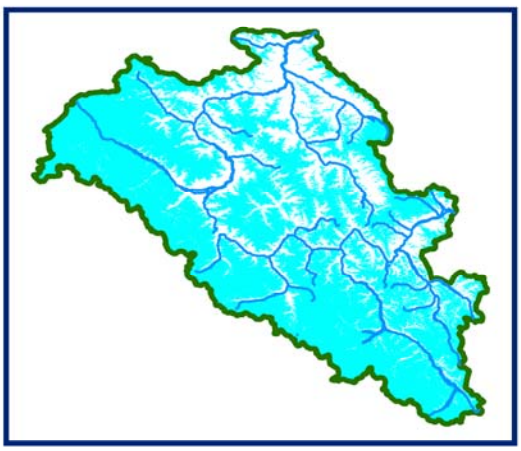
26 MAY 2011

SNOW

0 20 40 80 120 160

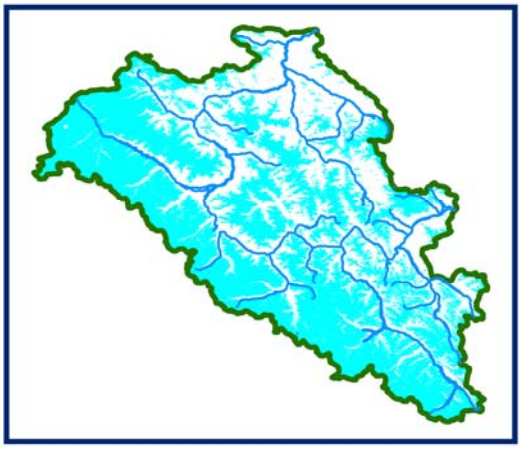
Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN



DATA USED

02 MAY 2011
03 MAY 2011



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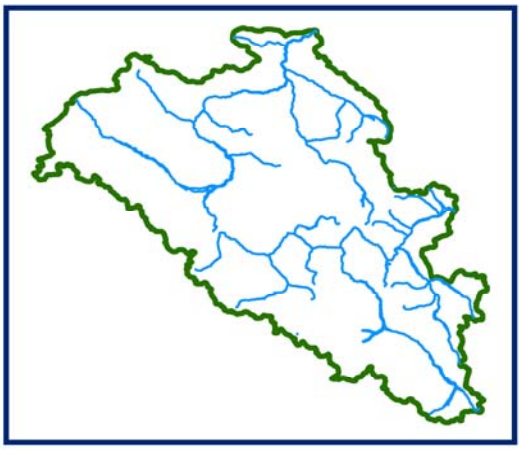


DATA USED

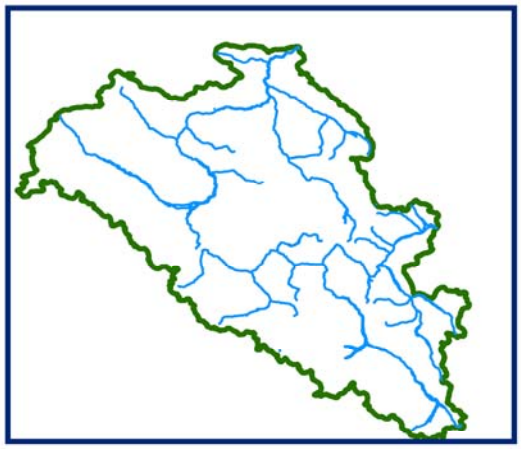
DATA NOT AVAILABLE

SNOW

0 20 40 80 120 160

Kilometers

SNOW COVER MAP: **ZASKER BASIN**



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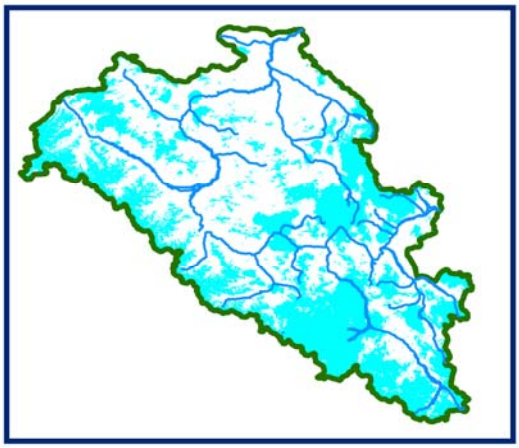
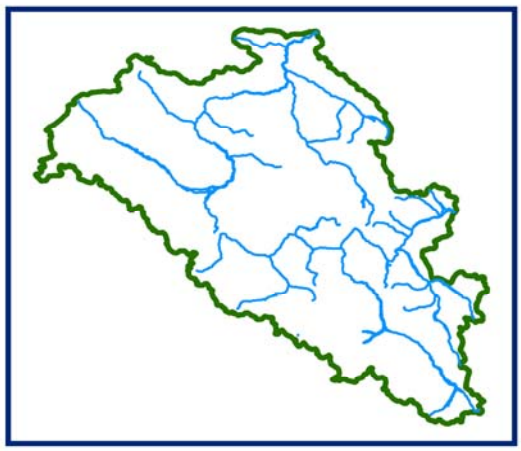


10 JUNE 2011



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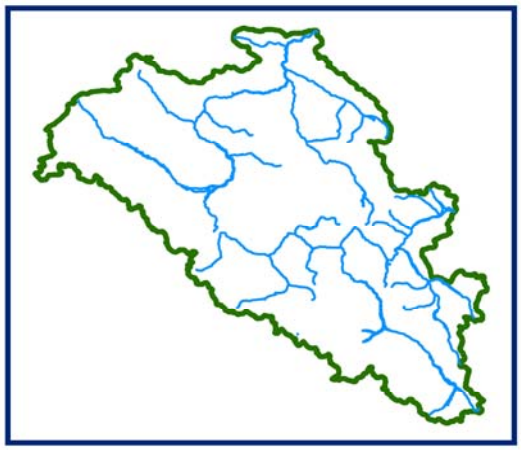

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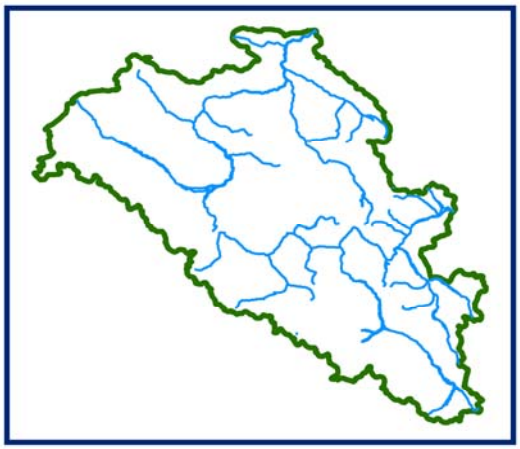


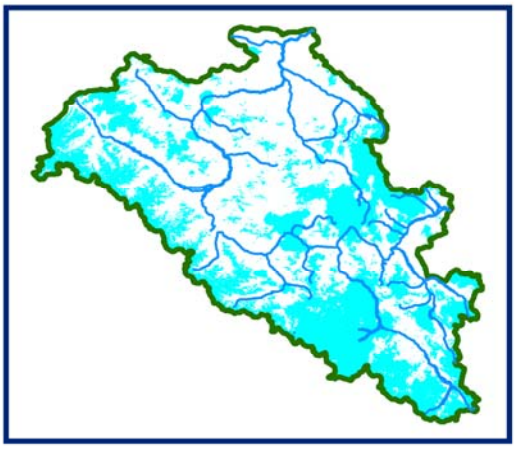
DATA NOT AVAILABLE

SNOW

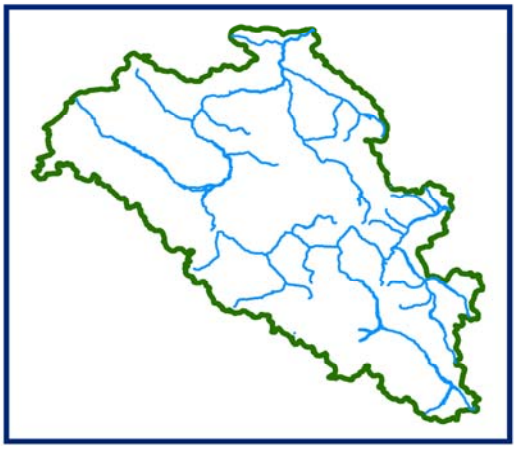
0 20 40 80 120 160

Kilometers

10 DAILY SNOW COVER MAP: ZASKER BASIN



DATA USED
10 JUNE 2011



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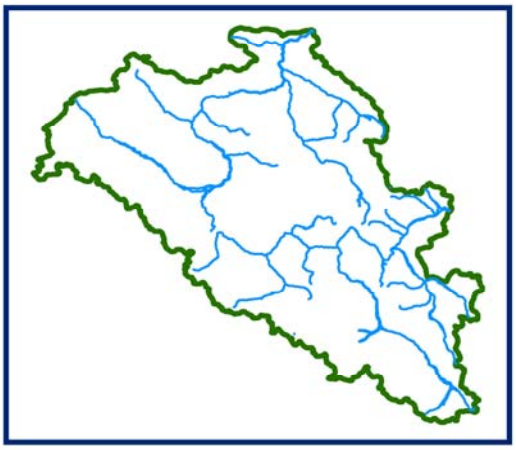

DATA USED
DATA NOT AVAILABLE

SNOW

0 20 40 80 120 160
Kilometers