SNOW COVER ATLAS OF THE INDUS BASIN

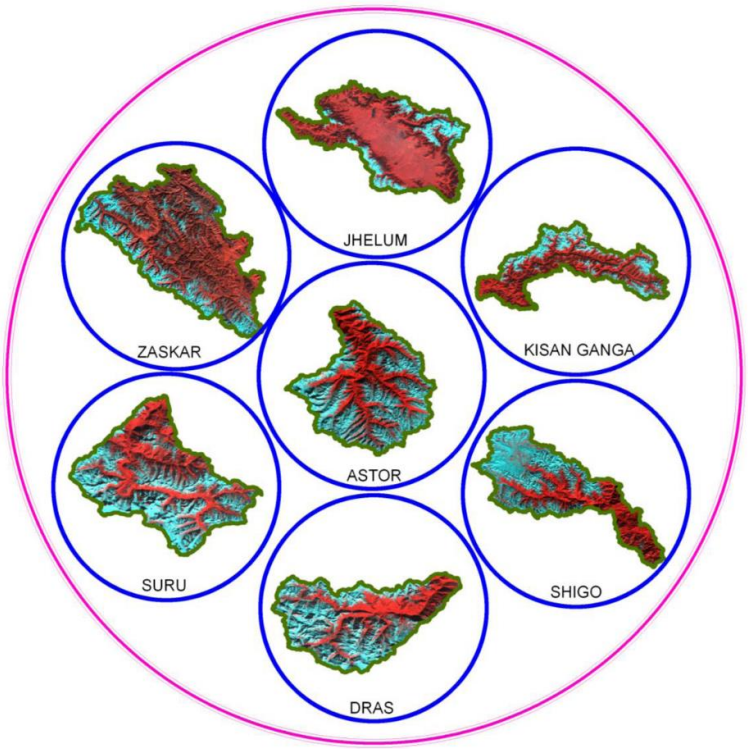
Sub-basins: Jhelum, Kisan ganga, Astor, Shigo, Dras, Suru, and Zaskar

(Integrated *Studies of Himalayan Cryosphere*

A Project of Indian Space Research Organisation)

2014-15

Volume I



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Abstract	This atlas gives subbasin-wise distribution of snow cover in the Indus basin from October 2014 to June 2015. 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
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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 2014 to June 2015 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 2014 to June 2015. Snow ablation pattern varies from basin to basin, depending on area altitude distribution in the basins. Accumulation and ablation pattern in Astor and Dras sub-basins are same. Accumulation and ablation pattern of snow in Kisanganga and Jhelum sub-basins are also same. In all the five basins accumulation starts from mid of October and ablation starts from mid of April. In Zaskar basin accumulation starts from December onwards ablation starts from April month. Accumulation starts from mid of January in Jhelum basin. Maximum snow was observed in end of March and ablation starts from April itself. It may be due lower altitude and latitude.

Acknowledgements

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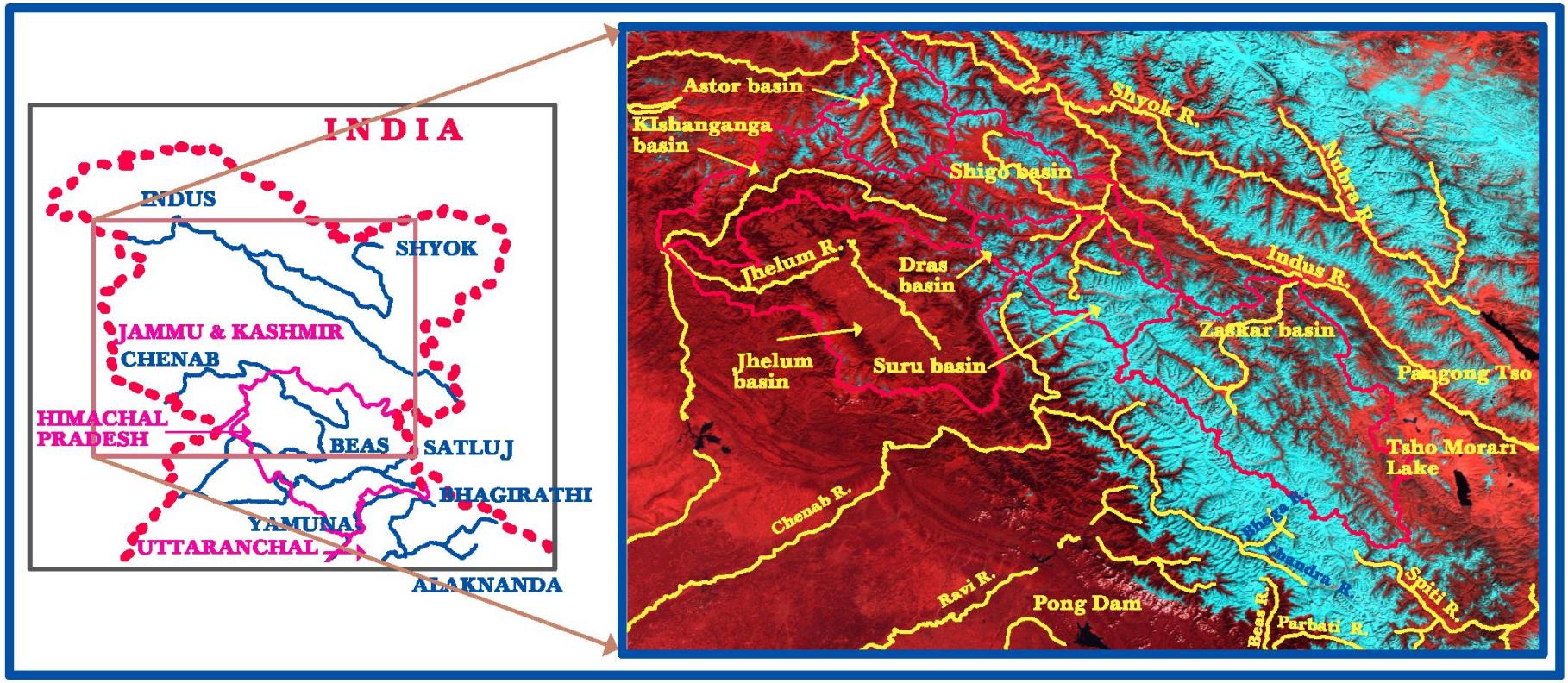


Figure 1: Location map of Jhelum, Kisan ganga, Astor, Shigo, Dras, Suru and Zaskar sub-basins (Part of Indus basin)

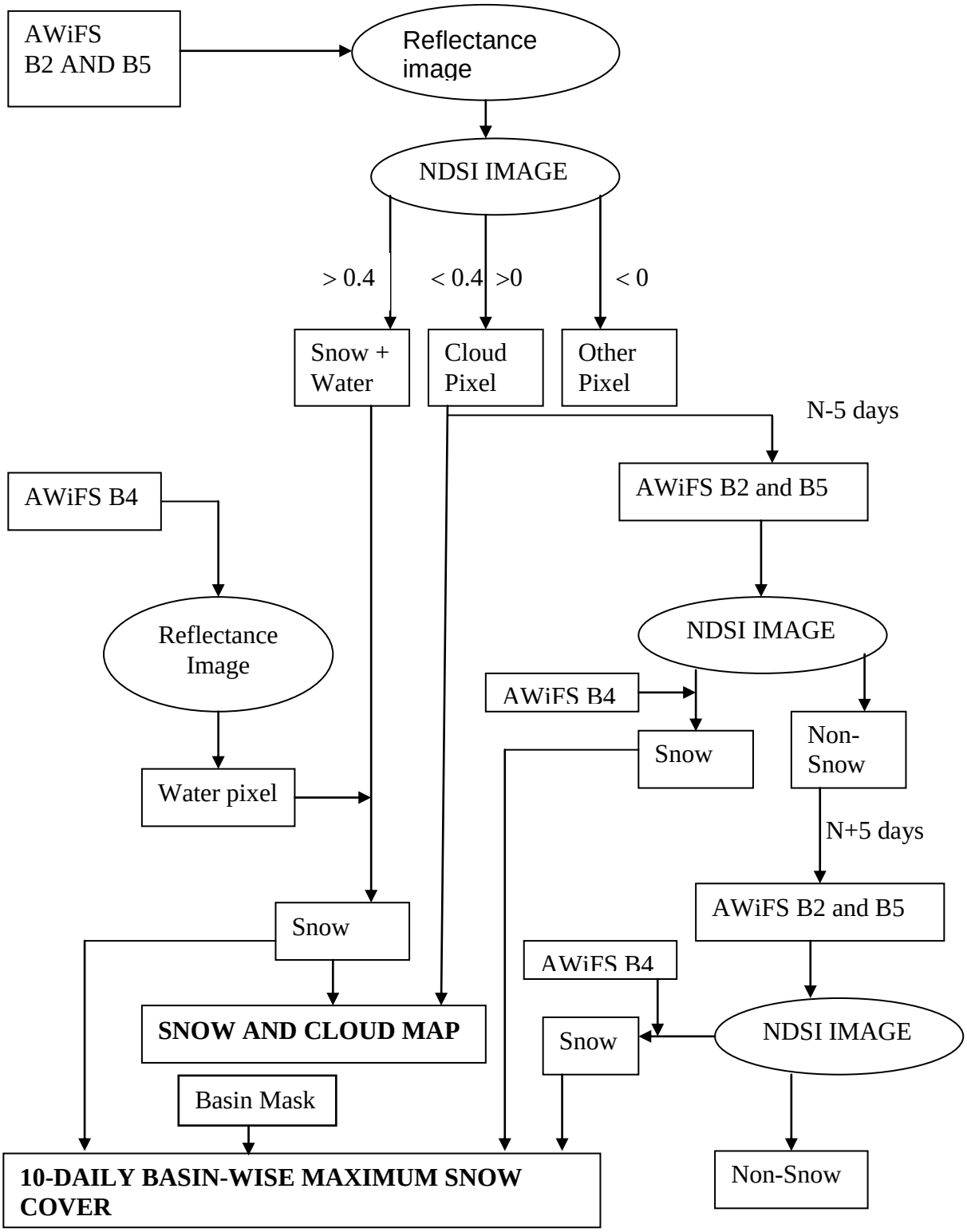


Figure 2: Algorithm for snow cover mapping using AWiFS data

JHELUM SUB-BASIN

AREAL EXTENT OF SNOW (5 DAILY)

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

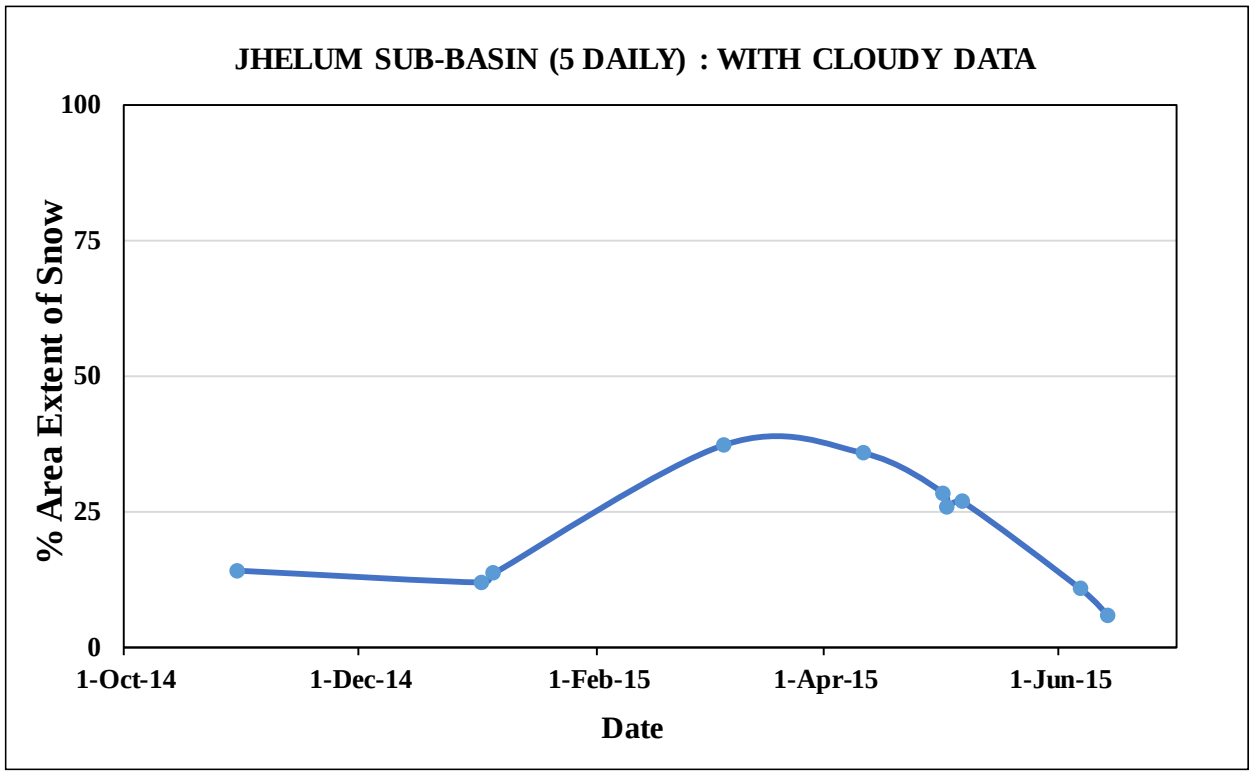
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	30-Oct-2014	2018	14				
January 2015							
2	02-Jan-2015	1705	12	**3**	05-Jan-2015	1966 (C)	14
March 2015							
4	06-Mar-2015	5379 (C)	37				
April 2015							
5	11-April-2015	5150	36				
May 2015							
6	02-May-2015	4086 (C)	28	**7**	03-May-2015	3726	26
8	07-May-2015	3846	27				
June 2015							
9	07-june-2015	1504	10	**10**	14-June-2015	798 (C)	6

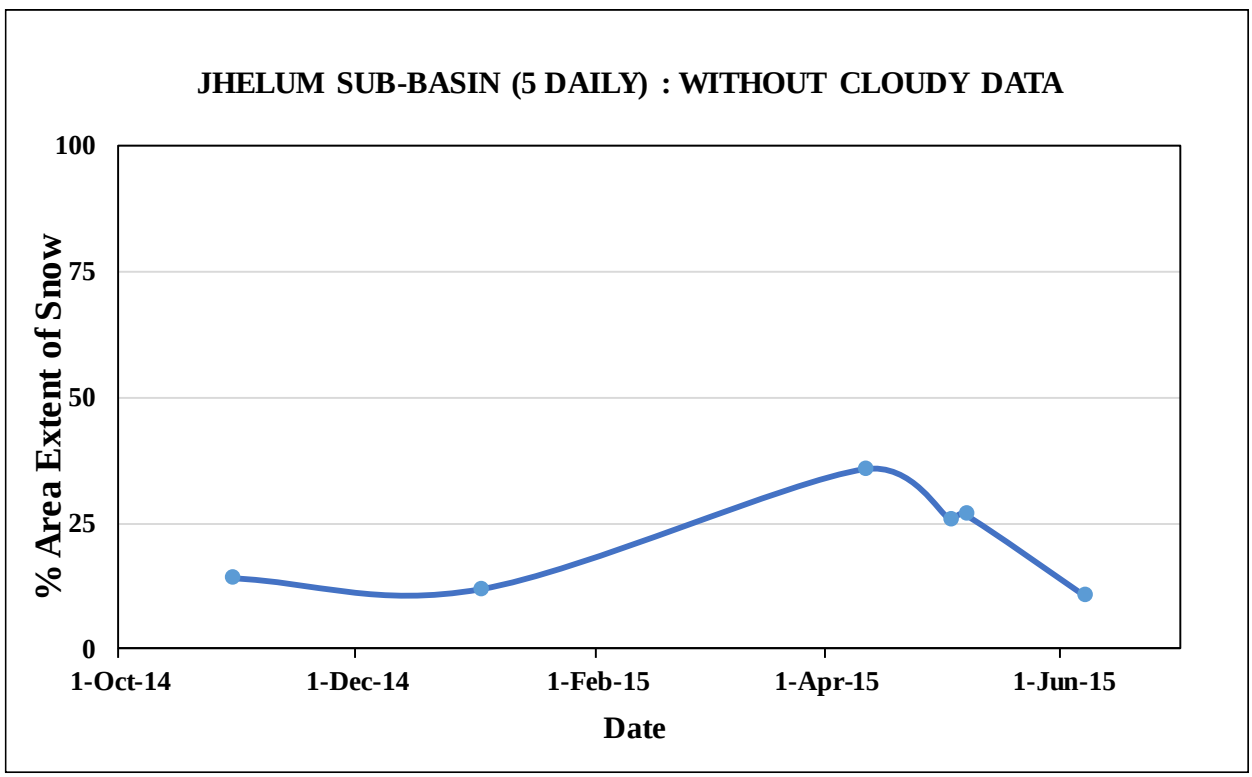
AREAL EXTENT OF SNOW (5 DAILY)

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 2014							
1	30-Oct-2014	2018	14				
January 2015							
2	05-Jan-2015	1588	11				
April 2015							
3	11-April-2015	5150	36				
May 2015							
4	05-May-2015	4409	30				
June 2015							
5	07-june-2015	1504	10				

SNOW COVER DEPLETION CURVE





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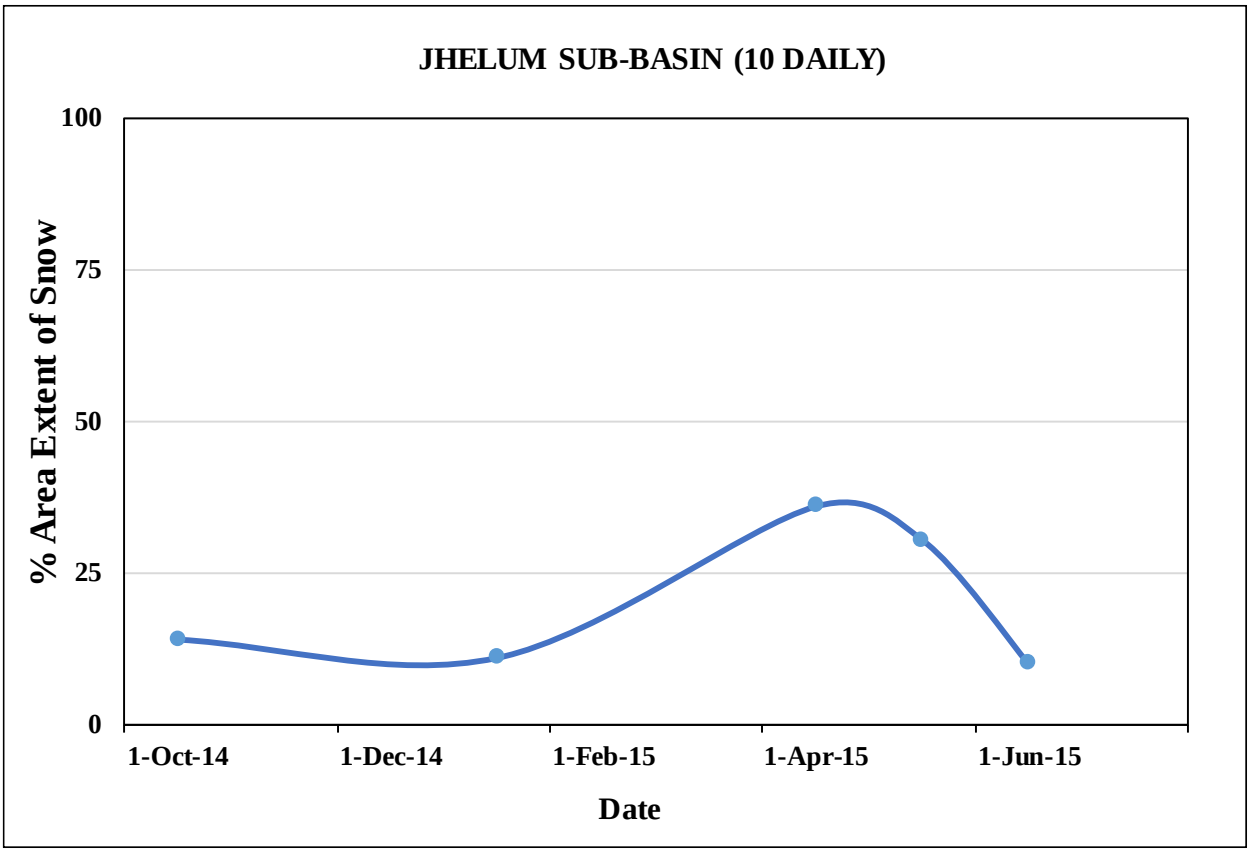
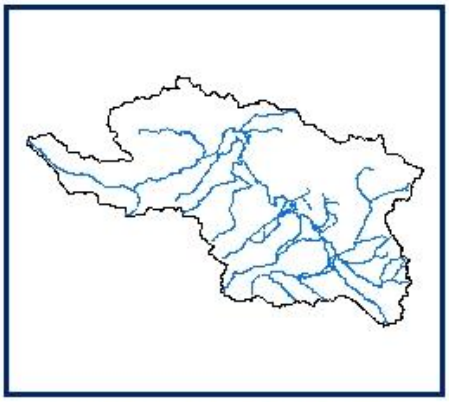


SNOW COVER MAP

SNOW COVER MAP : JHELUM SUB-BASIN



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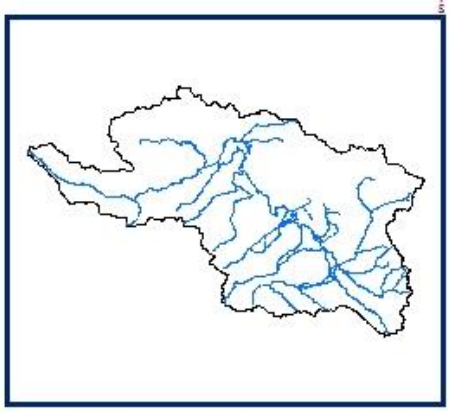

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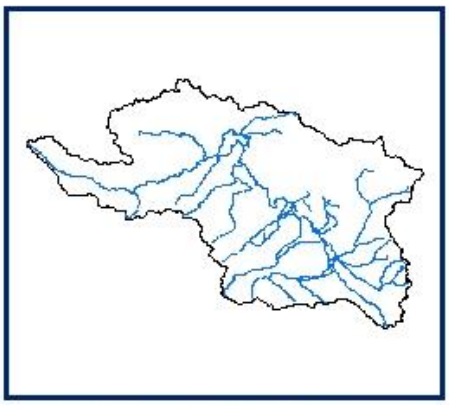

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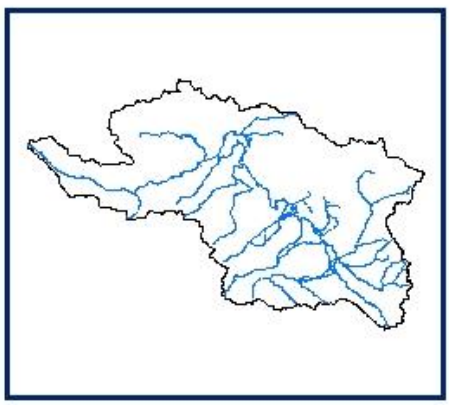

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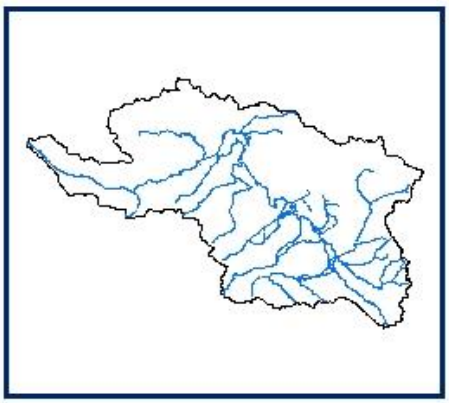

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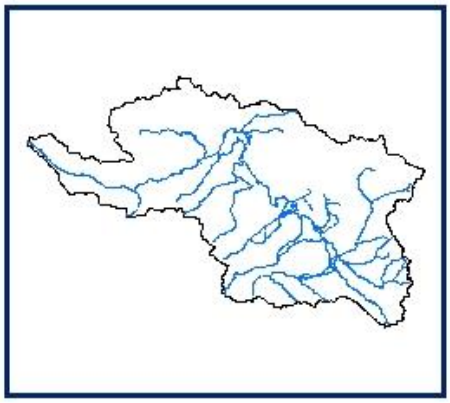
30 OCTOBER 2014

SNOW

60 30 0 60 120 180

Kilometers

10 DAILY SNOW COVER MAP : JHELUM SUB-BASIN



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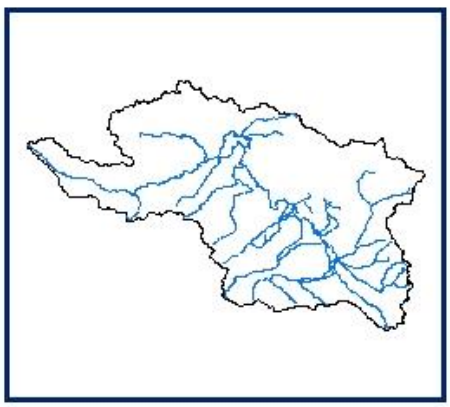

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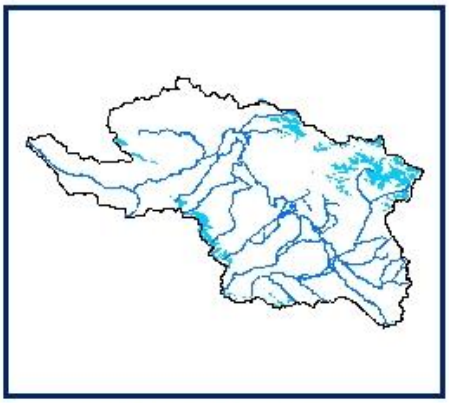
30 OCTOBER 2014

SNOW

3015 0 30 60 90
Kilometers

SNOW COVER MAP : JHELUM SUB-BASIN



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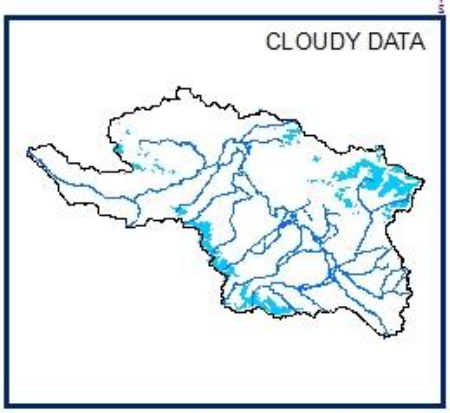

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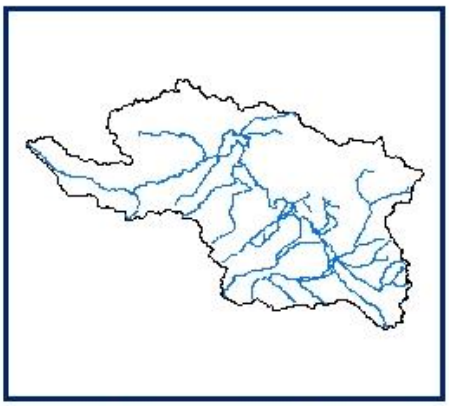

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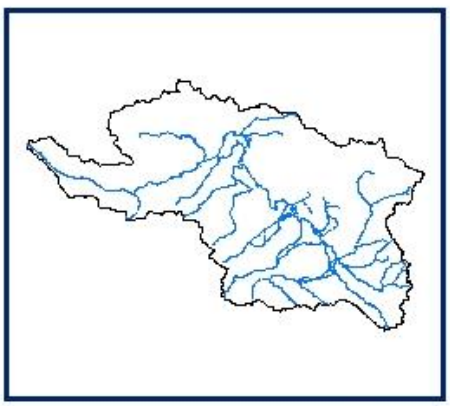

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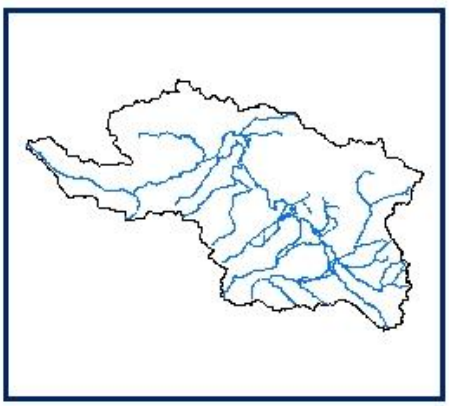

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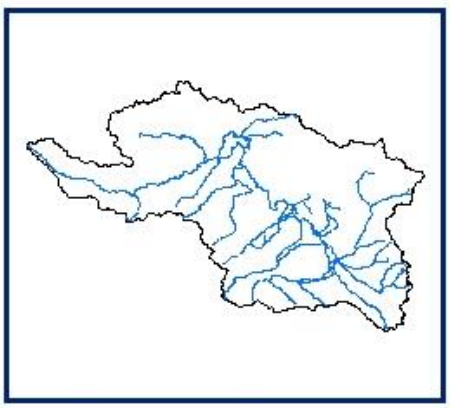

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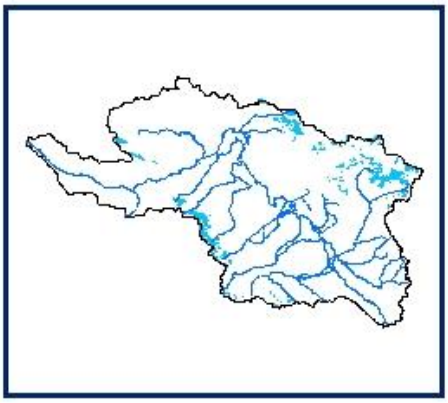
SNOW

60 30 0 60 120 180

Kilometers

10 DAILY SNOW COVER MAP : JHELUM SUB-BASIN



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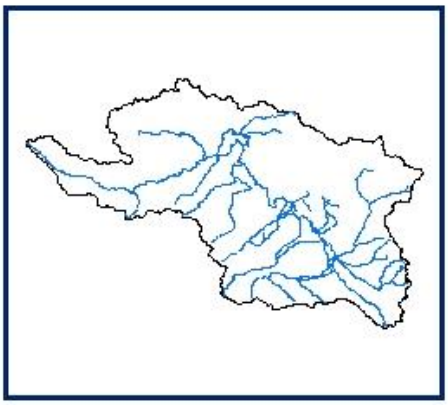

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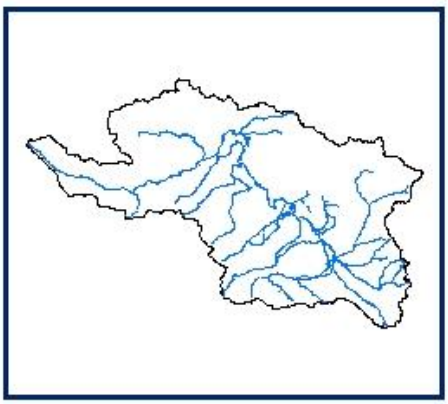

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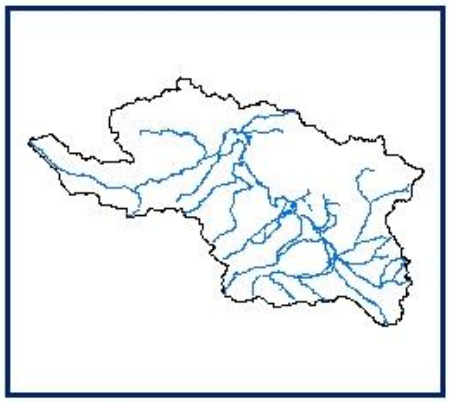
SNOW

3015 0 30 60 90
Kilometers

SNOW COVER MAP : JHELUM SUB-BASIN



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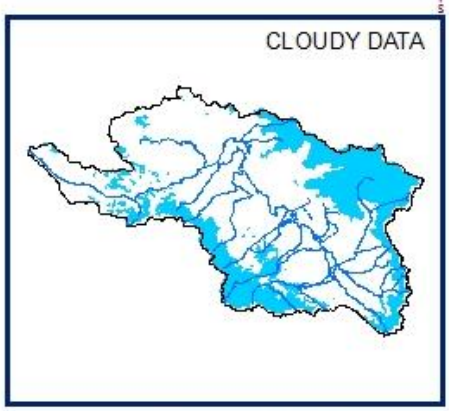

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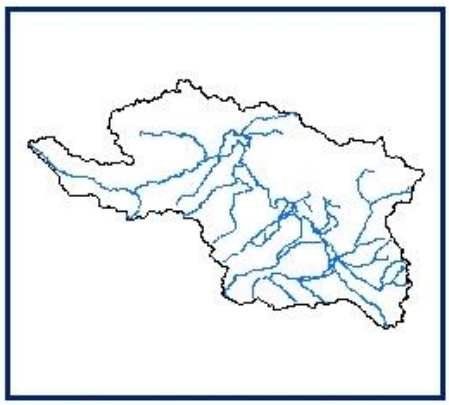

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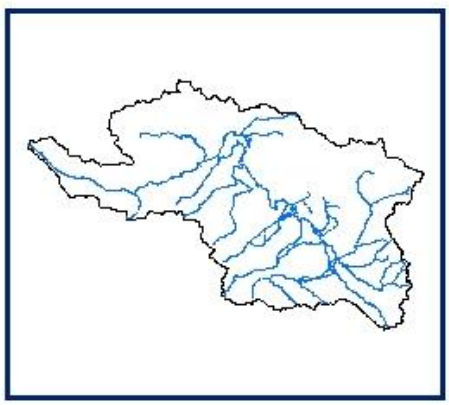

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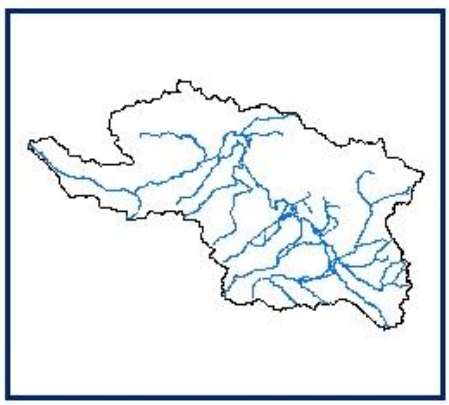

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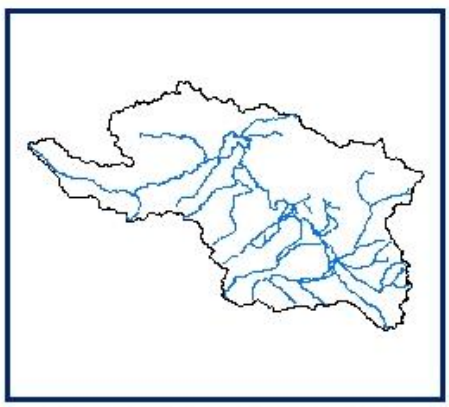

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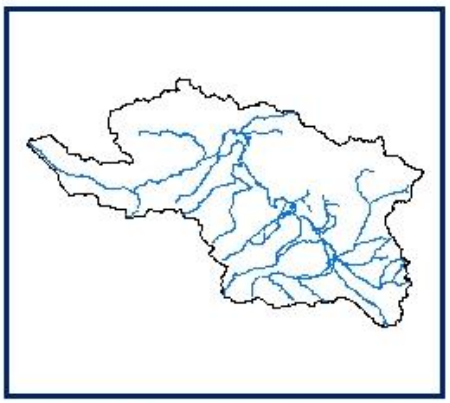
SNOW

60 30 0 60 120 180

Kilometers

SNOW COVER MAP : JHELUM SUB-BASIN



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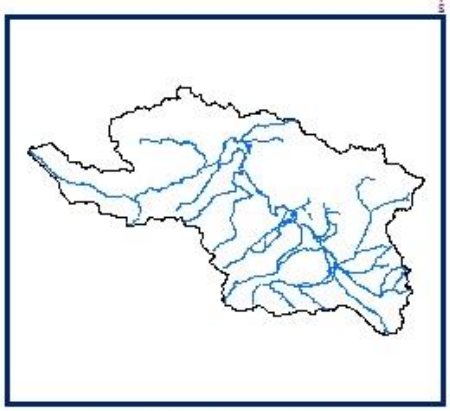

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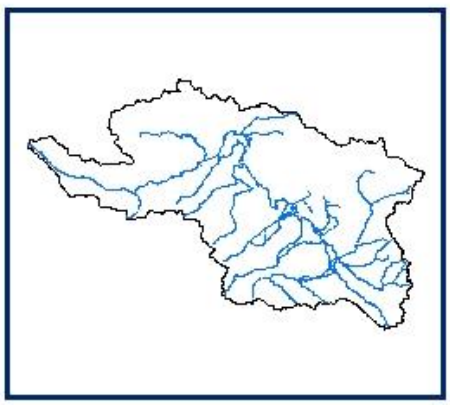

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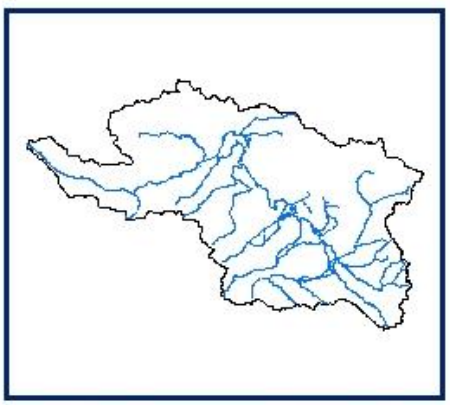

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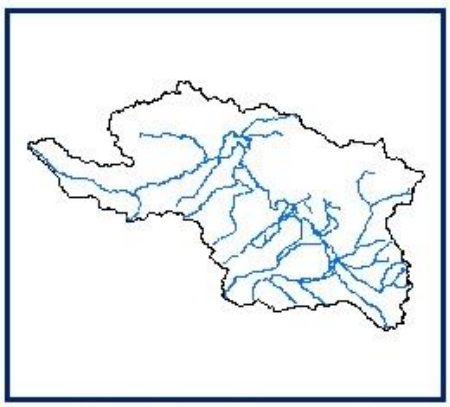

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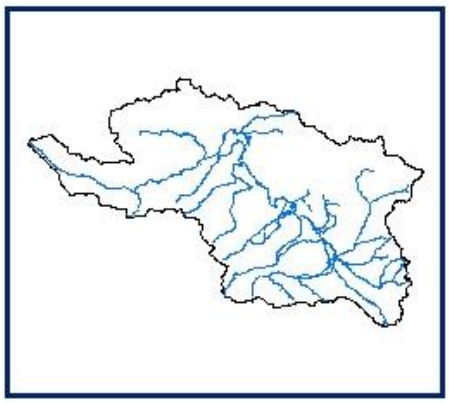
SNOW

60 30 0 60 120 180

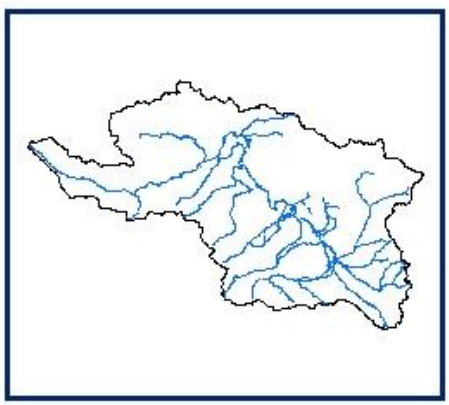
Kilometers

10 DAILY SNOW COVER MAP : JHELUM SUB-BASIN



DATA NOT AVAILABLE

DATA USED
11 APRIL 2015



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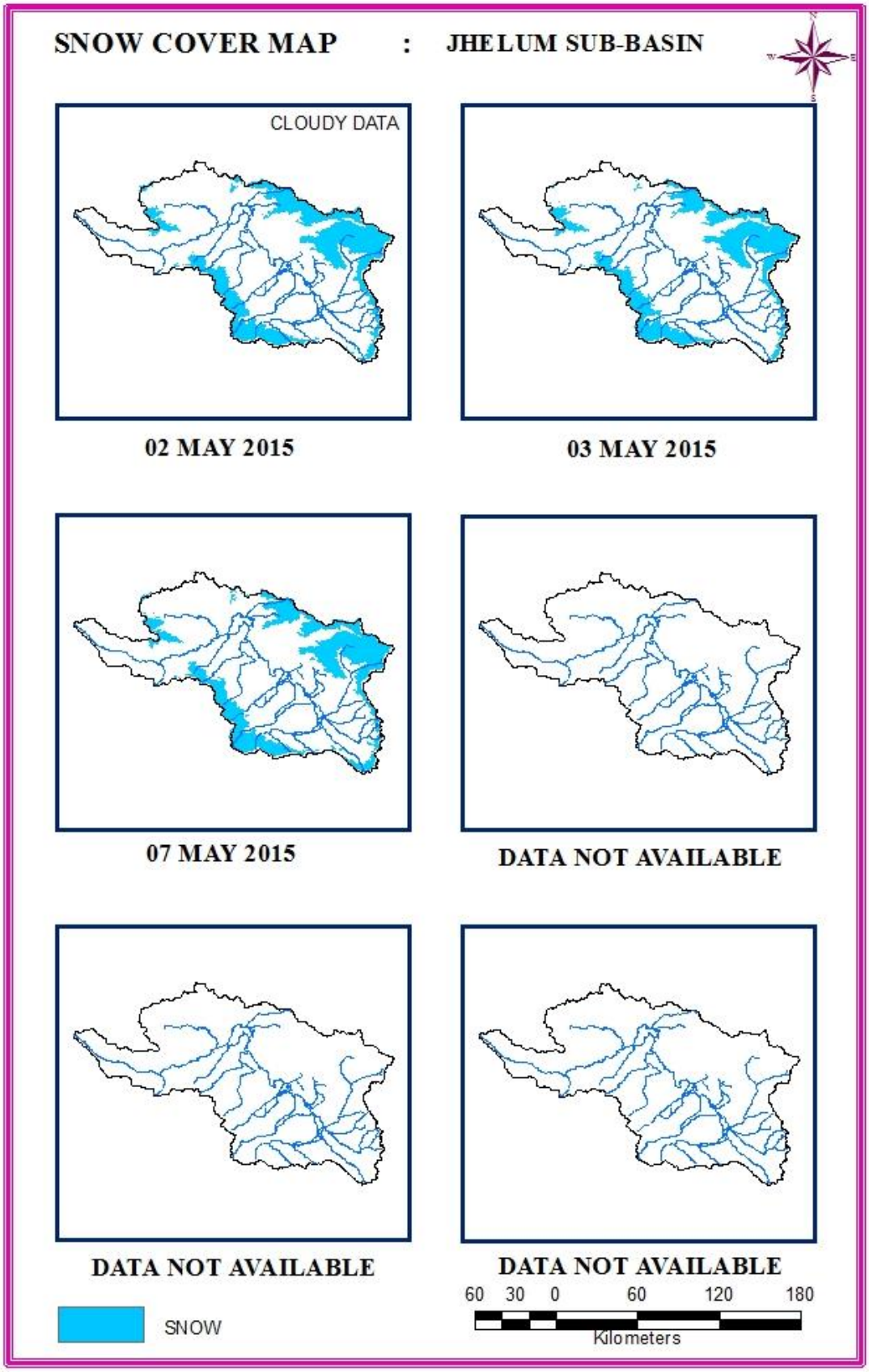
SNOW

3015 0 30 60 90
Kilometers


SNOW COVER MAP : JHELUM SUB-BASIN
CLOUDY DATA
02 MAY 2015
03 MAY 2015
07 MAY 2015
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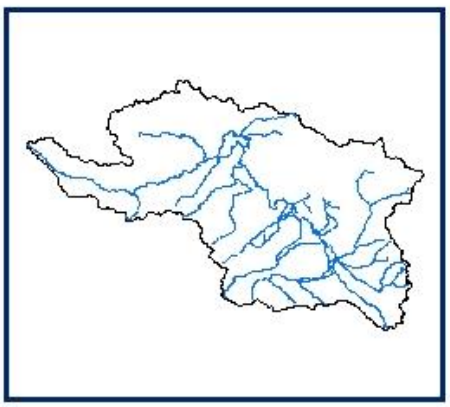
DATA NOT AVAILABLE
SNOW
60 30 0 60 120 180
Kilometers

10 DAILY SNOW COVER MAP : JHELUM SUB-BASIN

DATA USED
03 MAY 2015
07 MAY 2015



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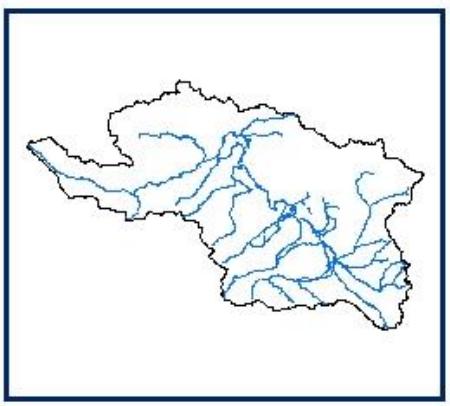

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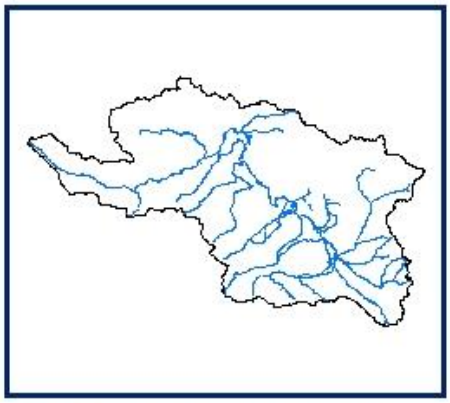
SNOW

3015 0 30 60 90
Kilometers

SNOW COVER MAP : JHELUM SUB-BASIN



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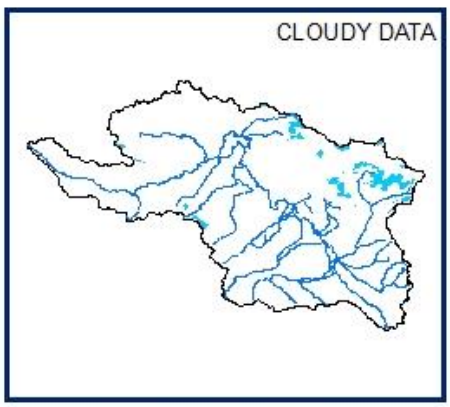
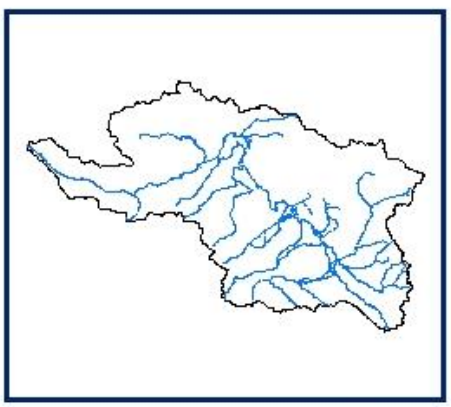
07 JUNE 2015



14 JUNE 2015



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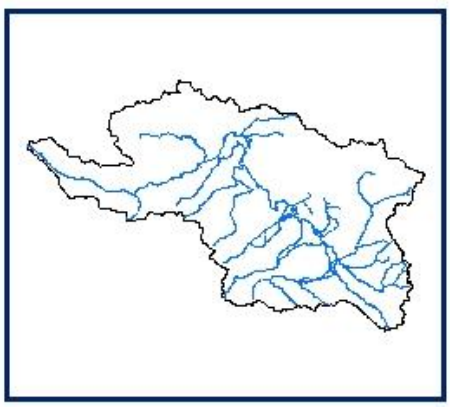

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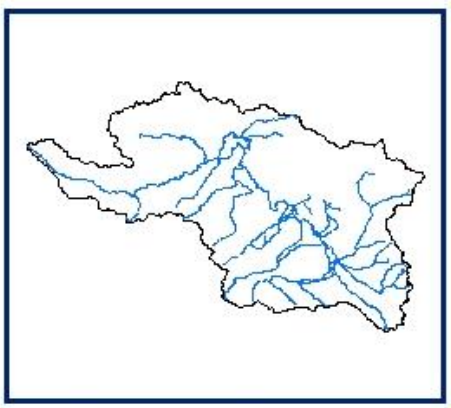

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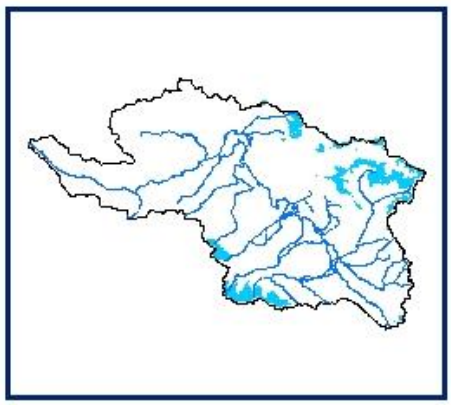
SNOW

60 30 0 60 120 180

Kilometers

10 DAILY SNOW COVER MAP : JHELUM SUB-BASIN



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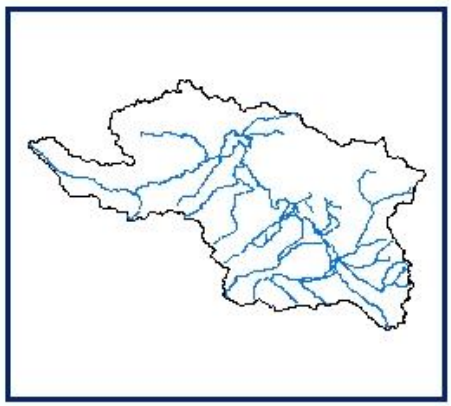

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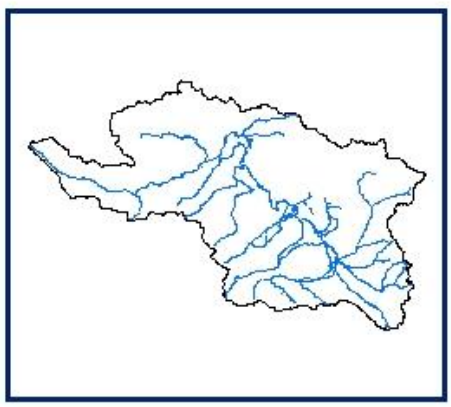

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SNOW

3015 0 30 60 90
Kilometers

KISANGANGA SUB-BASIN

AREAL EXTENT OF SNOW (5 DAILY)

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

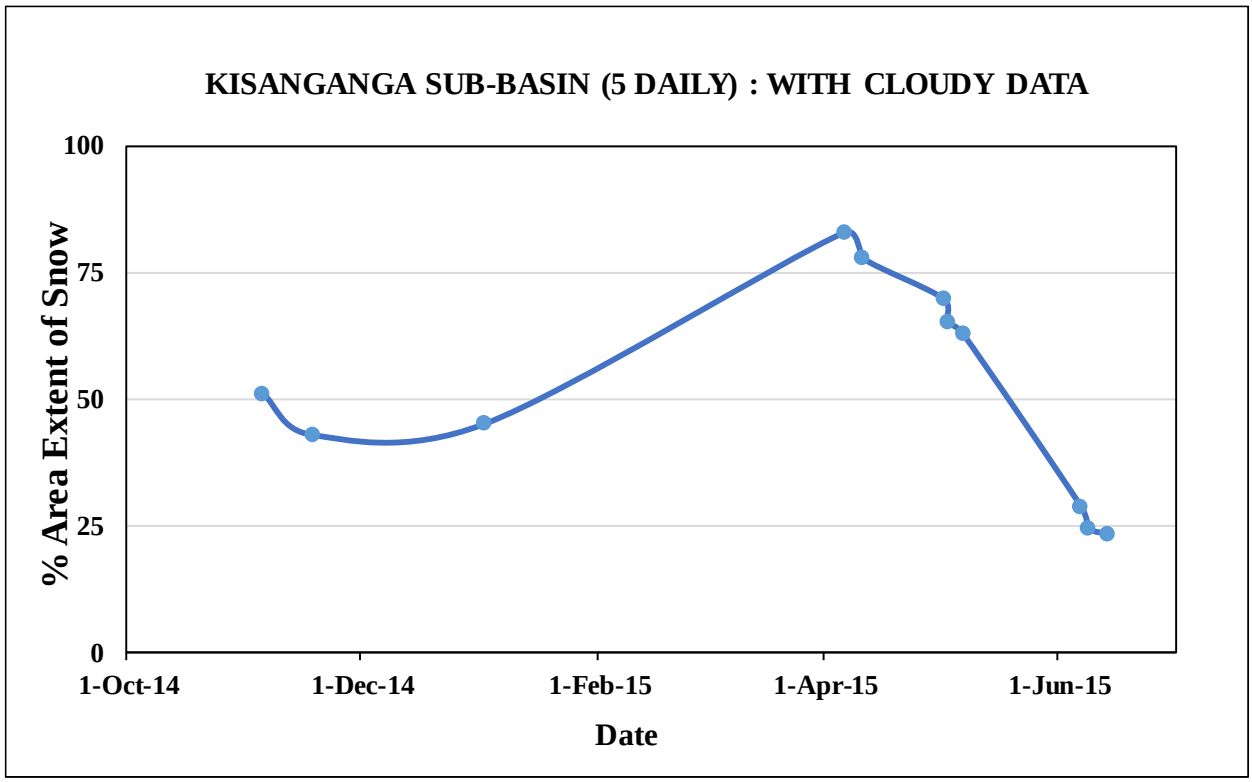
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	05-Nov-2014	3821 (C)	51	**2**	18-Nov-2014	3205	43
January 2015							
3	02-Jan-2015	3366	45				
April 2015							
4	06-April-2015	6184	83	**5**	11-April-2015	5802	78
May 2015							
6	02-May-2015	5211 (C)	70	**7**	03-May-2015	4865	65
8	07-May-2015	4703	63				
June 2015							
9	07-June-2015	2148 (C)	29	**10**	09-June-2015	1829 (C)	25
11	14-June-2015	1751	23				

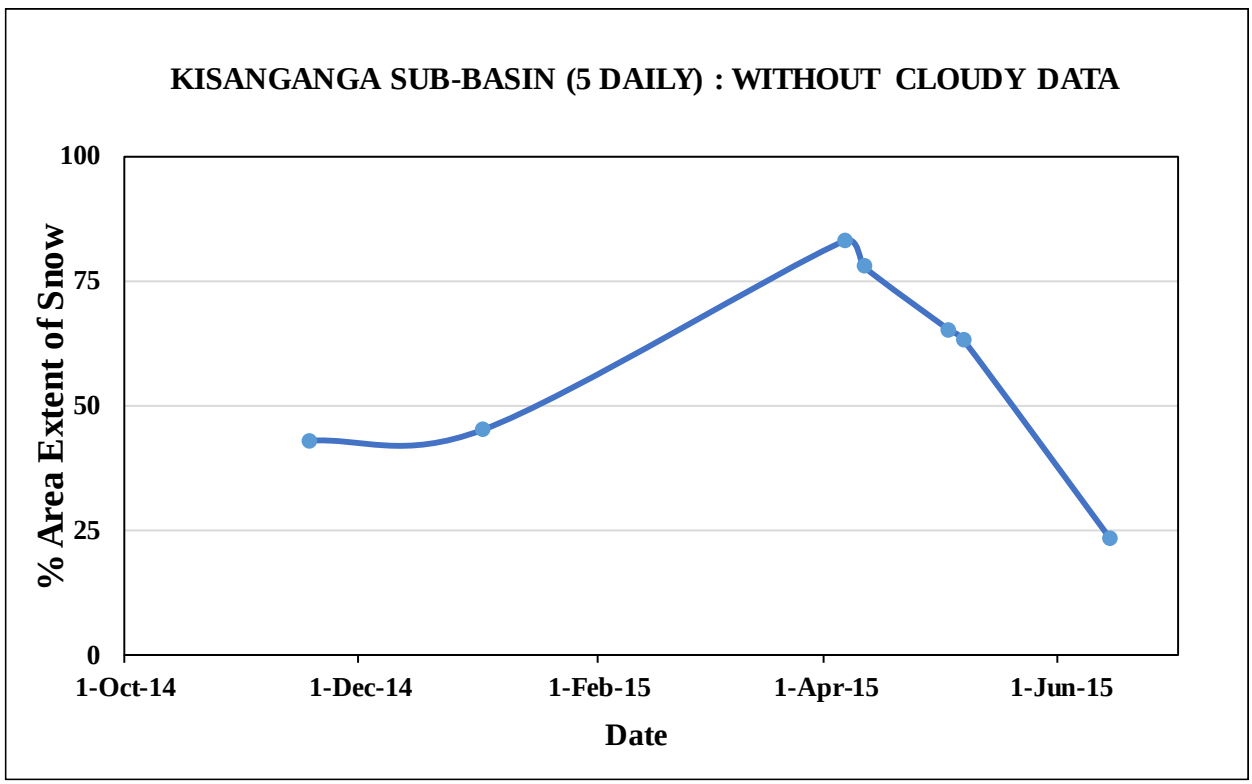
AREAL EXTENT OF SNOW (10 DAILY)

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 2014							
1	18-Nov-2014	3205	43				
January 2015							
2	02-Jan-2015	3366	45				
April 2015							
3	06-April-2015	6184	83	**4**	11-April-2015	5802	78
May 2015							
5	05-May-2015	5326	71				
June 2015							
6	05-June-2015	2139	29	**7**	14-June-2015	1751	23

SNOW COVER DEPLETION CURVE





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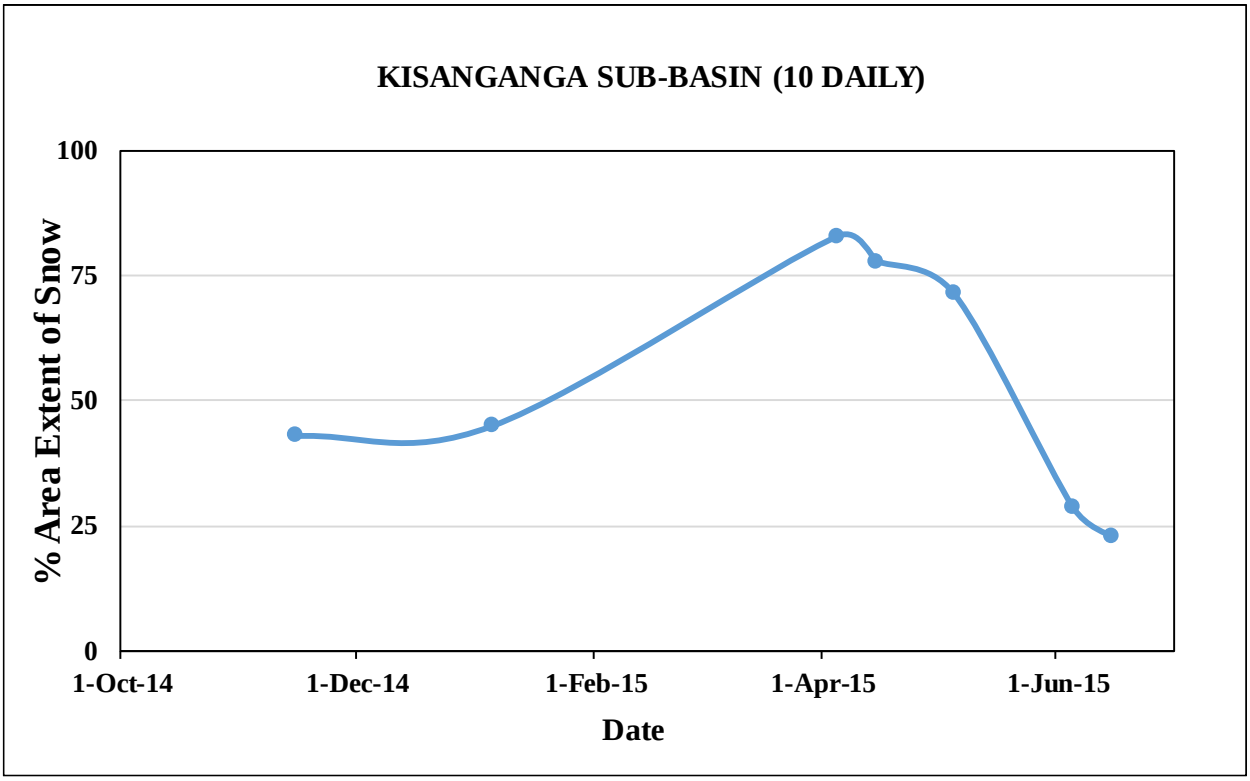
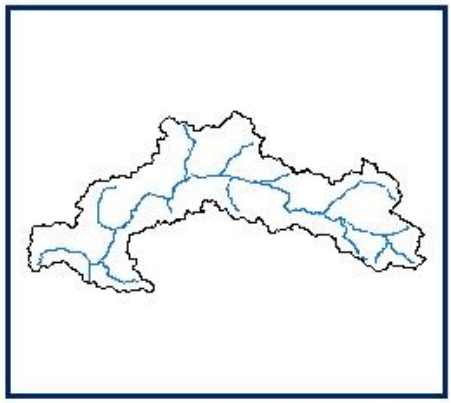


SNOW COVER MAP

SNOW COVER MAP : KISAN GANGA SUB-BASIN



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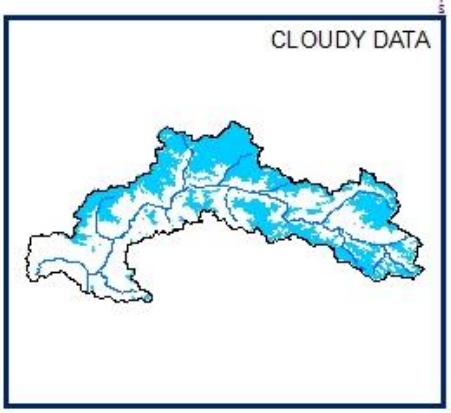
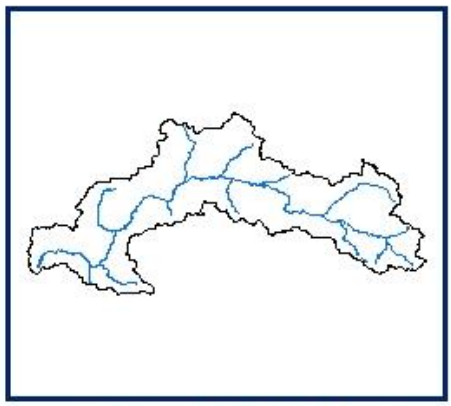


05 NOVEMBER 2014



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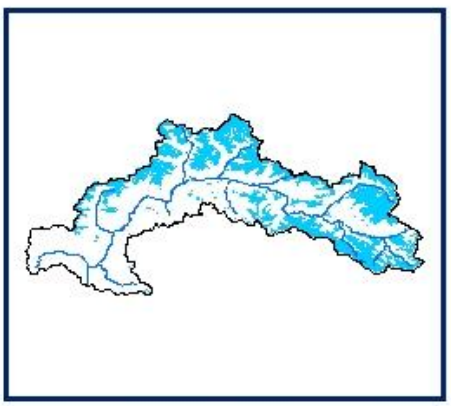

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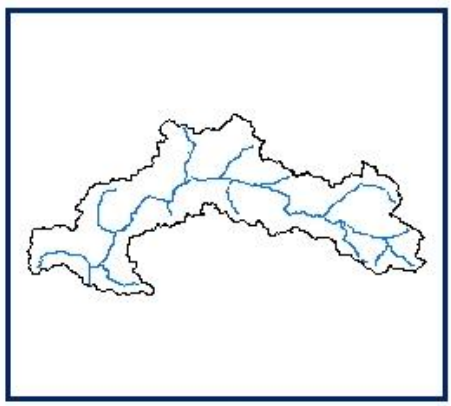

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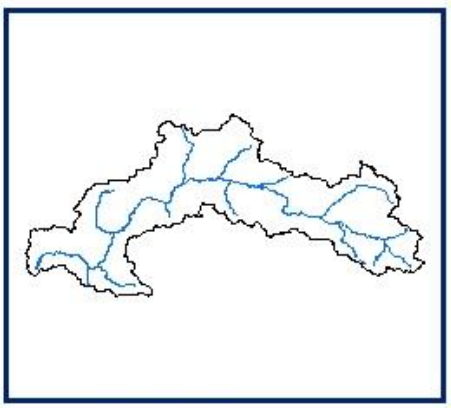

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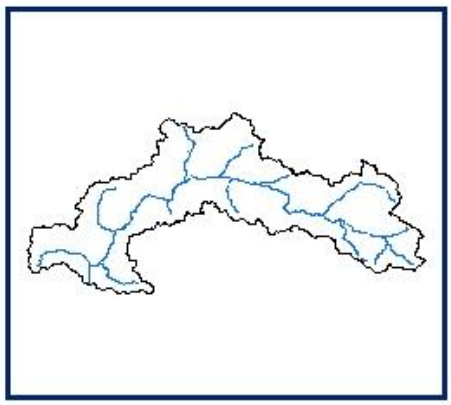
SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : KISAN GANGA SUB-BASIN



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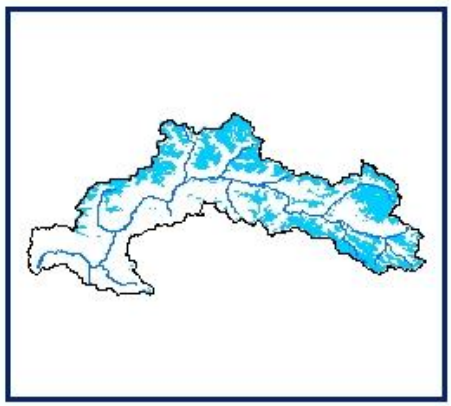

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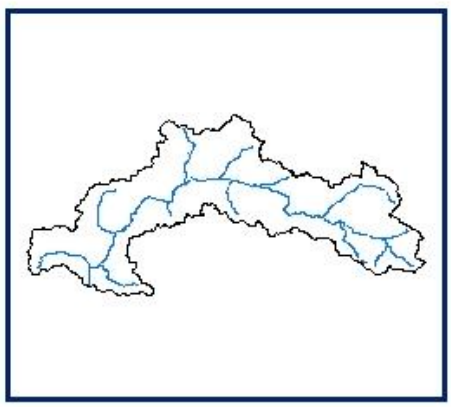
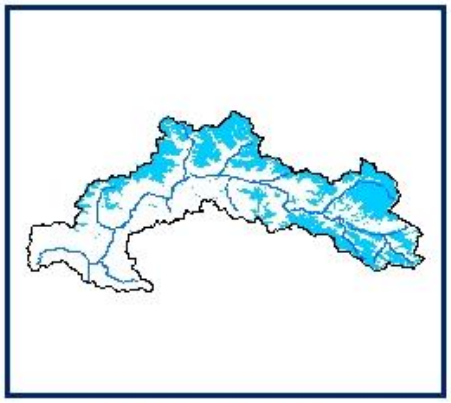


DATA NOT AVAILABLE

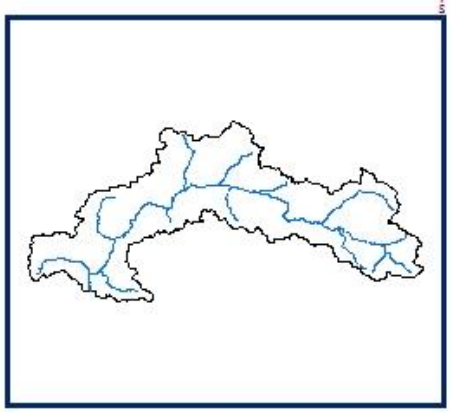
30 15 0 30 60 90
Kilometers

SNOW

SNOW COVER MAP : KISAN GANGA SUB-BASIN



02 JANUARY 2015



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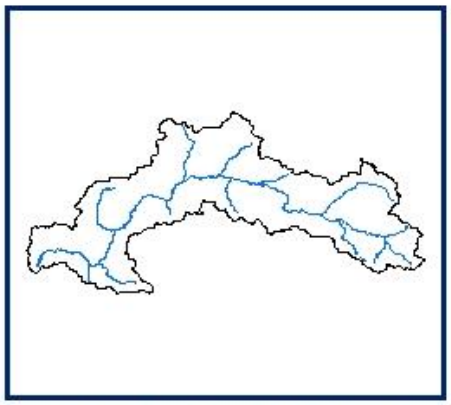

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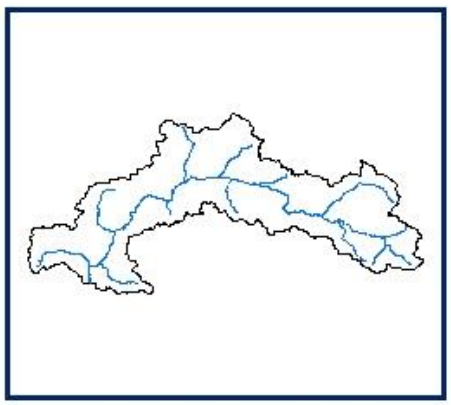

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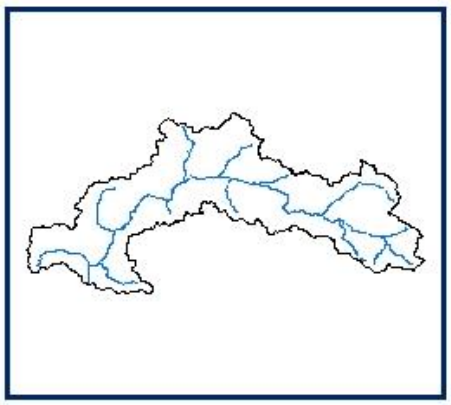

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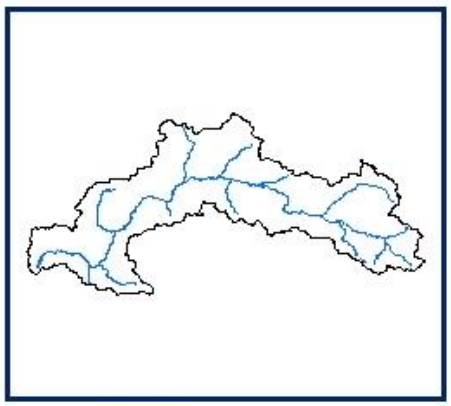

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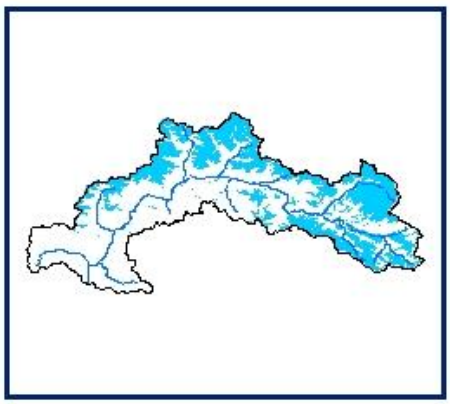
SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : KISAN GANGA SUB-BASIN



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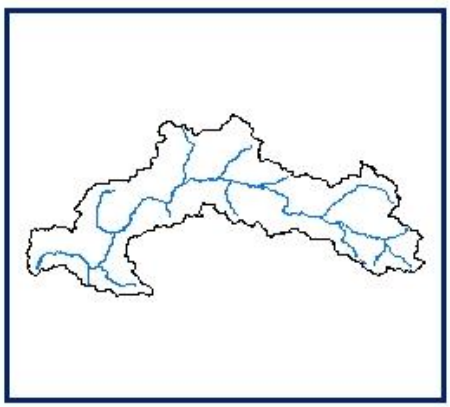

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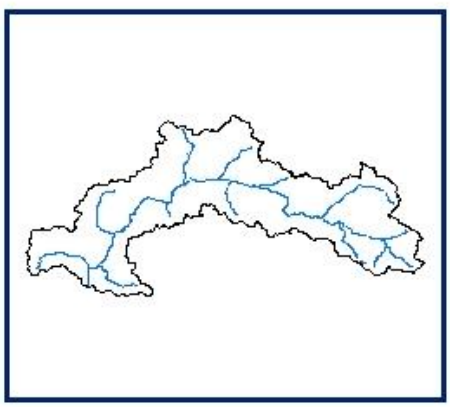

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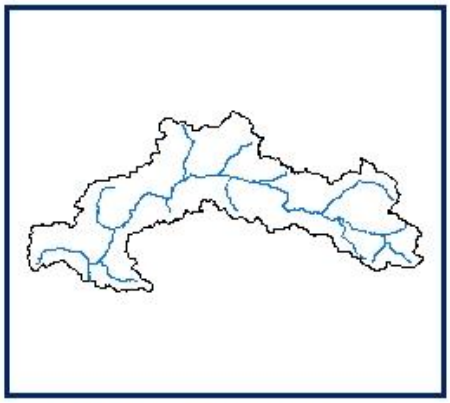
SNOW

30 15 0 30 60 90
Kilometers

SNOW COVER MAP : KISAN GANGA SUB-BASIN



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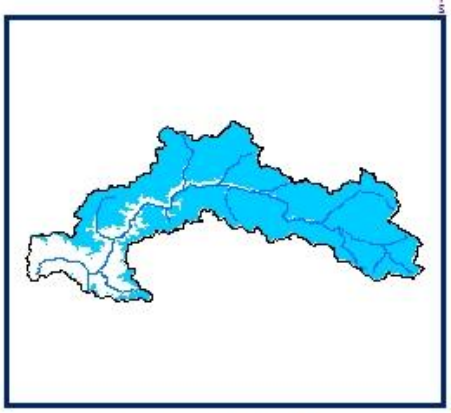
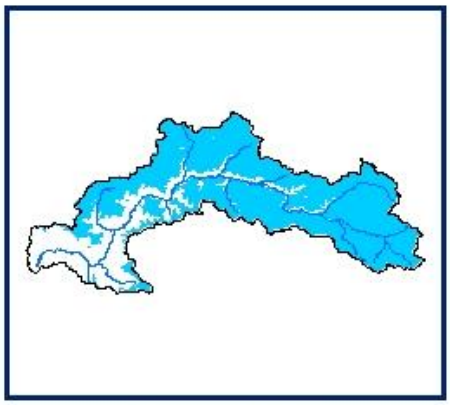
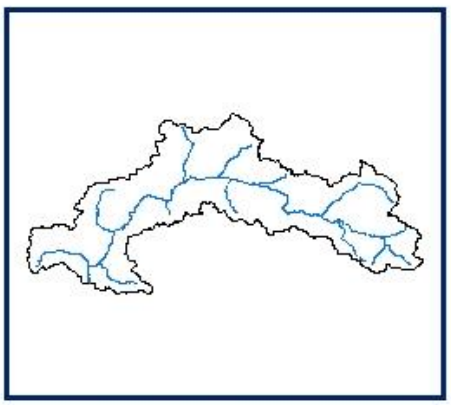


06 APRIL 2015



11 APRIL 2015



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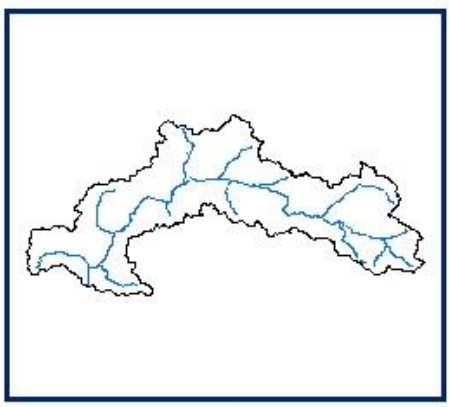

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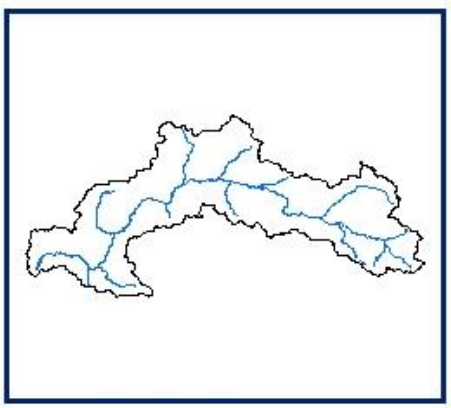

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SNOW

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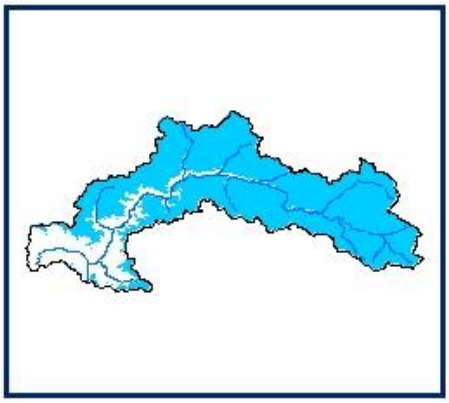
Kilometers

10 DAILY SNOW COVER MAP : KISAN GANGA SUB-BASIN



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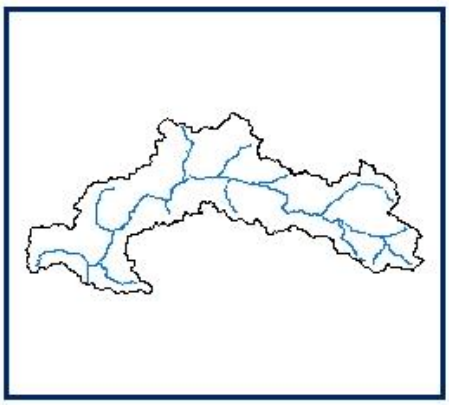

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SNOW

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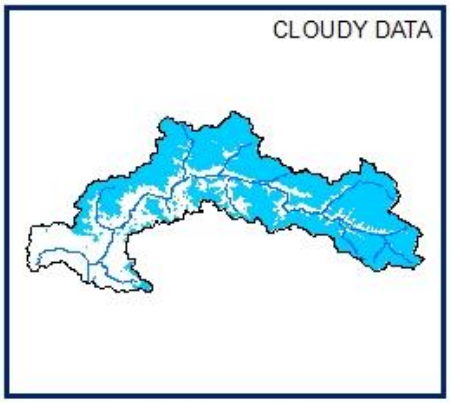
Kilometers

SNOW COVER MAP : KISAN GANGA SUB-BASIN



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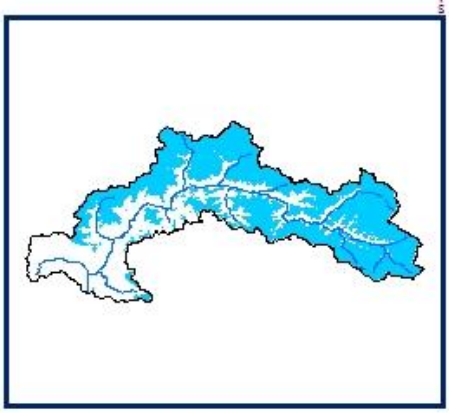

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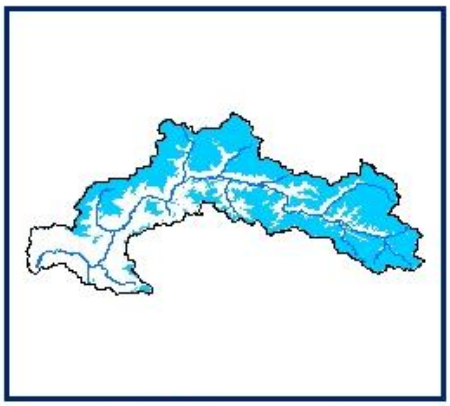

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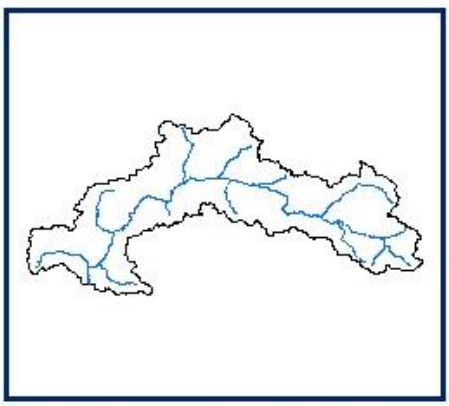

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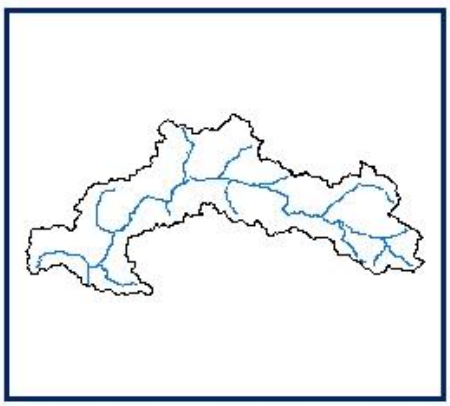

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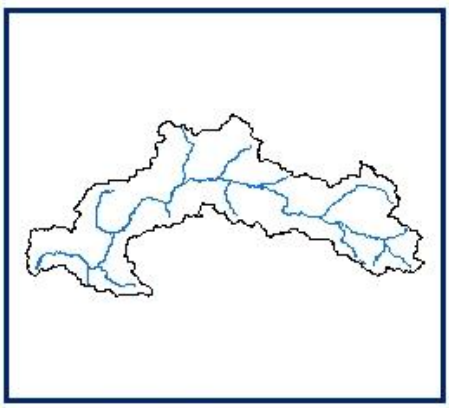


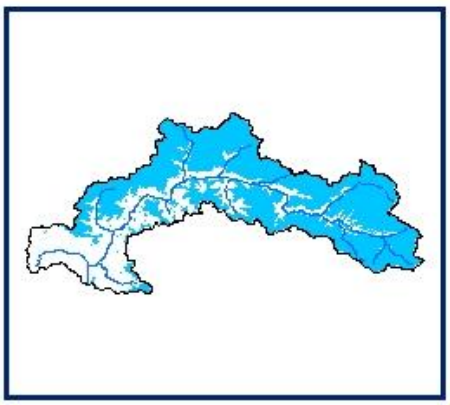
DATA NOT AVAILABLE

SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : KISAN GANGA SUB-BASIN



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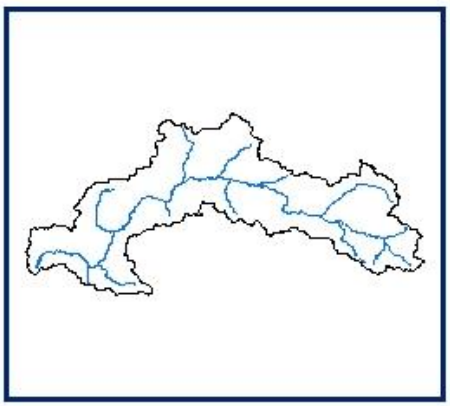

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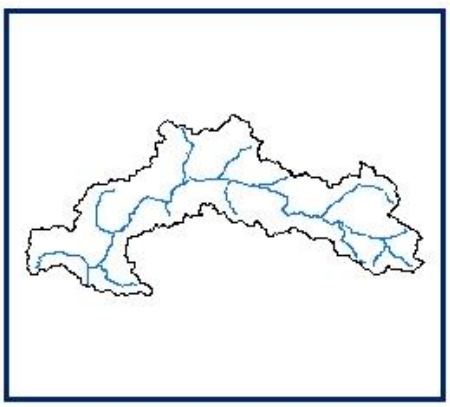

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SNOW

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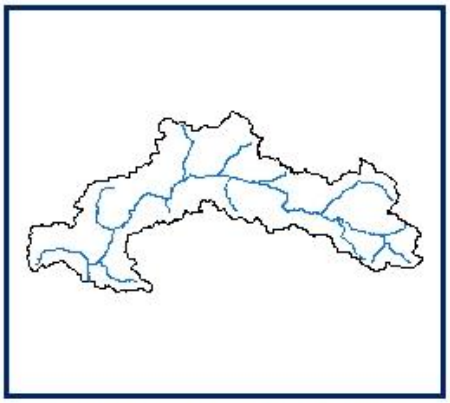
Kilometers

SNOW COVER MAP : KISAN GANGA SUB-BASIN



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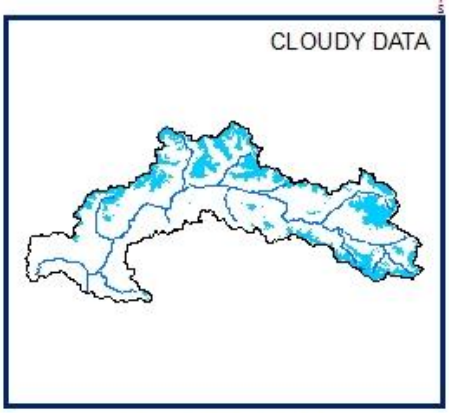
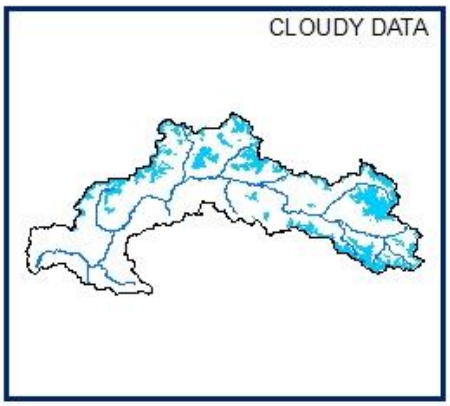
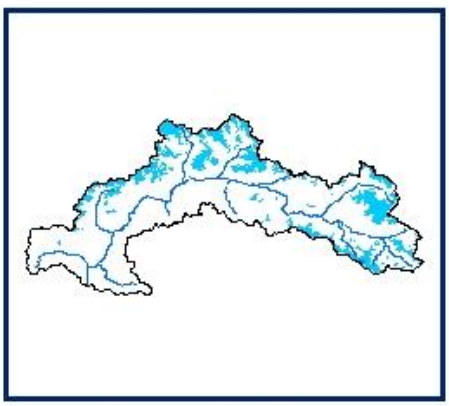


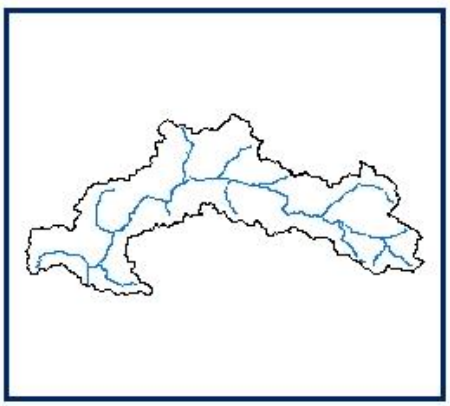
07 JUNE 2015



09 JUNE 2015



14 JUNE 2015



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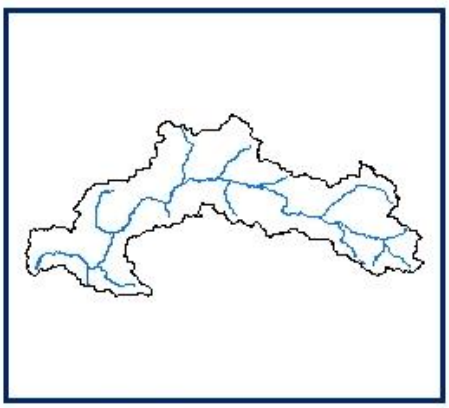

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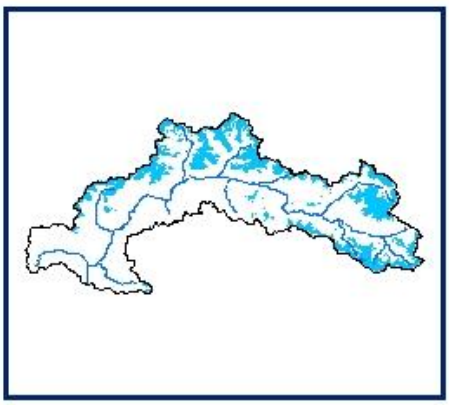
SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : KISAN GANGA SUB-BASIN



DATA USED
07 JUNE 2015
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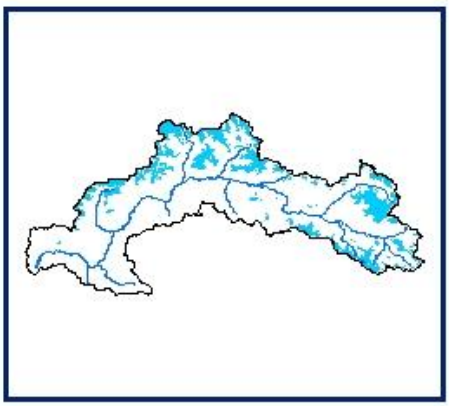

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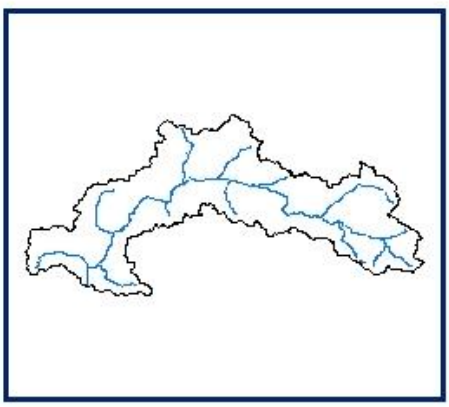


DATA NOT AVAILABLE

30 15 0 30 60 90
Kilometers

SNOW

ASTOR SUB-BASIN

AREAL EXTENT OF SNOW (5 DAILY)

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

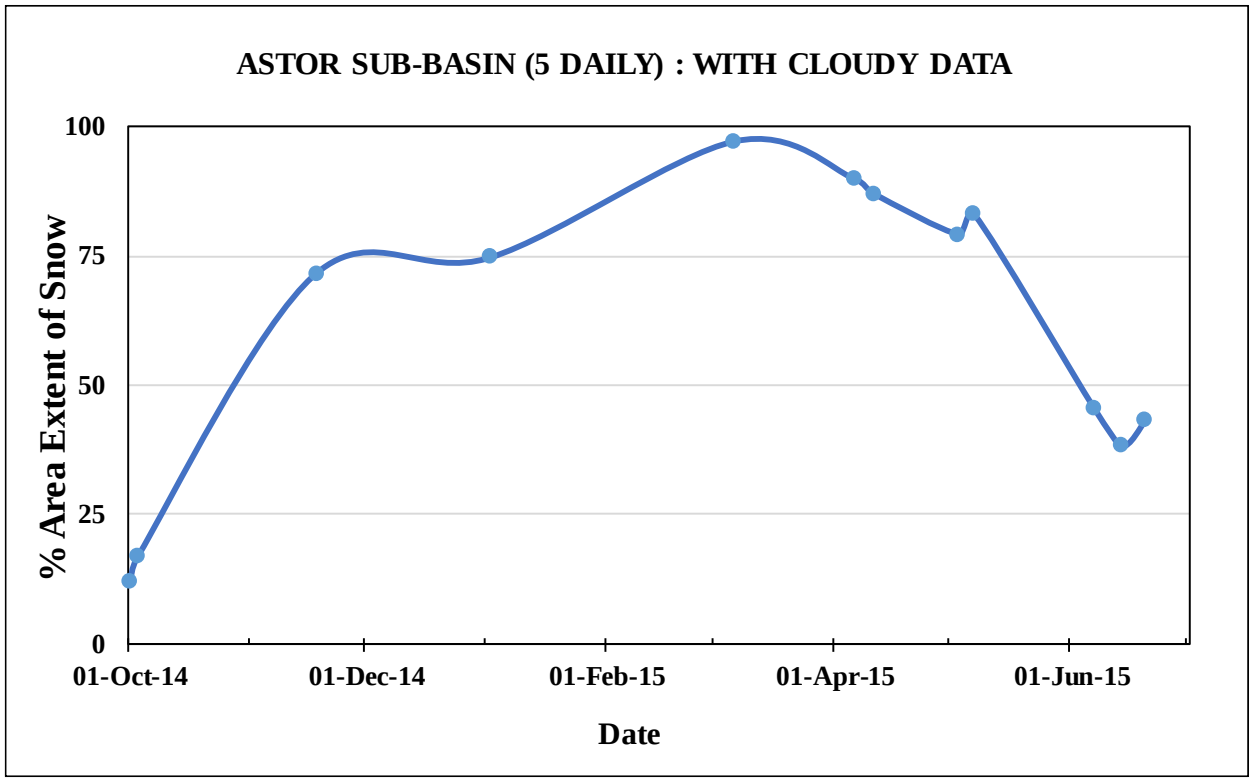
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	02-Oct-2014	480	12	**2**	03-Oct-2014	678	17
November 2014							
3	18-Nov-2014	2870	72				
January 2015							
4	02-Jan-2015	2995	72				
March 2015							
5	06-Mar-2015	3896 (C)	97				
April 2015							
6	06-Apr-2015	3605	90	**7**	11-Apr-2015	3490	87
May 2015							
8	03-May-2015	3172	79	**9**	07-May-2015	3327	83
June 2015							
10	07-June-2015	1820	45	**11**	14-June-2015	1532	38
12	20-June-2015	1726	43				

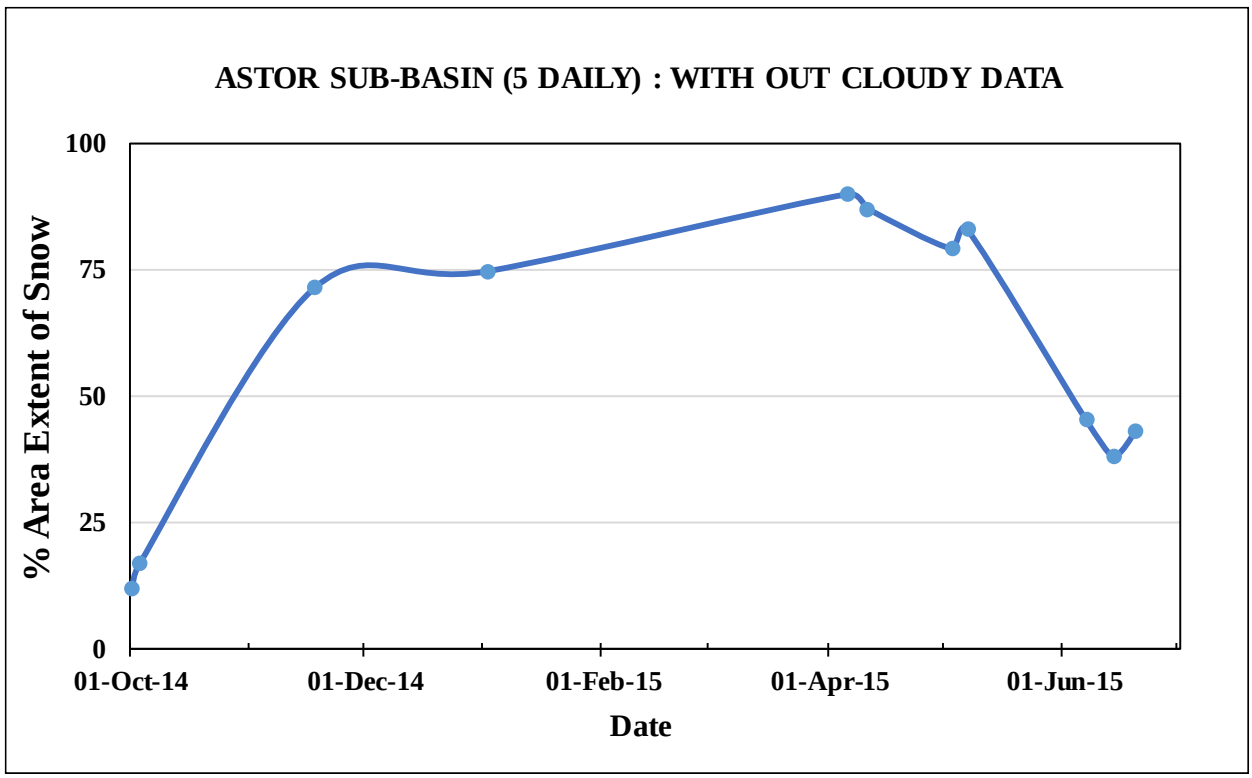
AREAL EXTENT OF SNOW (10 DAILY)

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

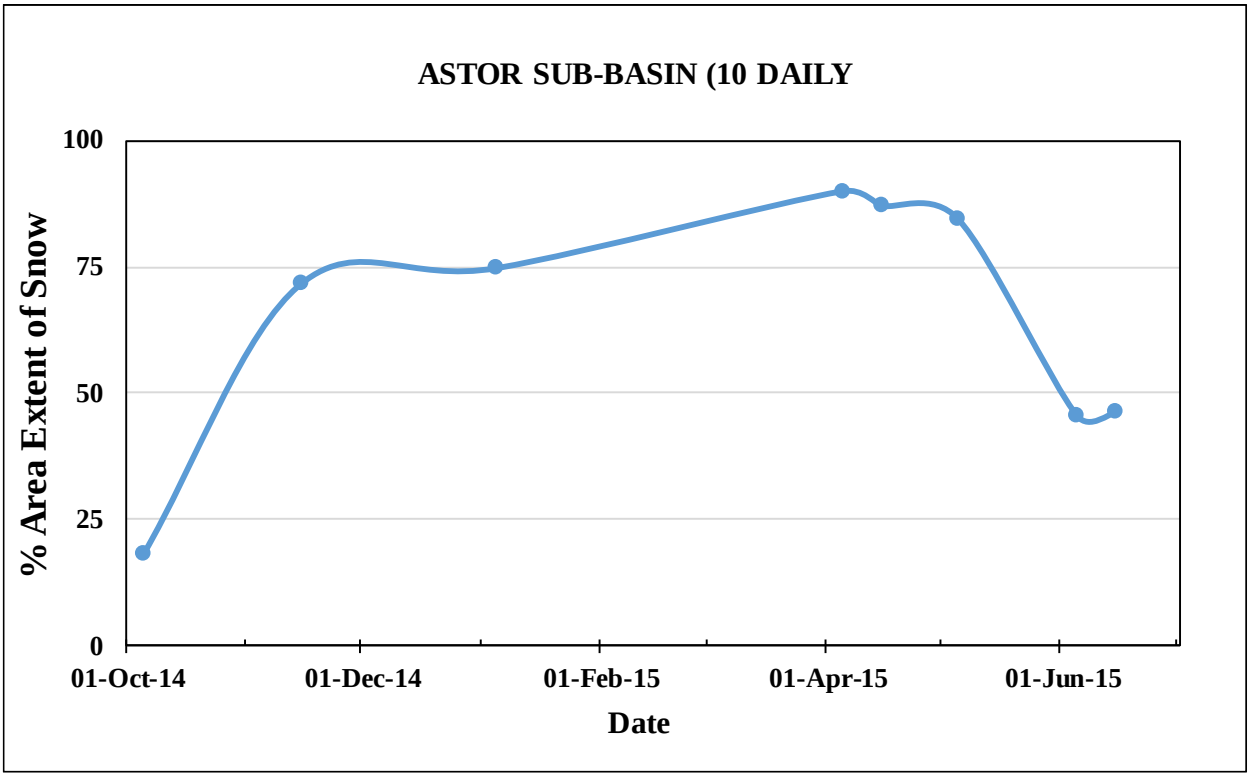
S. No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	05-Oct-2014	727	18				
November 2014							
2	18-Nov-2014	2870	72				
January 2015							
3	02-Jan-2015	2995	72				
April 2015							
4	06-Apr-2015	3605	90	**5**	11-Apr-2015	3490	87
May 2015							
6	05-May-2015	3383	84				
June 2015							
7	07-June-2015	1820	45		15-June-2015	1850	46

SNOW COVER DEPLETION CURVE



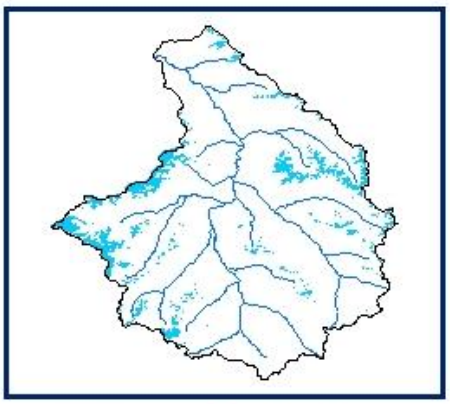


SNOW COVER DEPLETION CURVE

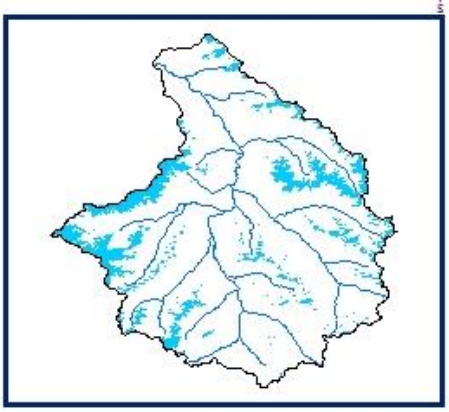


SNOW COVER MAP

SNOW COVER MAP : ASTOR SUB-BASIN



01 OCTOBER 2014



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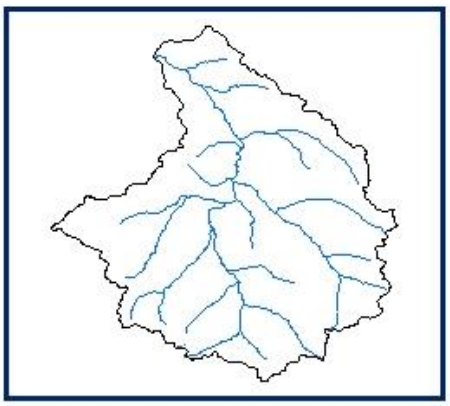

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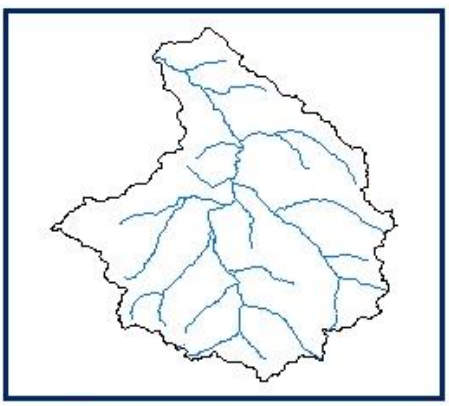

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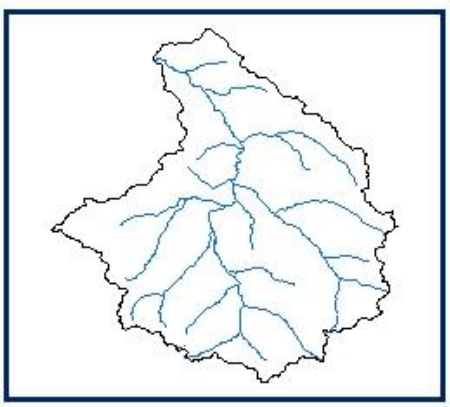

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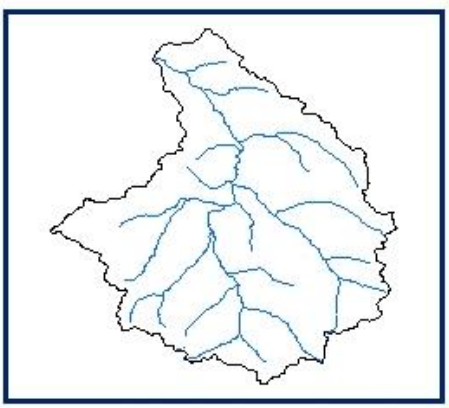


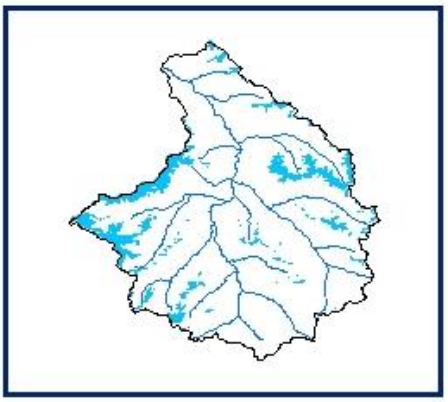
DATA NOT AVAILABLE

SNOW

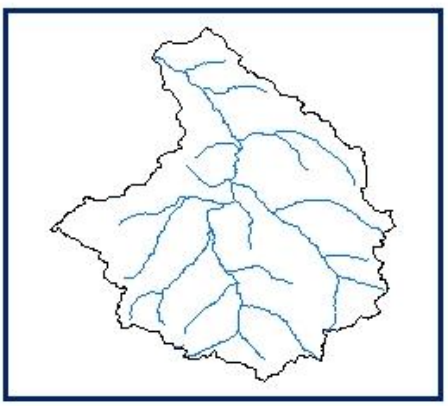
25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : ASTOR SUB-BASIN



DATA USED
01 OCTOBER 2014
03 OCTOBER 2014



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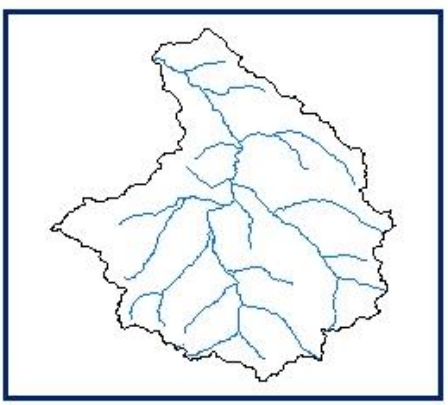
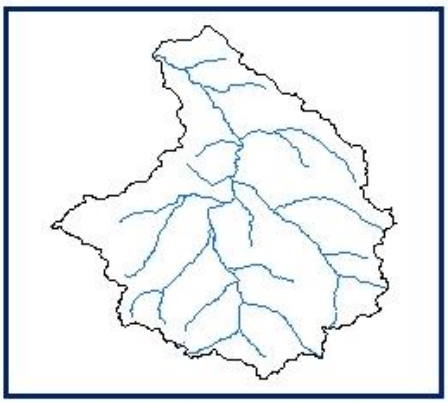


DATA NOT AVAILABLE

SNOW

105 0 10 20 30
Kilometers

SNOW COVER MAP : ASTOR SUB-BASIN



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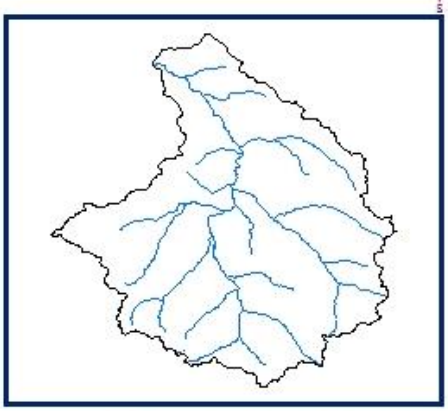

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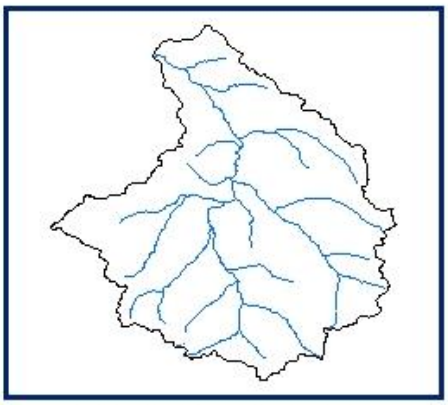

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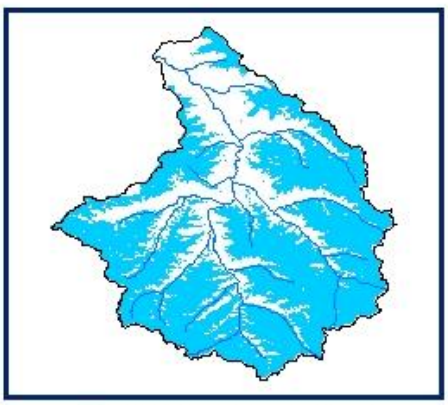

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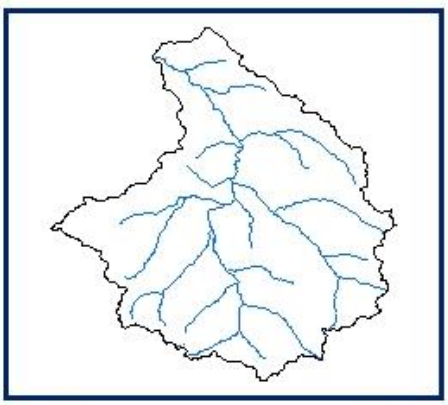

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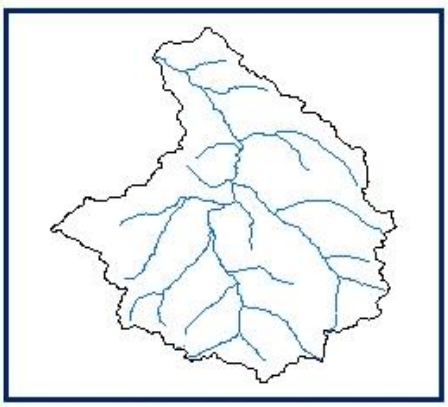


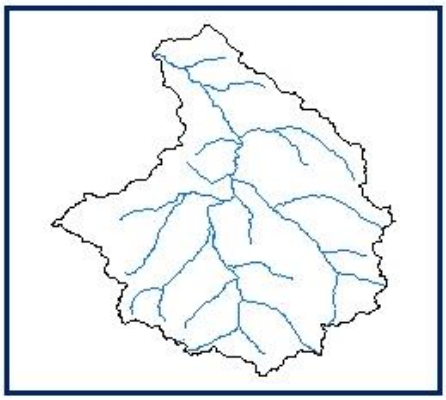
DATA NOT AVAILABLE

SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : ASTOR SUB-BASIN



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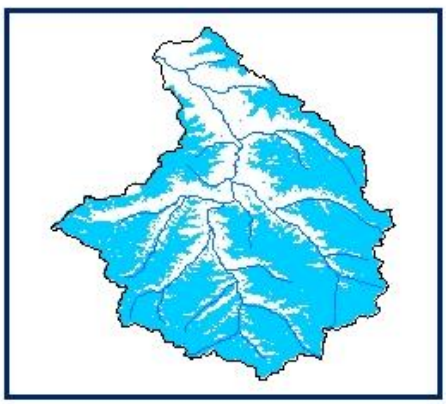

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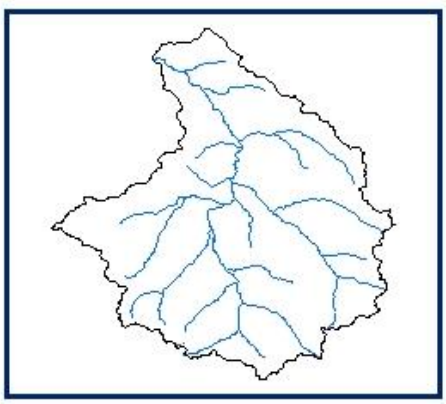

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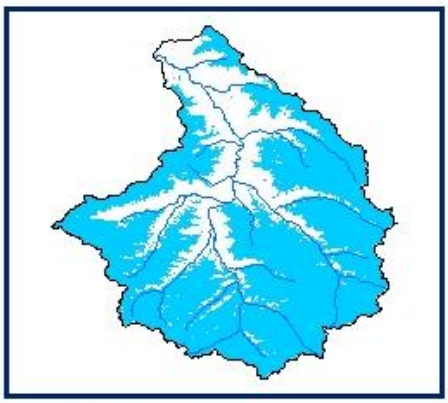
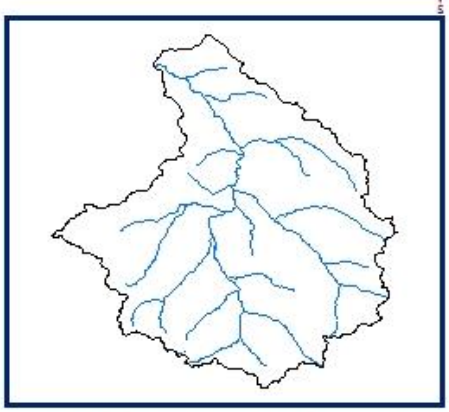
SNOW

105 0 10 20 30
Kilometers

SNOW COVER MAP : ASTOR SUB-BASIN



02 JANUARY 2015



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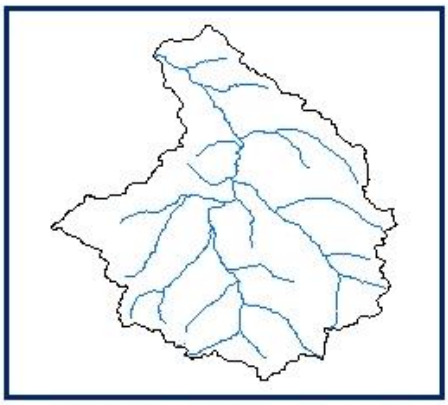

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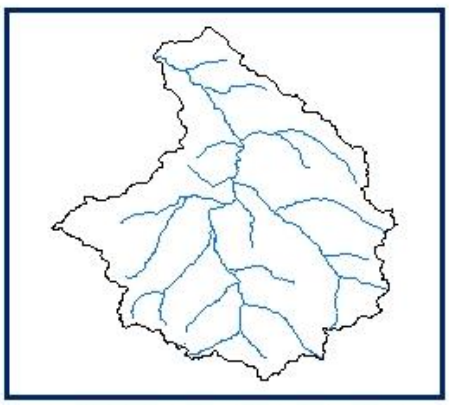

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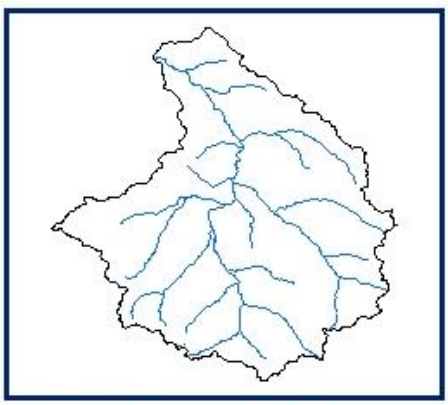

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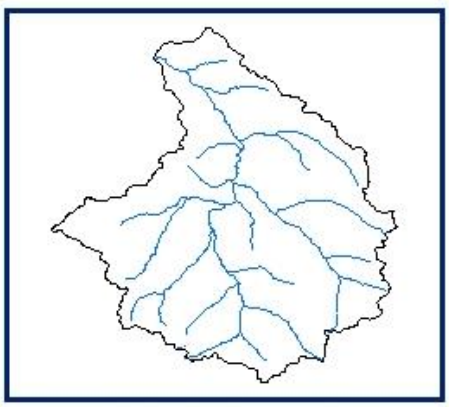

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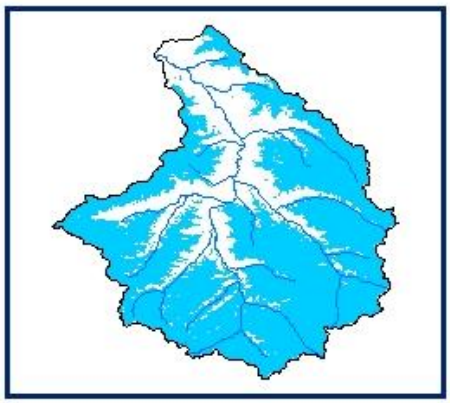
SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : ASTOR SUB-BASIN



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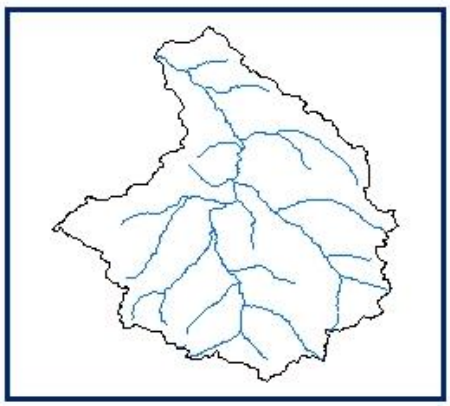

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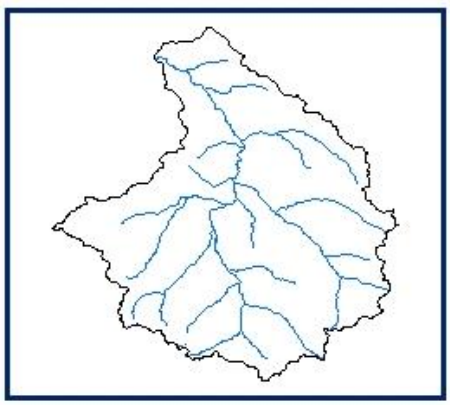


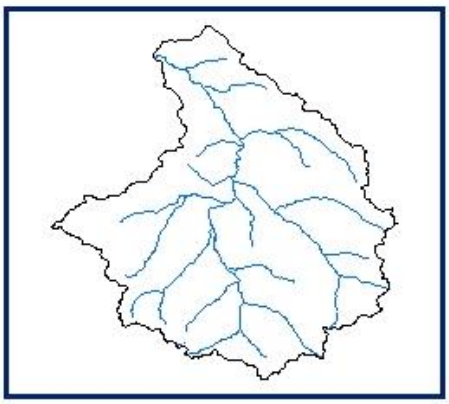
DATA NOT AVAILABLE

105 0 10 20 30

Kilometers

SNOW

SNOW COVER MAP : ASTOR SUB-BASIN



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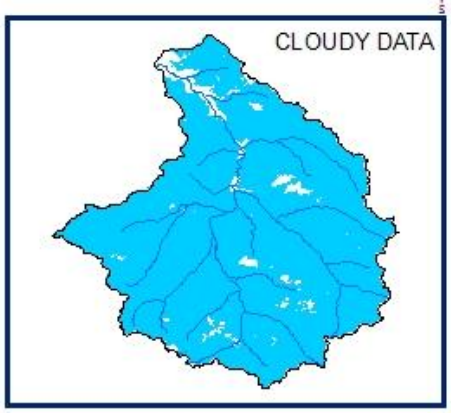
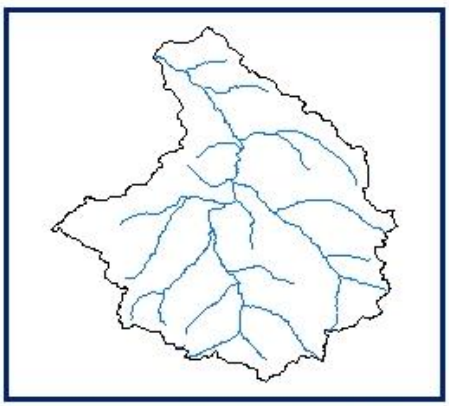


06 MARCH 2015



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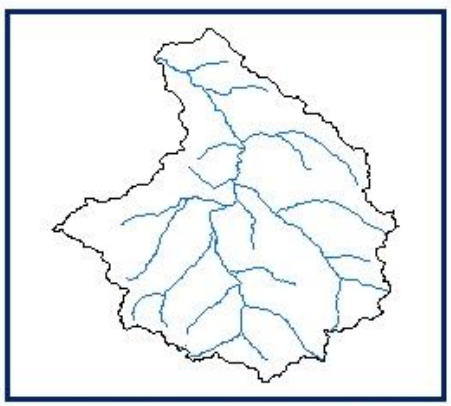

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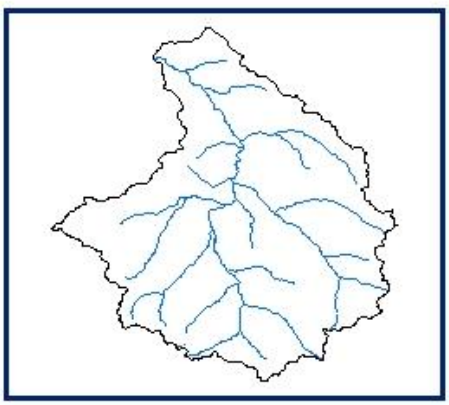

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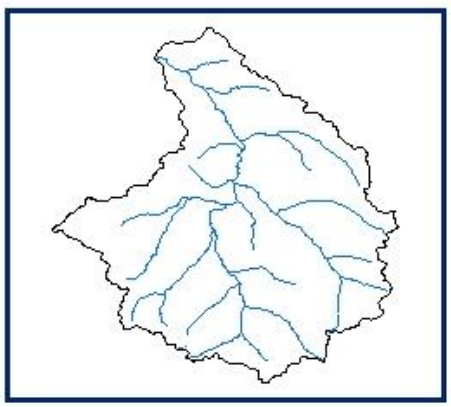

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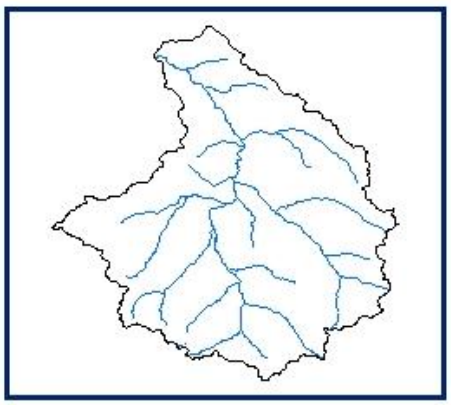
SNOW

25 12.5 0 25 50 75

Kilometers

SNOW COVER MAP : ASTOR SUB-BASIN



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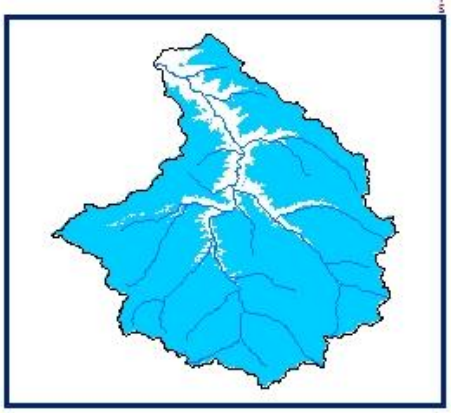
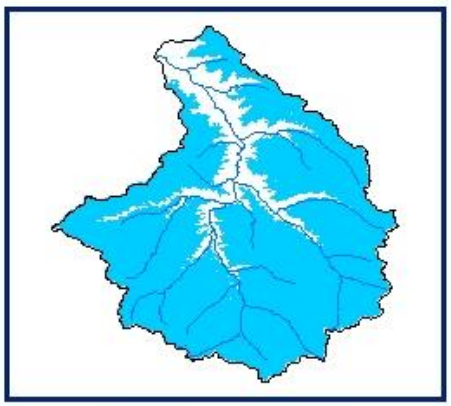
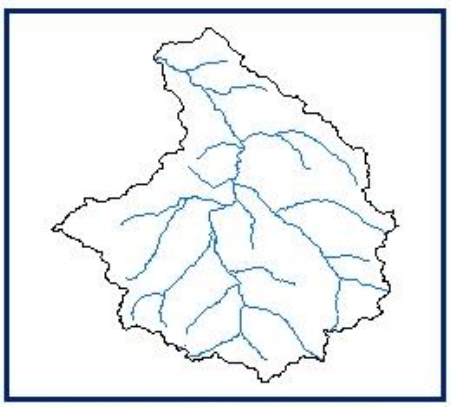


06 APRIL 2015



11 APRIL 2015



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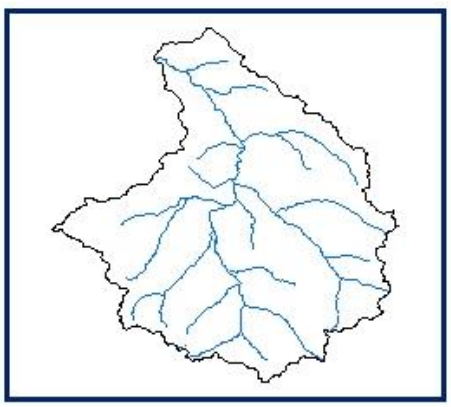

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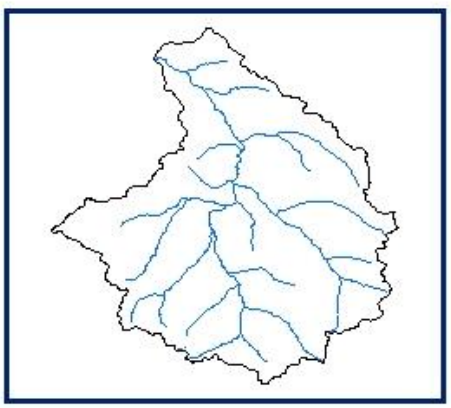

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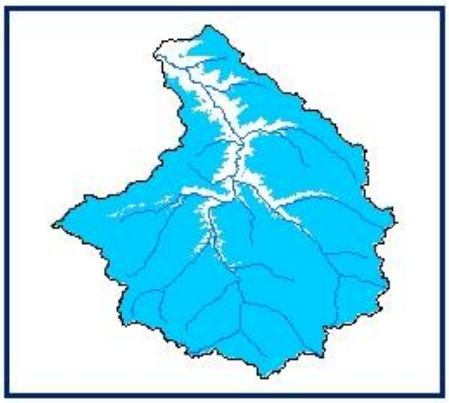
SNOW

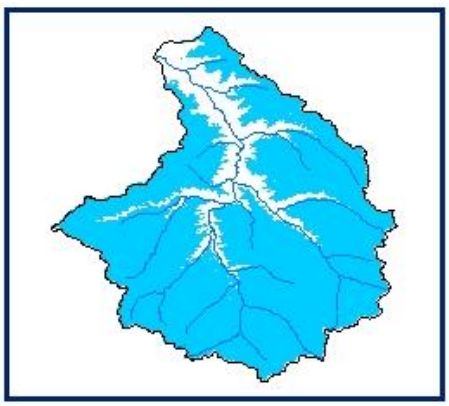
25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : ASTOR SUB-BASIN



DATA USED
06 APRIL 2015



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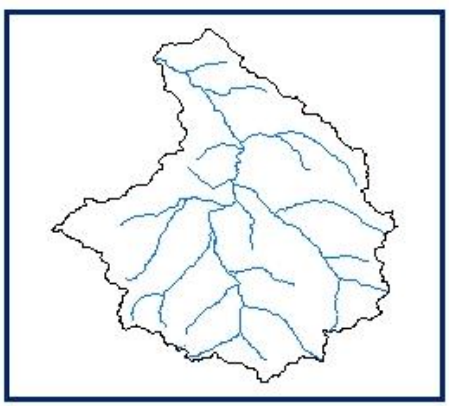
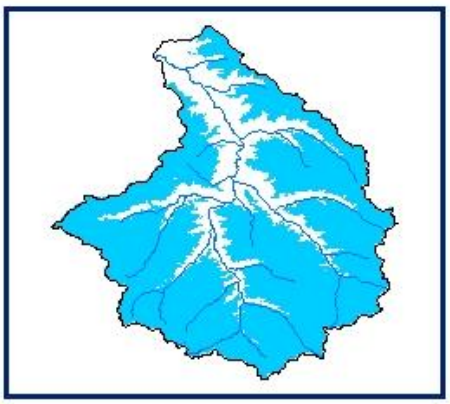


DATA NOT AVAILABLE

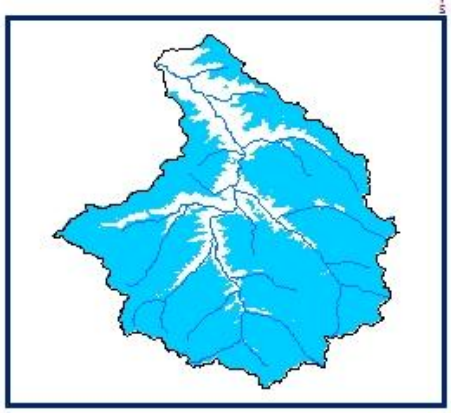
SNOW

105 0 10 20 30
Kilometers

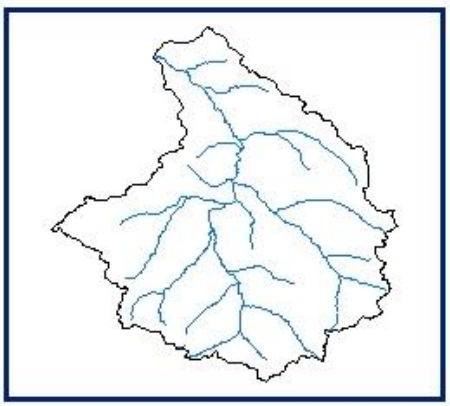
SNOW COVER MAP : ASTOR SUB-BASIN



03 MAY 2015



07 MAY 2015



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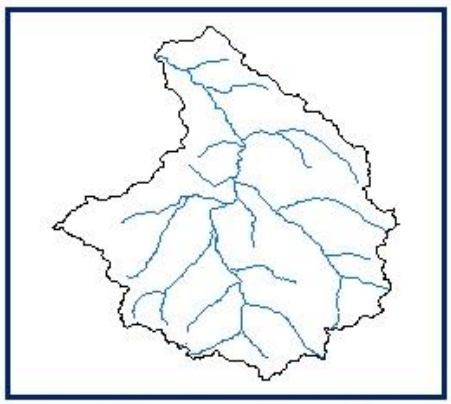

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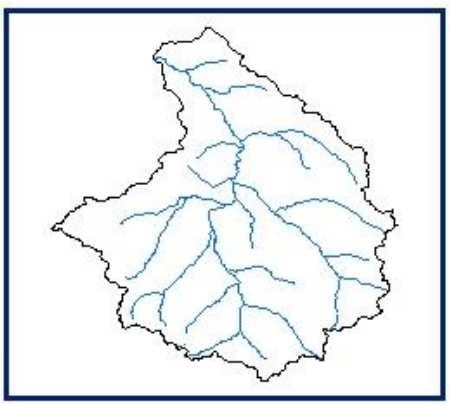

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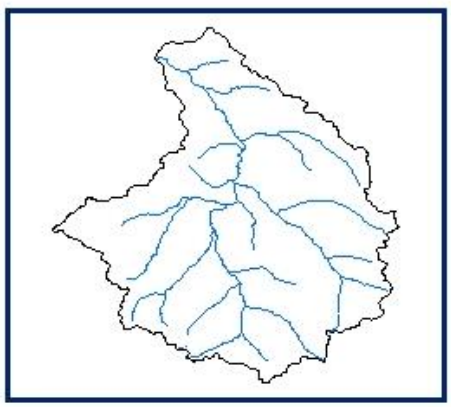


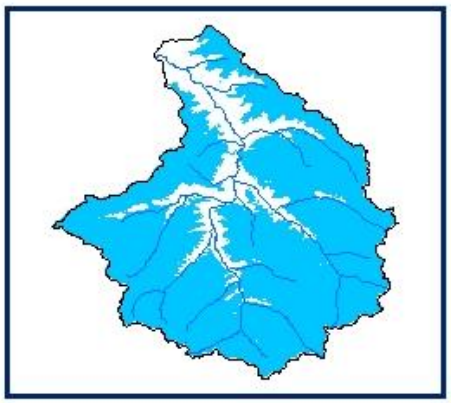
DATA NOT AVAILABLE

SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : ASTOR SUB-BASIN



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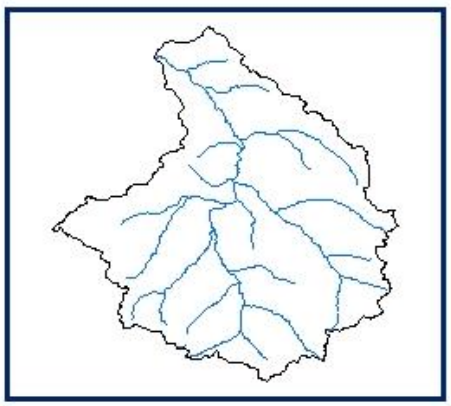

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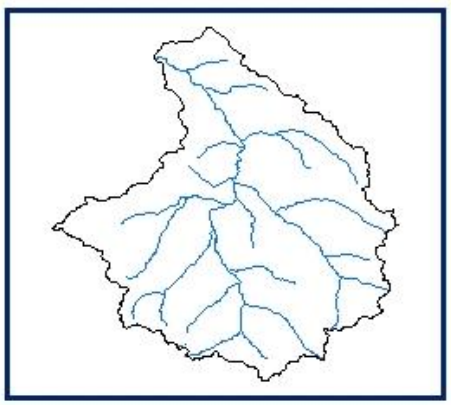
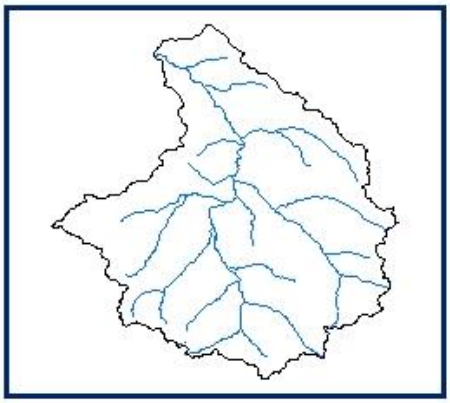


DATA NOT AVAILABLE

105 0 10 20 30
Kilometers

SNOW

SNOW COVER MAP : ASTOR SUB-BASIN



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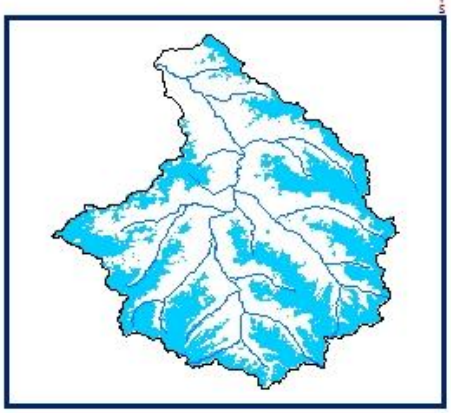
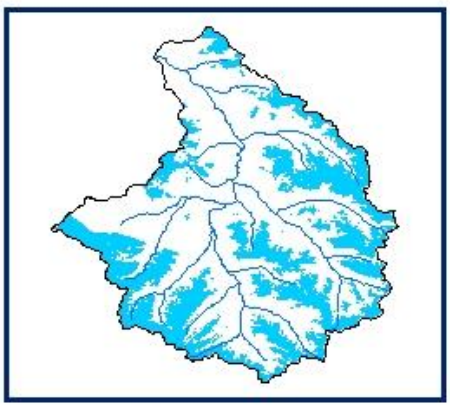
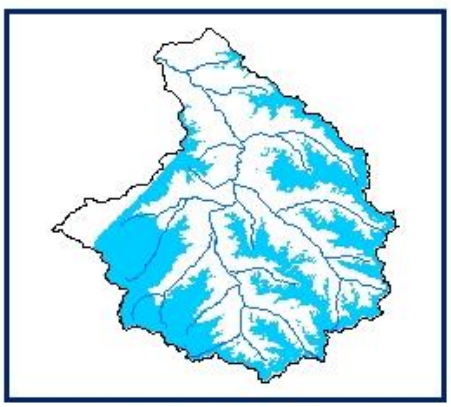


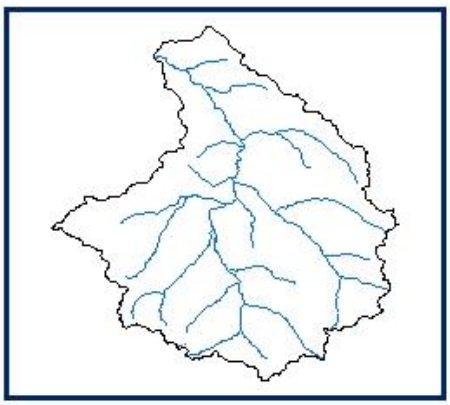
07 JUNE 2015



14 JUNE 2015



20 JUNE 2015



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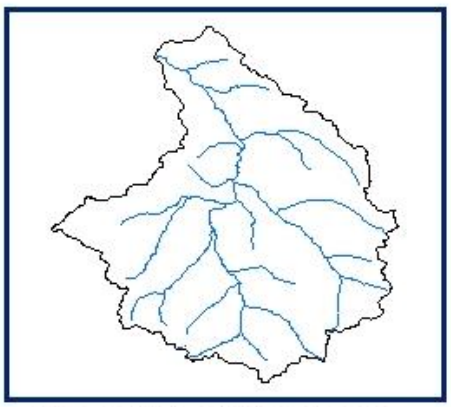


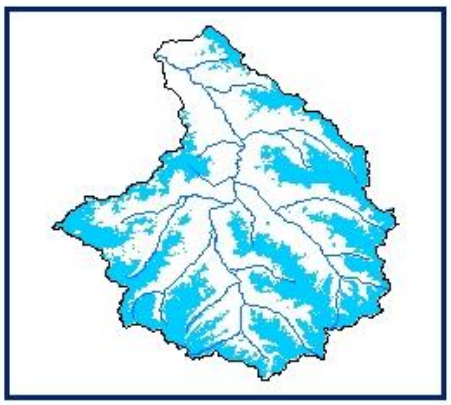
DATA NOT AVAILABLE

SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : ASTOR SUB-BASIN



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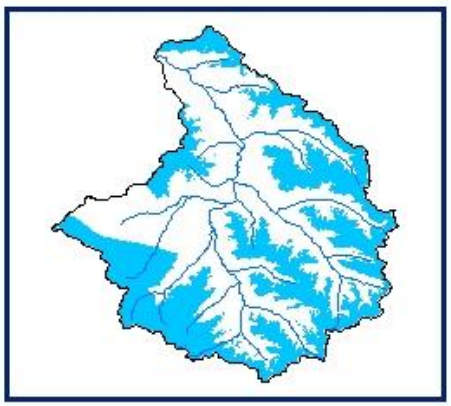
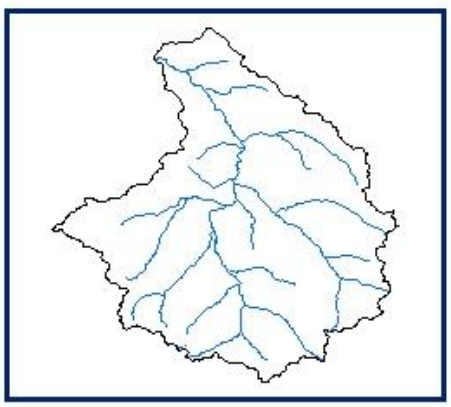


DATA USED
14 JUNE 2015
20 JUNE 2015



DATA NOT AVAILABLE

105 0 10 20 30
Kilometers

SNOW

SHIGO SUB-BASIN

AREAL EXTENT OF SNOW (5 DAILY)

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

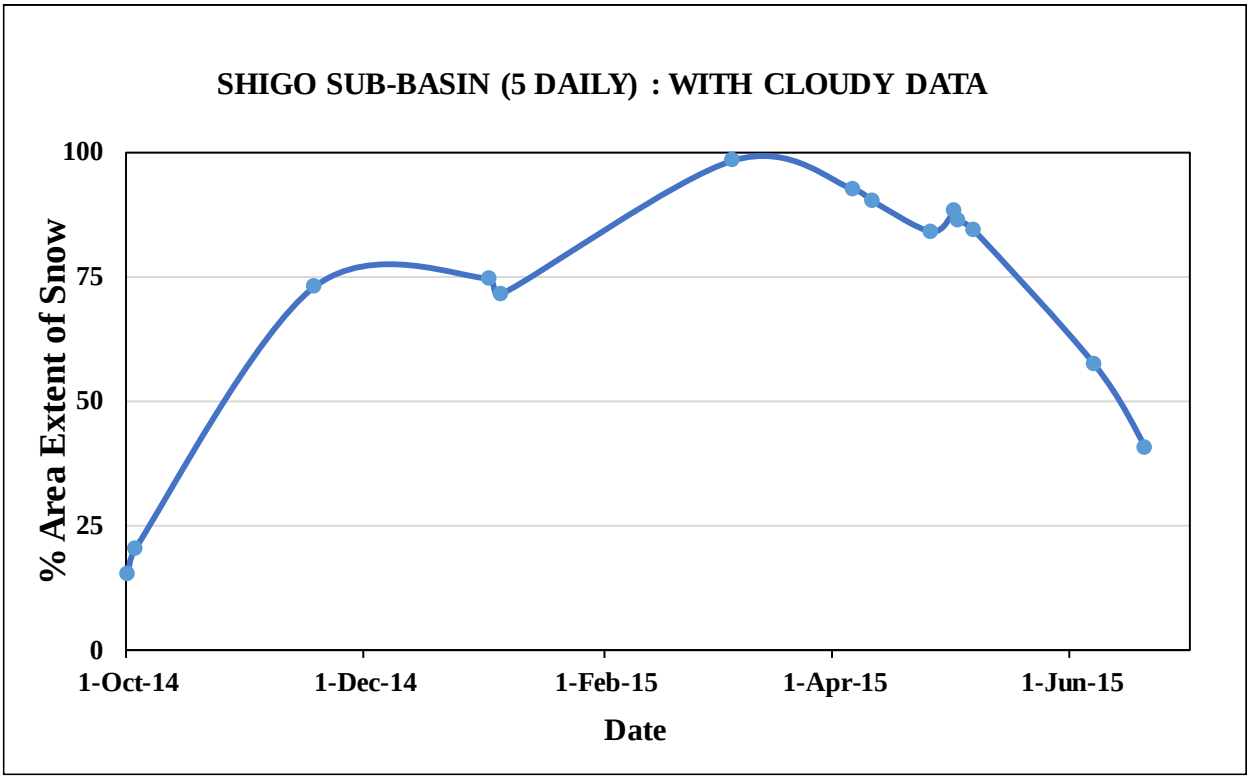
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	01-Oct-2014	829	15	**2**	03-Oct-2014	1121	20
November 2014							
3	18-Nov-2014	4033	73				
January 2015							
4	02-Jan-2015	4126	74	**5**	05-Jan-2015	3950	71
March 2015							
6	06-Mar-2015	5444	98				
April 2015							
7	06-April-2015	5119	92	**8**	11-April-2015	4984	90
9	26-April-2015	4650	84				
May 2015							
10	02-May-2015	4878	88	**11**	03-May-2015	4780	86
12	07-May-2015	4661	84				
June 2015							
13	07-June-2015	3166	57	**14**	20-June-2015	2253	41

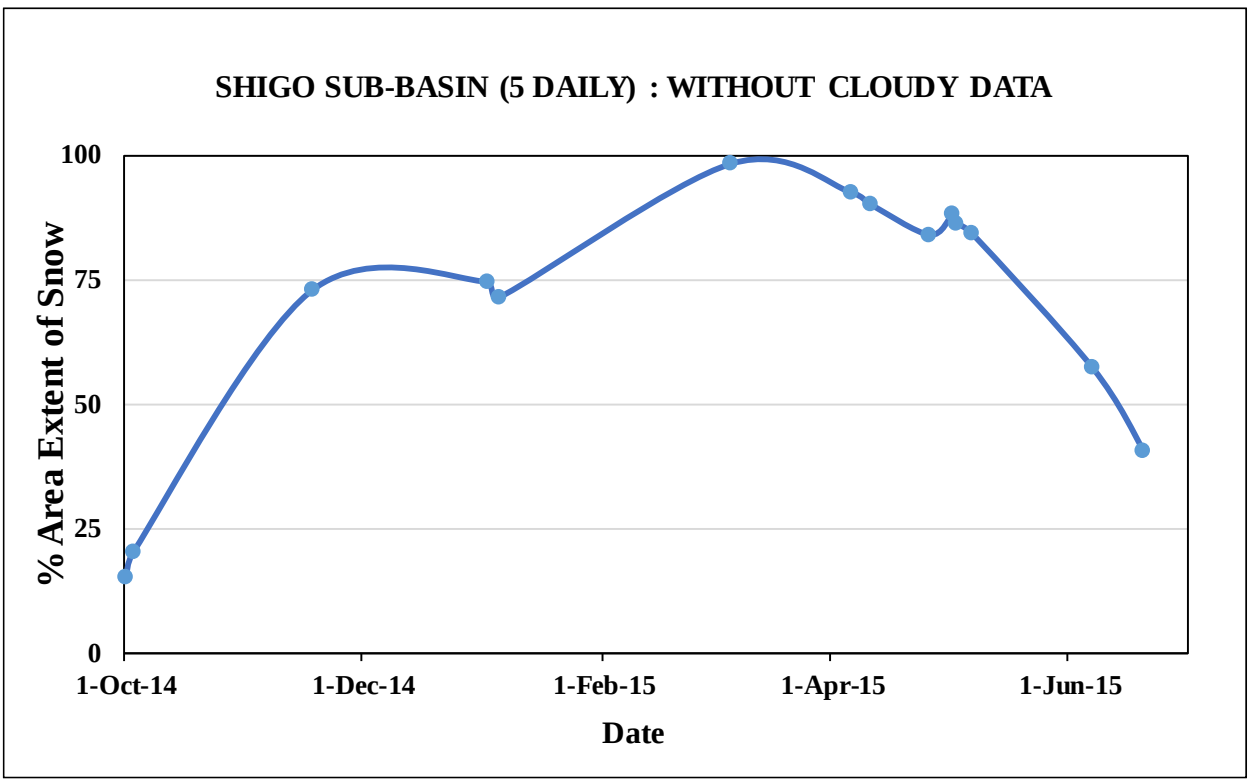
AREAL EXTENT OF SNOW (10 DAILY)

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

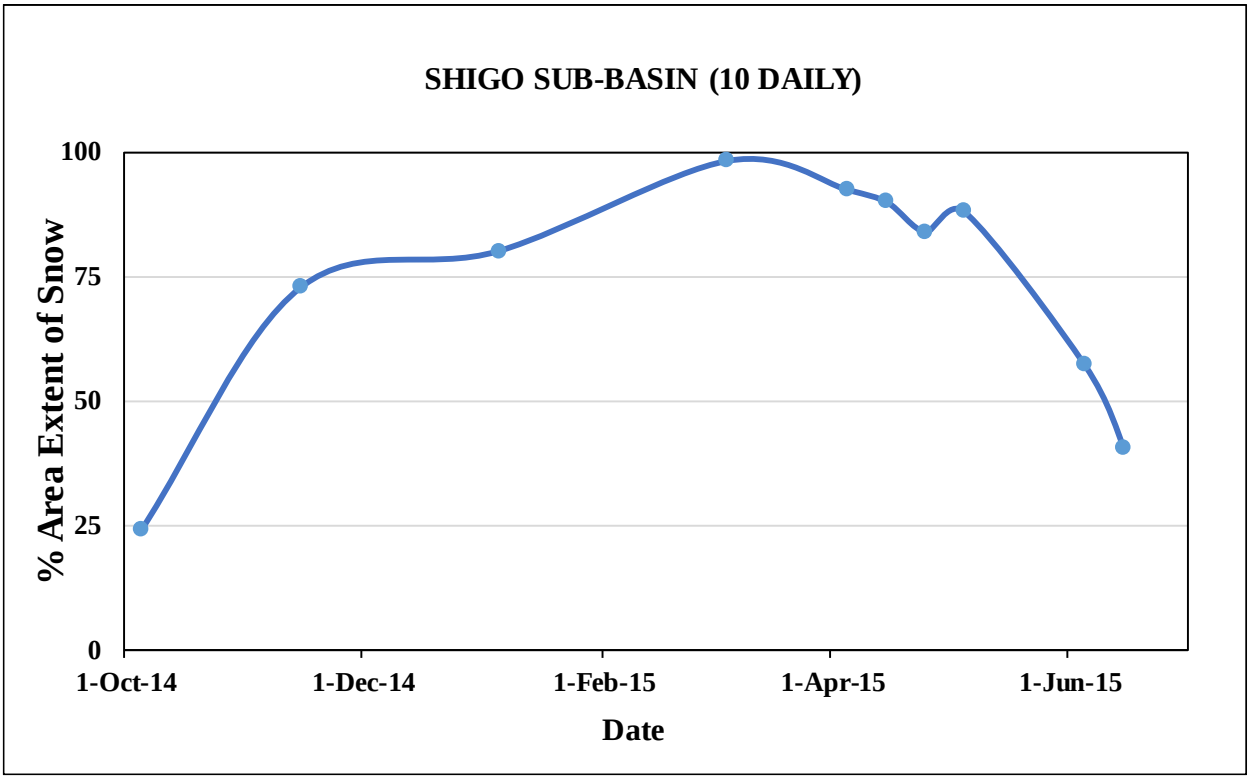
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	05-Oct-2014	1334	24				
November 2014							
2	18-Nov-2014	4033	73				
January 2015							
3	05-Jan-2015	4439	80				
March 2015							
4	06-Mar-2015	5444	98				
April 2015							
5	06-April-2015	5119	92	**6**	11-April-2015	4984	90
7	26-April-2015	4650	84				
May 2015							
8	05-May-2015	5548	100				
June 2015							
9	07-June-2015	3166	57	**10**	20-June-2015	2253	41

SNOW COVER DEPLETION CURVE





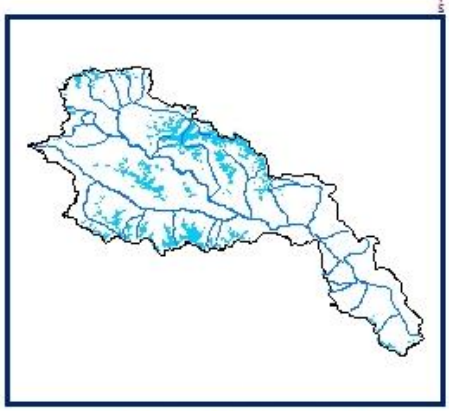
SNOW COVER DEPLETION CURVE



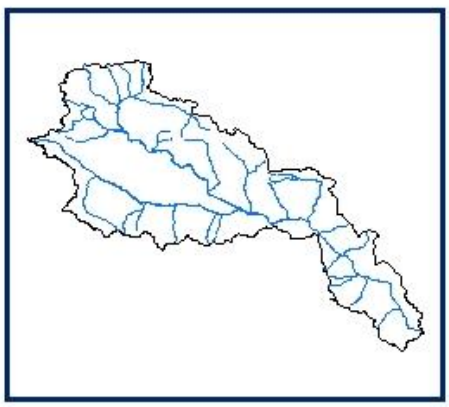
SNOW COVER MAP

SNOW COVER MAP : SHIGO SUB-BASIN

01 OCTOBER 2014



03 OCTOBER 2014



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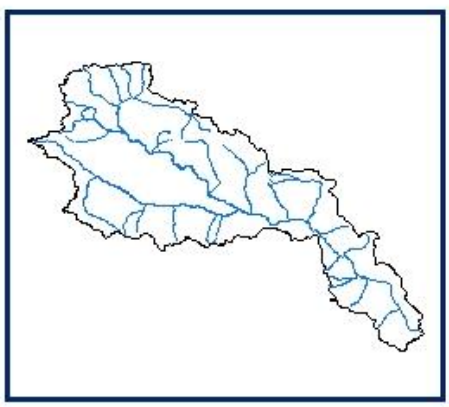

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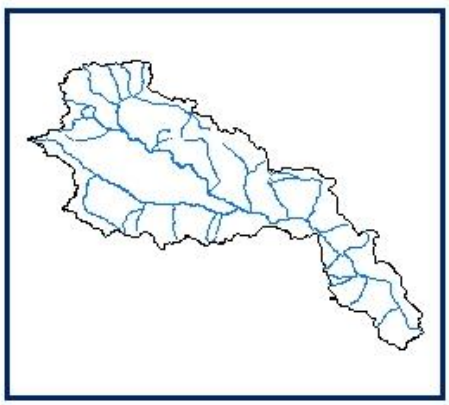

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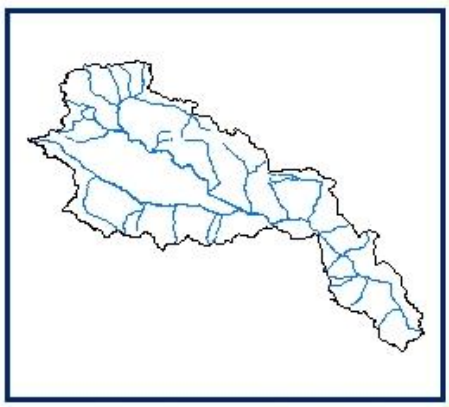


DATA NOT AVAILABLE

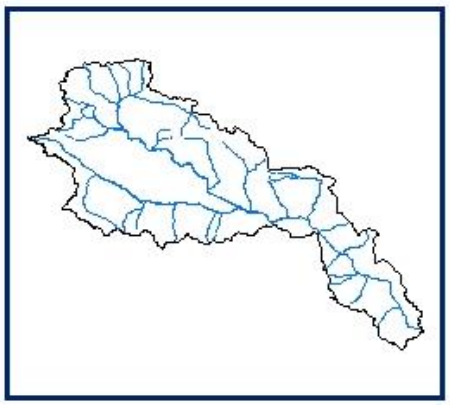
SNOW

40 20 0 40 80 120

Kilometers

10 DAILY SNOW COVER MAP : SHIGO SUB-BASIN

DATA USED
01 OCTOBER 2014
03 OCTOBER 2014



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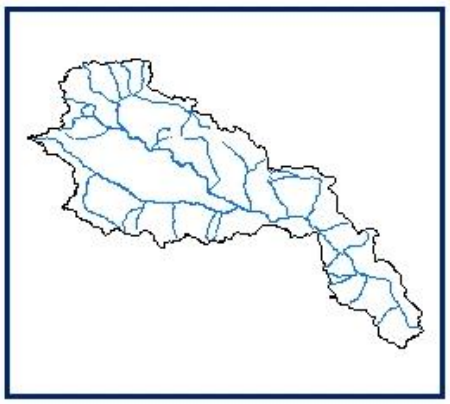
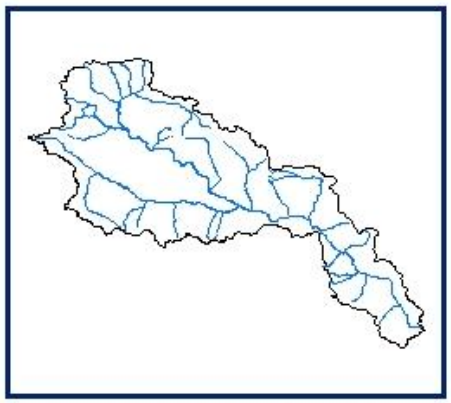


DATA NOT AVAILABLE

SNOW

2512.5 0 25 50 75
Kilometers

SNOW COVER MAP : SHIGO SUB-BASIN



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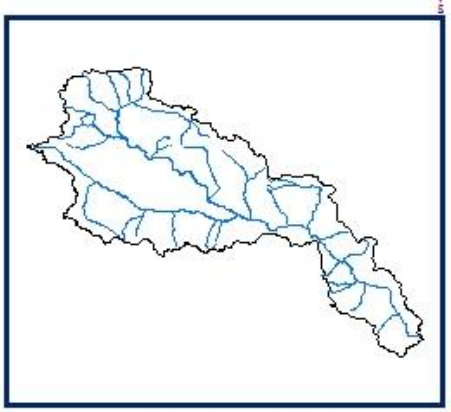

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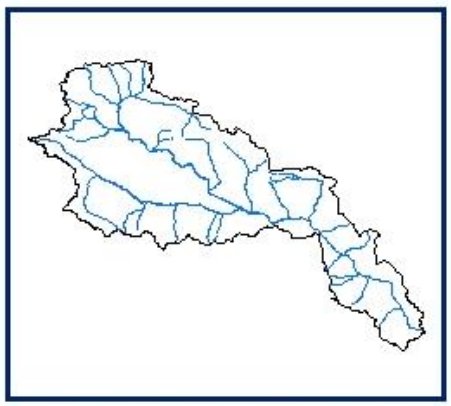

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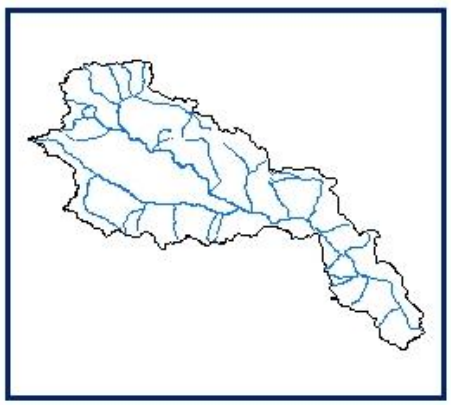
18 NOVEMBER 2014



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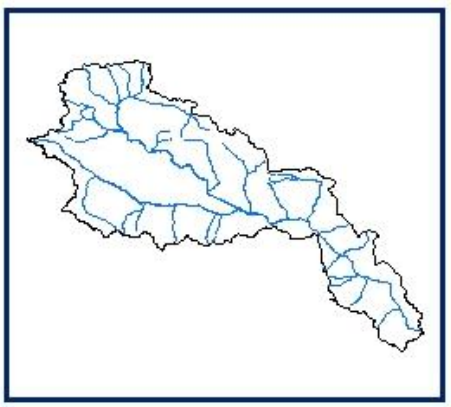


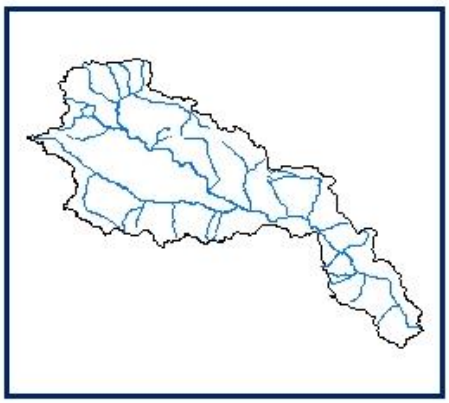
DATA NOT AVAILABLE

SNOW

40 20 0 40 80 120

Kilometers

10 DAILY SNOW COVER MAP : SHIGO SUB-BASIN



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DATA USED
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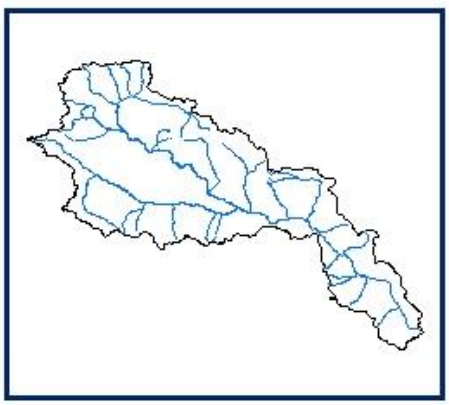


DATA NOT AVAILABLE

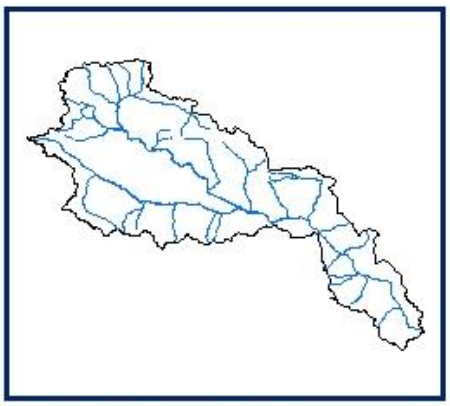
2512.5 0 25 50 75
Kilometers

SNOW

SNOW COVER MAP : SHIGO SUB-BASIN

02 JANUARY 2015

05 JANUARY 2015



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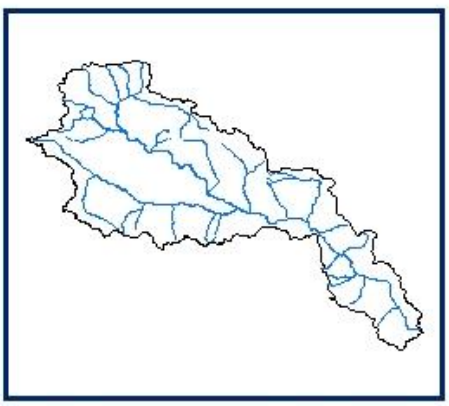

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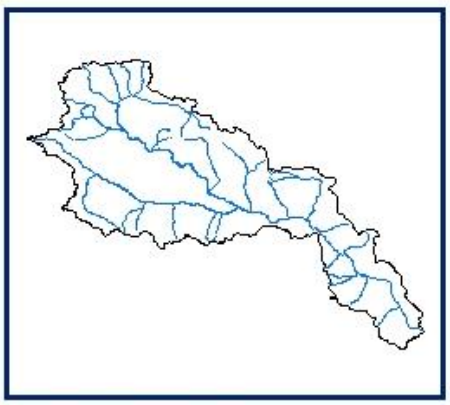

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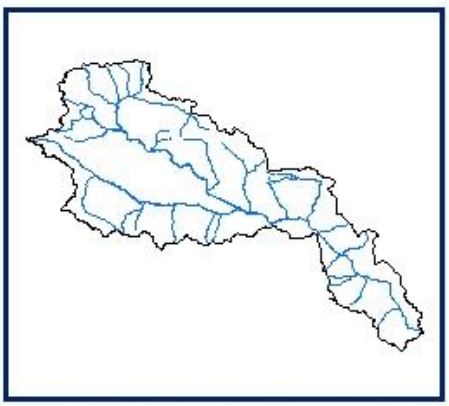


DATA NOT AVAILABLE

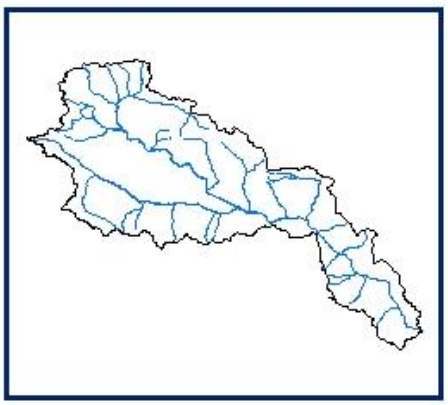
SNOW

40 20 0 40 80 120

Kilometers

10 DAILY SNOW COVER MAP : SHIGO SUB-BASIN

DATA USED
02 JANUARY 2015
05 JANUARY 2015



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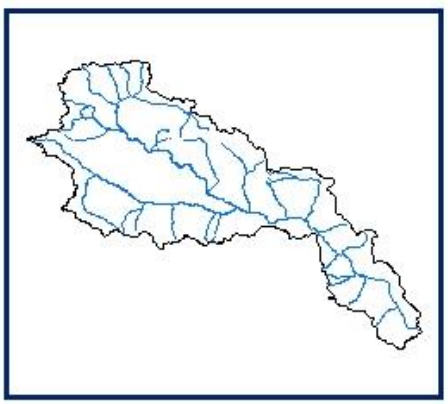


DATA NOT AVAILABLE

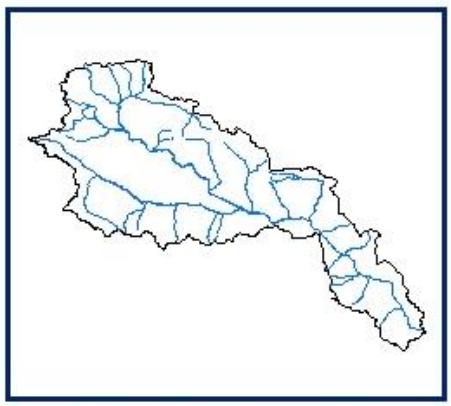
SNOW

2512.5 0 25 50 75
Kilometers

SNOW COVER MAP : SHIGO SUB-BASIN

DATA NOT AVAILABLE

06 MARCH 2015



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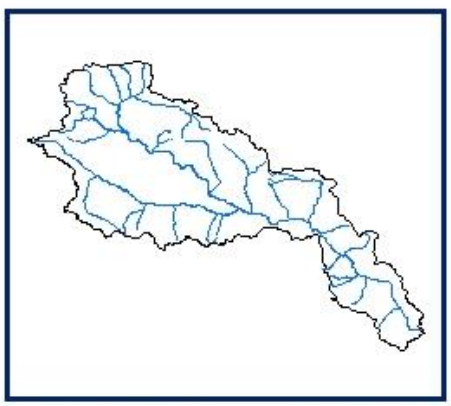

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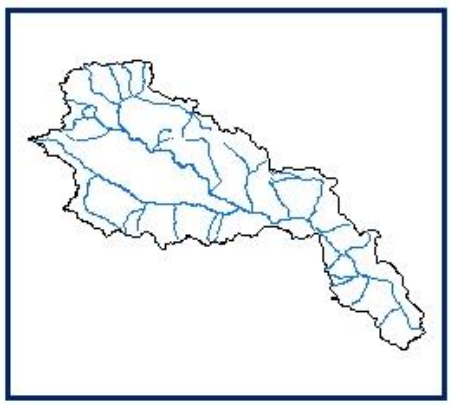

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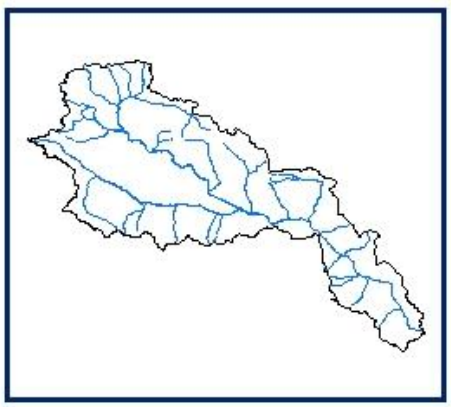


DATA NOT AVAILABLE

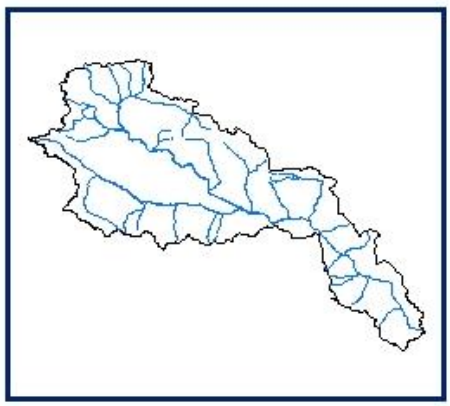
SNOW

40 20 0 40 80 120

Kilometers

10 DAILY SNOW COVER MAP : SHIGO SUB-BASIN

DATA USED
06 MARCH 2015



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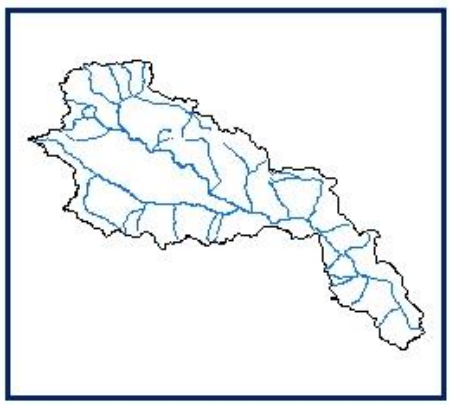


DATA NOT AVAILABLE

SNOW

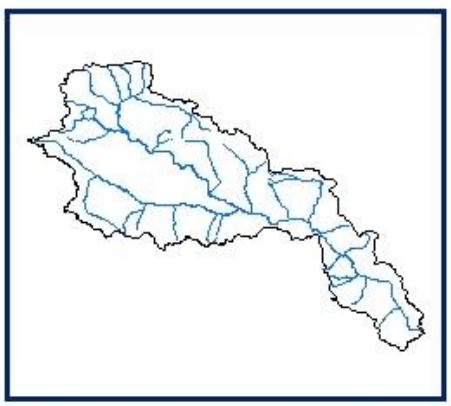
2512.5 0 25 50 75
Kilometers

SNOW COVER MAP : SHIGO SUB-BASIN

DATA NOT AVAILABLE

06 APRIL 2015

11 APRIL 2015



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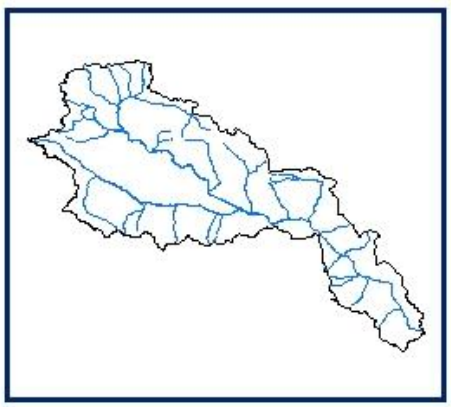


DATA NOT AVAILABLE

SNOW

40 20 0 40 80 120

Kilometers

10 DAILY SNOW COVER MAP : SHIGO SUB-BASIN

DATA USED
06 APRIL 2015

DATA USED
11 APRIL 2015

DATA USED
26 APRIL 2015

2512.5 0 25 50 75
Kilometers

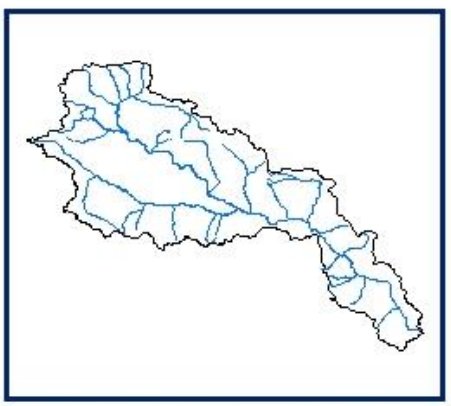
SNOW

SNOW COVER MAP : SHIGO SUB-BASIN

02 MAY 2015

03 MAY 2015

07 MAY 2015



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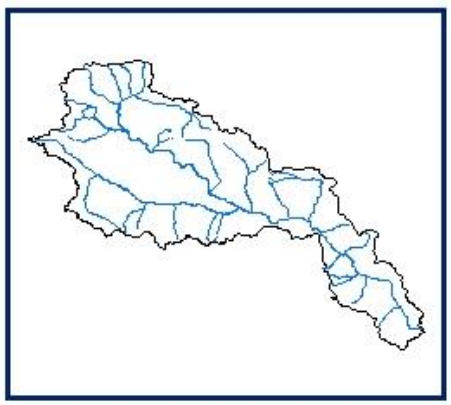

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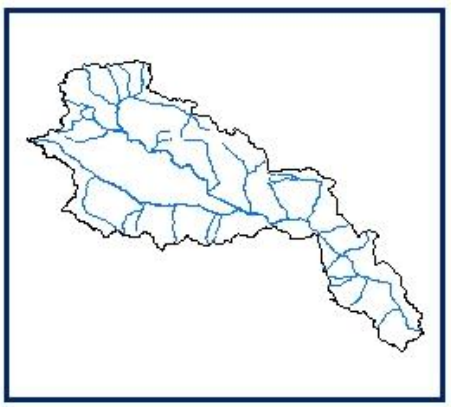


DATA NOT AVAILABLE

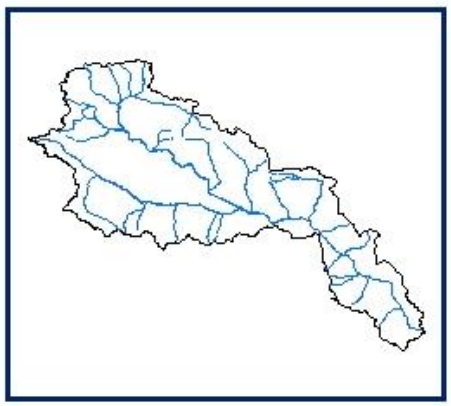
SNOW

40 20 0 40 80 120

Kilometers

10 DAILY SNOW COVER MAP : SHIGO SUB-BASIN

DATA USED
02 MAY 2015
03 MAY 2015
07 MAY 2015



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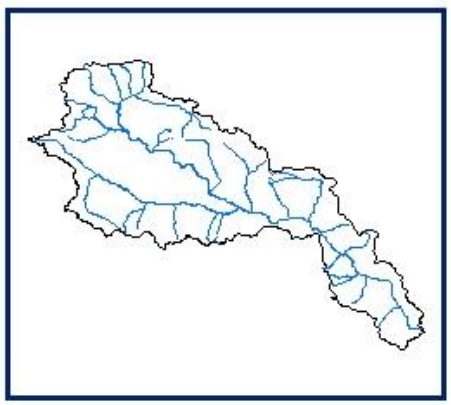
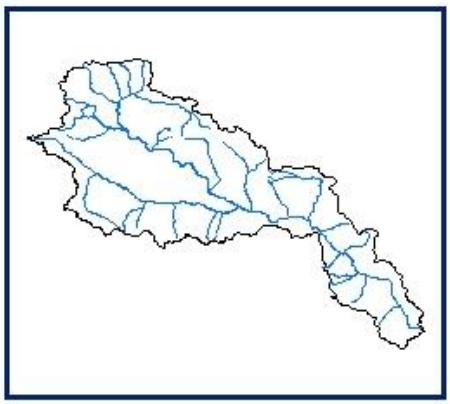


DATA NOT AVAILABLE

SNOW

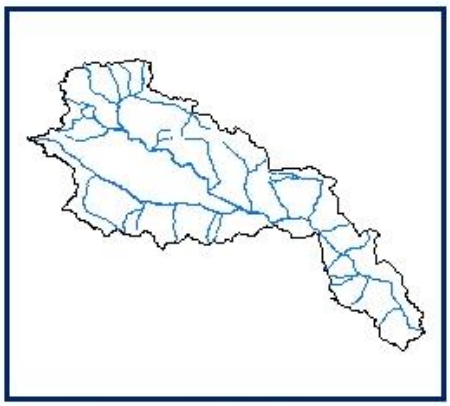
2512.5 0 25 50 75
Kilometers

SNOW COVER MAP : SHIGO SUB-BASIN



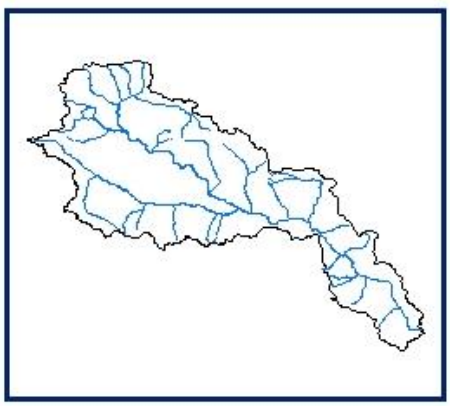
DATA NOT AVAILABLE

07 JUNE 2015



DATA NOT AVAILABLE

20 JUNE 2015



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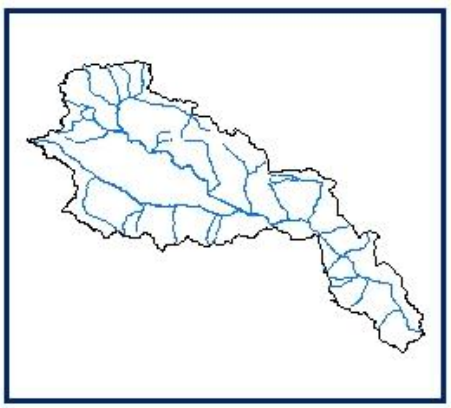


DATA NOT AVAILABLE

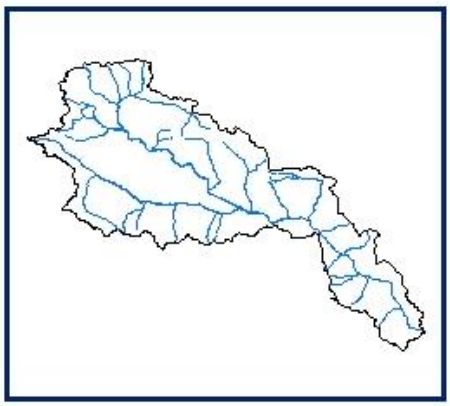
SNOW

40 20 0 40 80 120

Kilometers

10 DAILY SNOW COVER MAP : SHIGO SUB-BASIN

DATA USED
07 JUNE 2015



DATA NOT AVAILABLE

DATA USED
20 JUNE 2015

2512.5 0 25 50 75
Kilometers

SNOW

DRAS SUB-BASIN

AREAL EXTENT OF SNOW (5 DAILY)

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

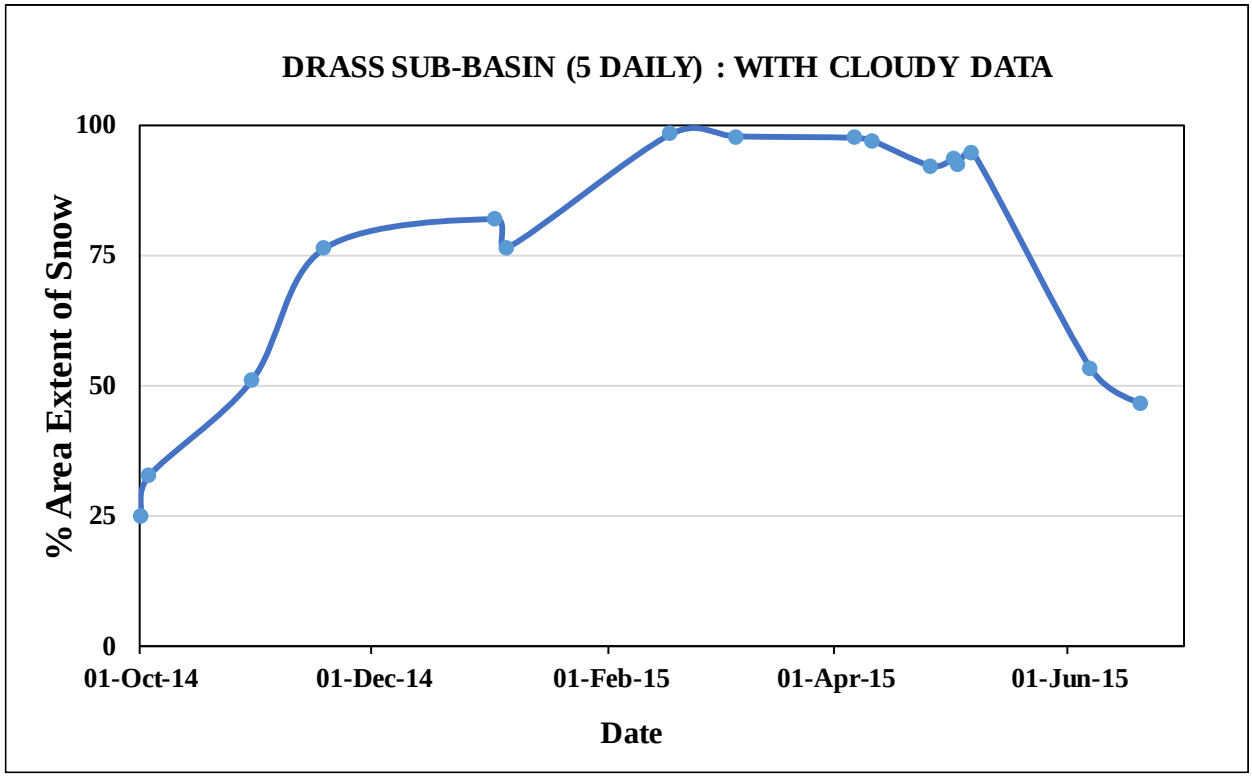
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	01-Oct-2014	421	25	**2**	03-Oct-2014	549	33
3	30-Oct-2014	858	51				
November 2014							
4	18-Nov-2014	1285	76				
January 2015							
5	02-Jan-2015	1380	82	**6**	05-Jan-2015	1288 (C)	77
February 2015							
7	17-Feb-2015	1656	98				
March 2015							
8	06-Mar-2015	1647	98				
April 2015							
9	06-Apr-2015	1643	98	**10**	11-Apr-2015	1631	97
11	26-Apr-2015	1552	92				
May 2015							
12	02-May-2015	1575	94	**13**	03-May-2015	1559	93
14	07-May-2015	1594	95				
June 2015							
15	07-June-2015	894 (C)	53	**16**	20-June-2015	783	47

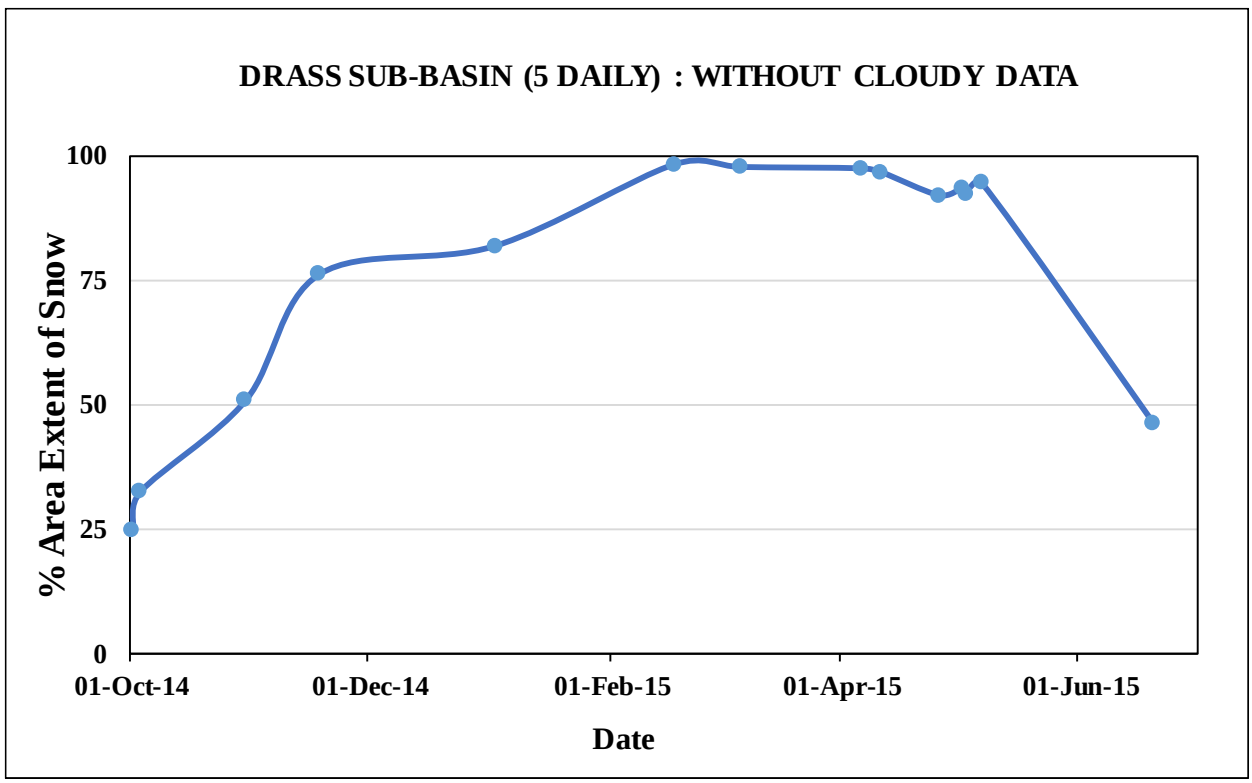
AREAL EXTENT OF SNOW (10 DAILY)

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

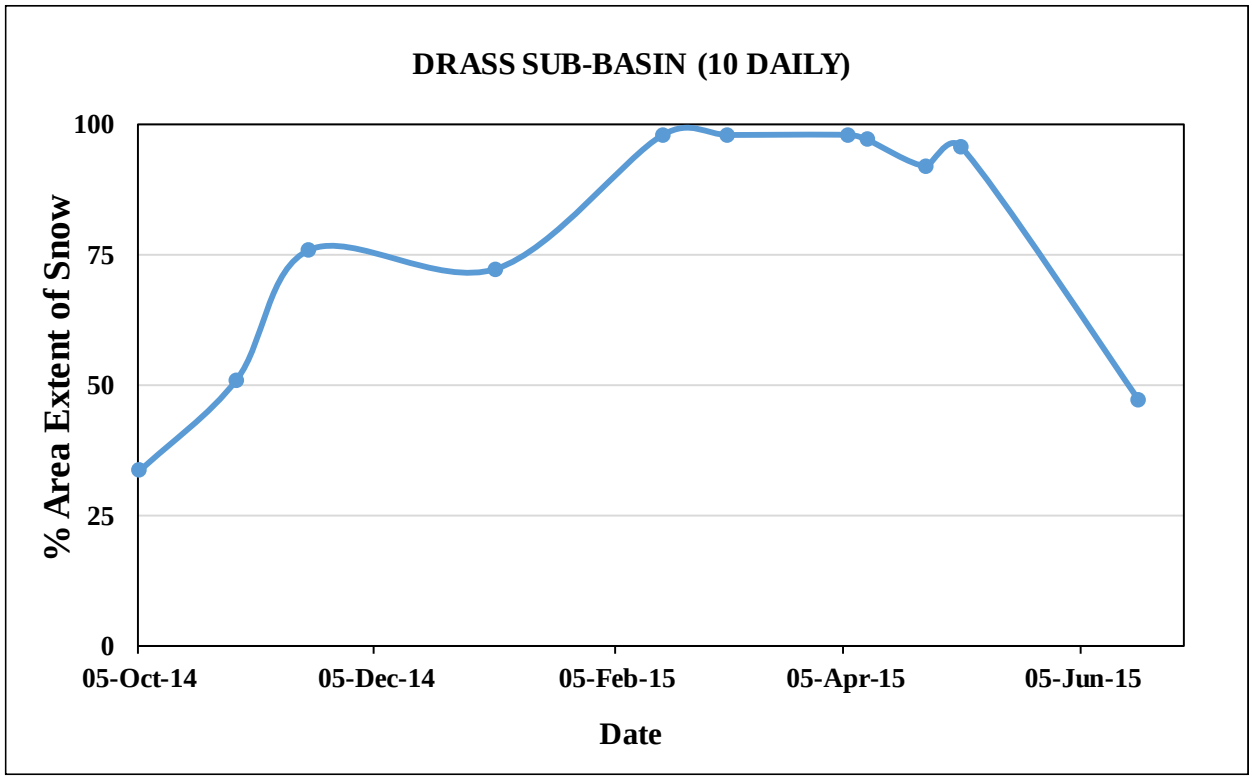
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	05-Oct-2014	564	33	**2**	30-Oct-2014	858	51
November 2014							
3	18-Nov-2014	1285	76				
January 2015							
4	05-Jan-2015	1217	72				
February 2015							
5	17-Feb-2015	1656	98				
March 2015							
6	06-Mar-2015	1647	98				
April 2015							
7	06-Apr-2015	1643	98	**8**	11-Apr-2015	1631	97
9	26-Apr-2015	1552	92				
May 2015							
10	05-May-2015	1612	96				
June 2015							
11	20-June-2015	783	47				

SNOW COVER DEPLETION CURVE





SNOW COVER DEPLETION CURVE

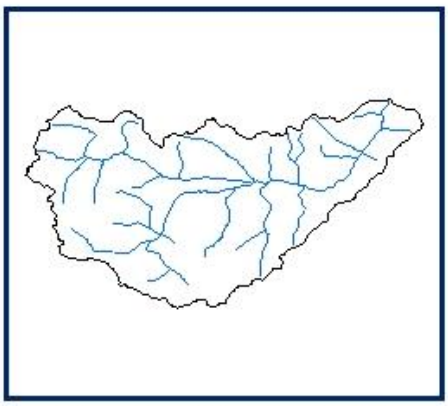


SNOW COVER MAP

SNOW COVER MAP : DRASS SUB-BASIN

01 OCTOBER 2014

03 OCTOBER 2014



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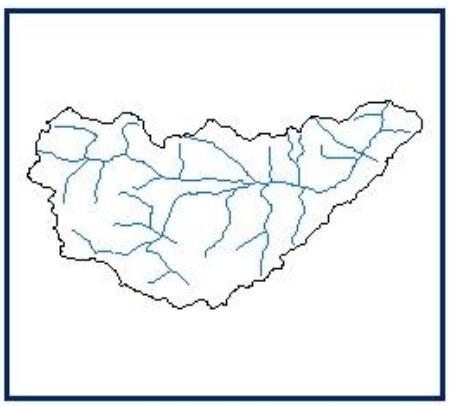

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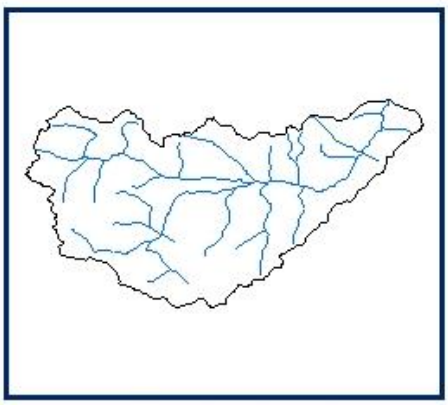


DATA NOT AVAILABLE

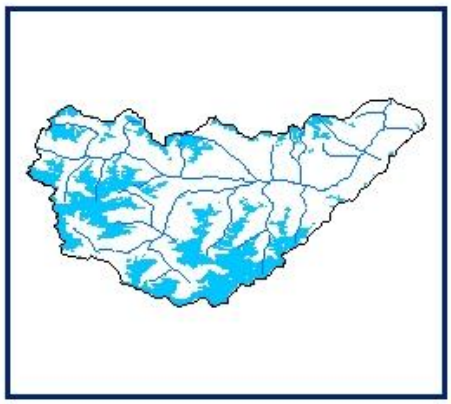
30 OCTOBER 2014

SNOW

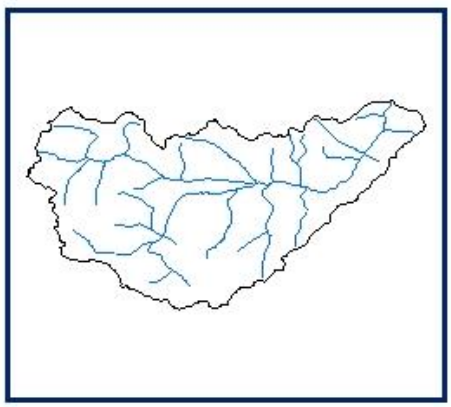
20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN



DATA USED
01 OCTOBER 2014
03 OCTOBER 2014



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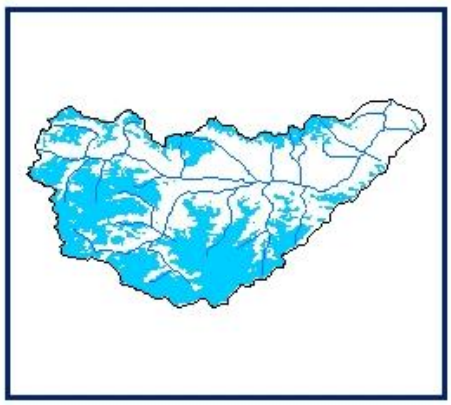
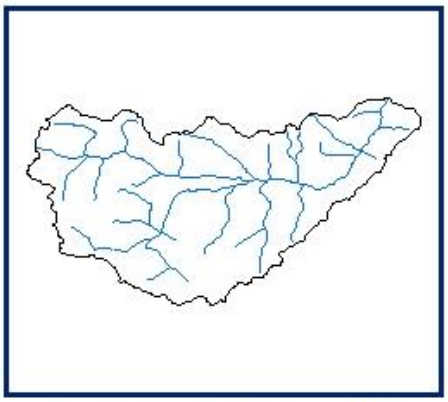


DATA USED
30 OCTOBER 2014

10 5 0 10 20 30
Kilometers

SNOW

SNOW COVER MAP : DRASS SUB-BASIN



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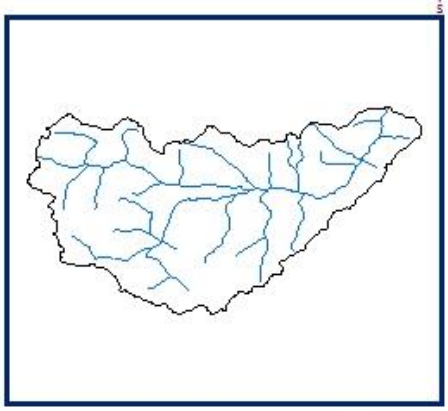

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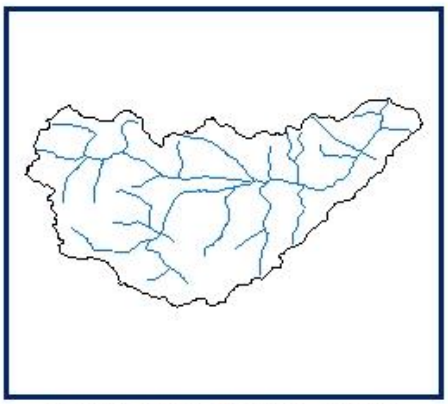

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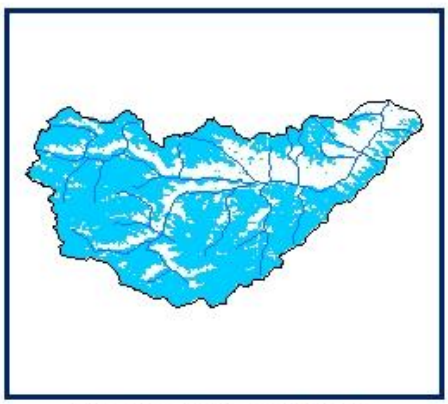


18 NOVEMBER 2014

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN

DATA NOT AVAILABLE

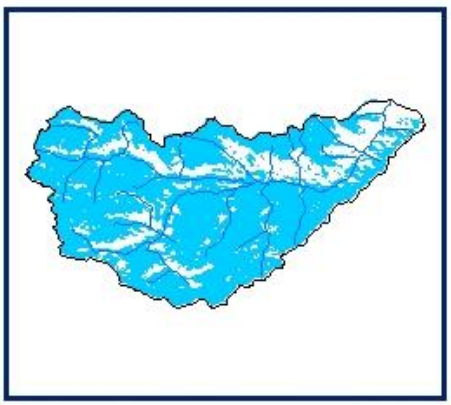
DATA USED
18 NOVEMBER 2014

DATA NOT AVAILABLE

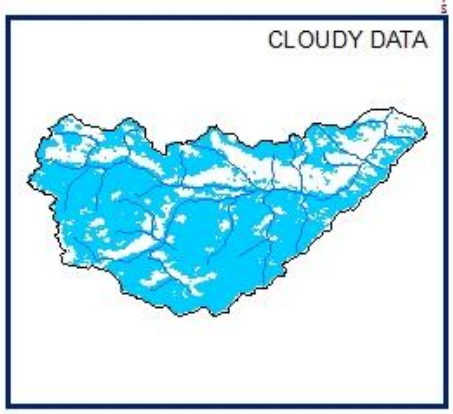
10 5 0 10 20 30
Kilometers

SNOW

SNOW COVER MAP : DRASS SUB-BASIN



02 JANUARY 2015



05 JANUARY 2015

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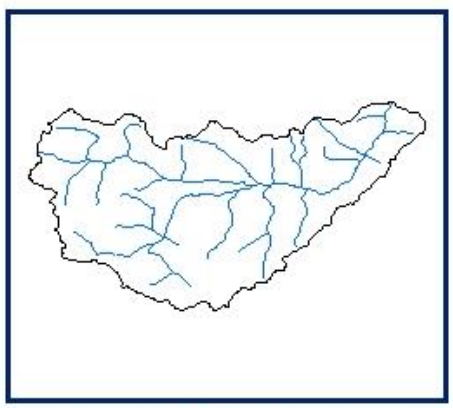

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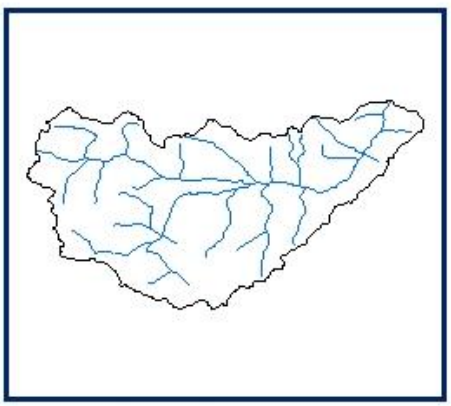

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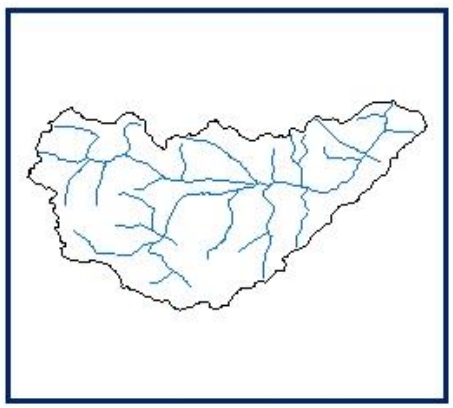


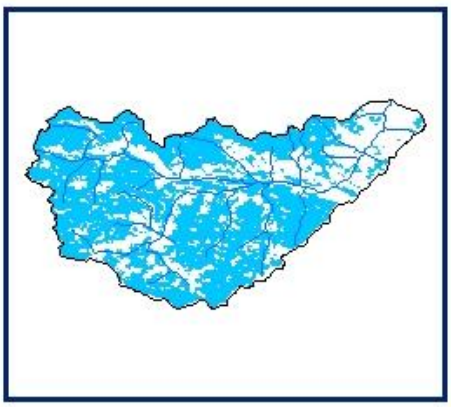
DATA NOT AVAILABLE

SNOW

20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN



DATA USED
02 JANUARY 2015
05 JANUARY 2015

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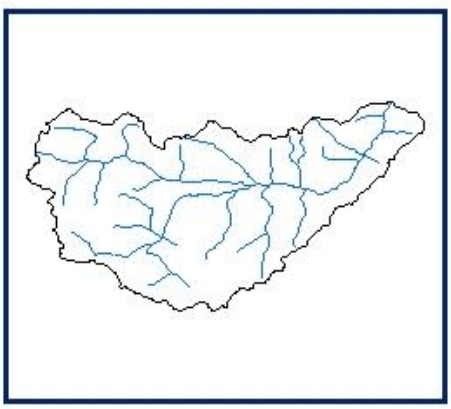


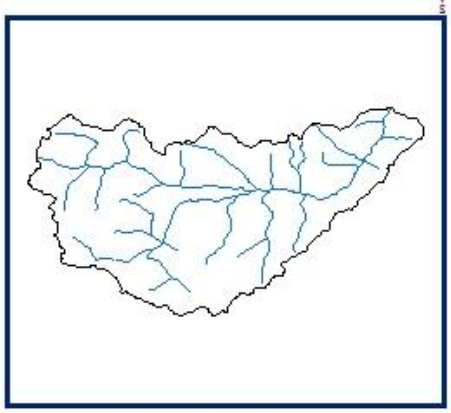
DATA NOT AVAILABLE

SNOW

10 5 0 10 20 30
Kilometers

SNOW COVER MAP : DRASS SUB-BASIN

DATA NOT AVAILABLE



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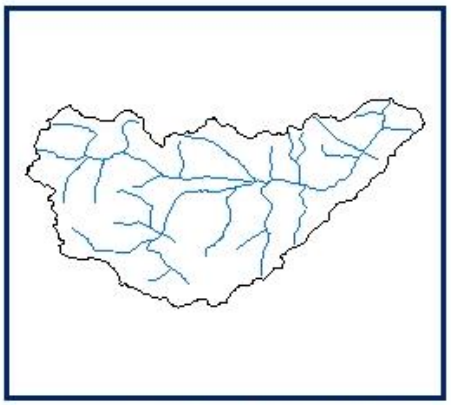

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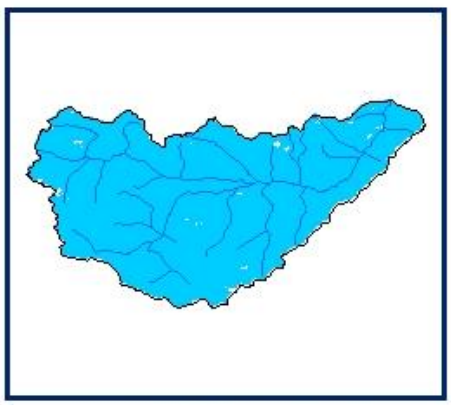
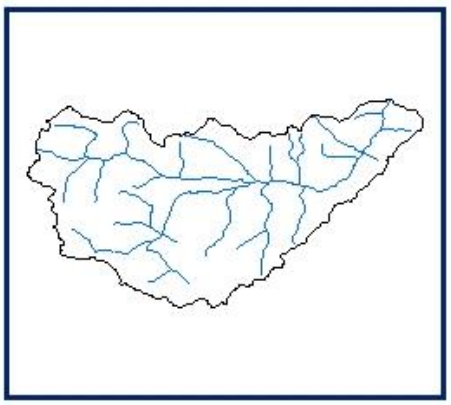


17 FEBRUARY 2015



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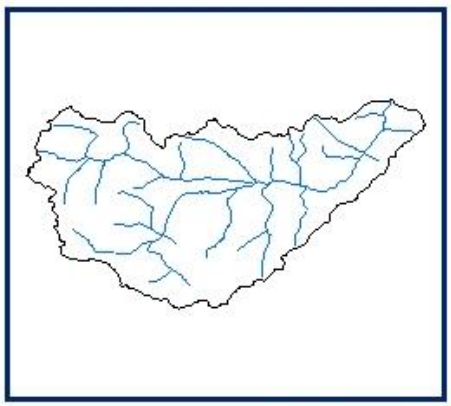


DATA NOT AVAILABLE

SNOW

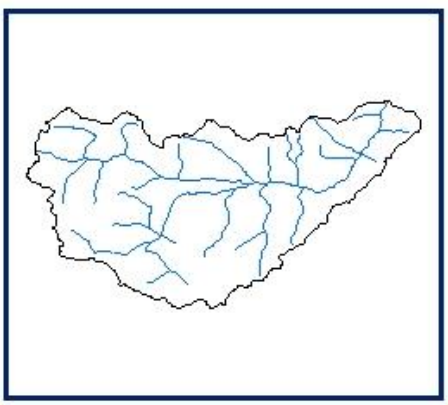
20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN

DATA NOT AVAILABLE

DATA USED
17 FEBRUARY 2015



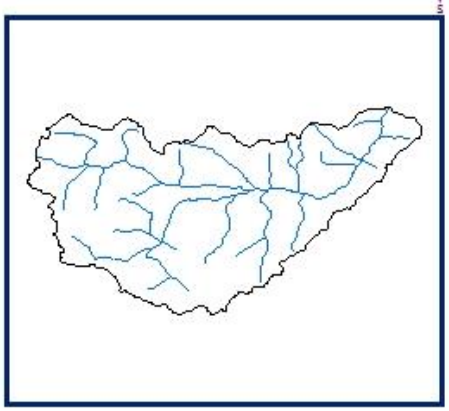
DATA NOT AVAILABLE

SNOW

10 5 0 10 20 30
Kilometers

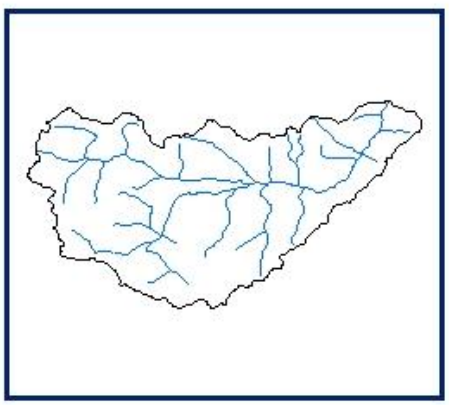
SNOW COVER MAP : DRASS SUB-BASIN

DATA NOT AVAILABLE



DATA NOT AVAILABLE

06 MARCH 2015



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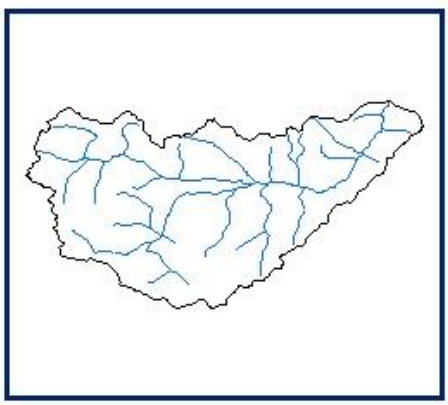

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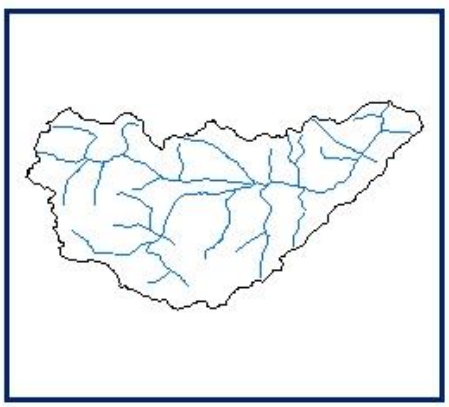


DATA NOT AVAILABLE

SNOW

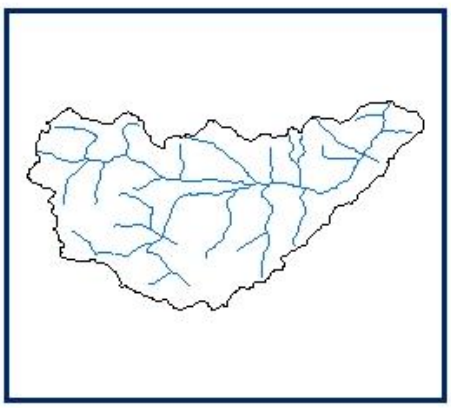
20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN

DATA USED
06 MARCH 2015

DATA NOT AVAILABLE



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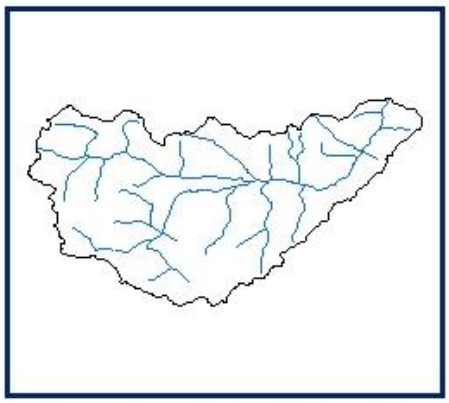
SNOW

10 5 0 10 20 30
Kilometers

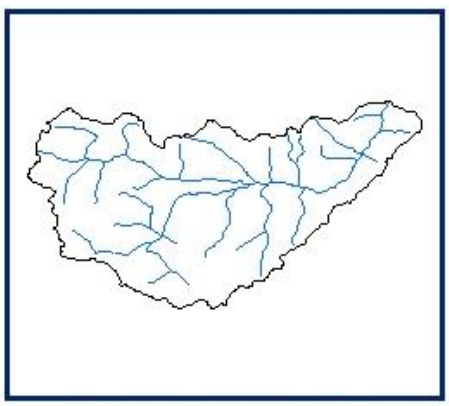
SNOW COVER MAP : DRASS SUB-BASIN



DATA NOT AVAILABLE

06 APRIL 2015

11 APRIL 2015



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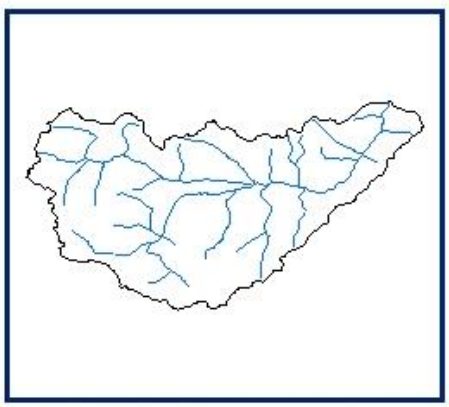
26 APRIL 2015



DATA NOT AVAILABLE

SNOW

20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN

DATA USED
06 APRIL 2015

DATA USED
11 APRIL 2015

DATA USED
26 APRIL 2015

10 5 0 10 20 30
Kilometers

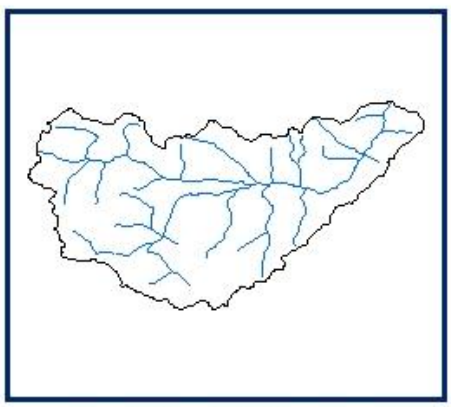
SNOW

SNOW COVER MAP : DRASS SUB-BASIN

02 MAY 2015

03 MAY 2015

07 MAY 2015



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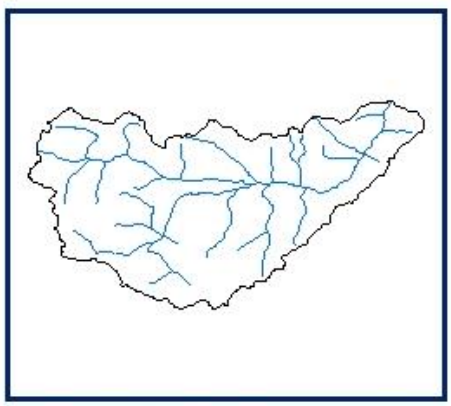

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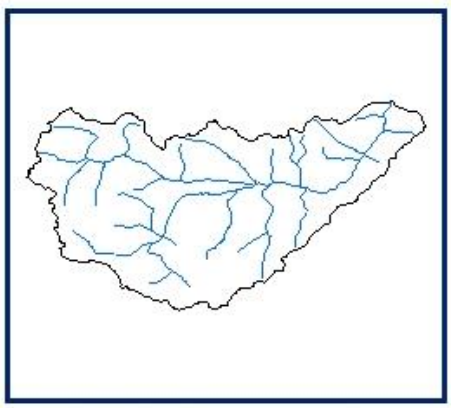


DATA NOT AVAILABLE

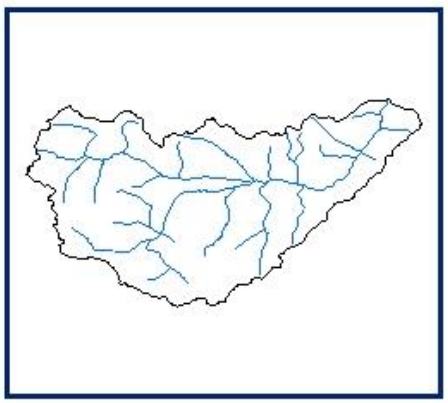
SNOW

20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN

DATA USED
02 MAY 2015
03 MAY 2015
07 MAY 2015



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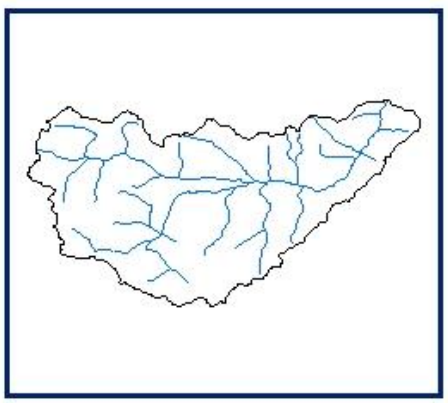


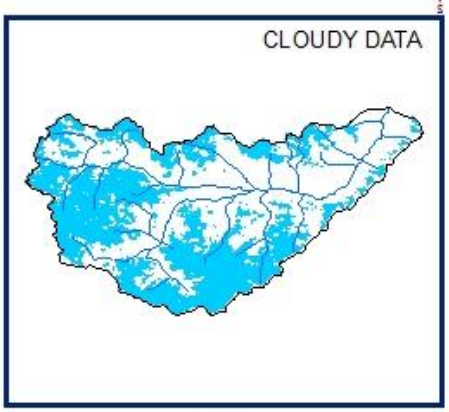
DATA NOT AVAILABLE

SNOW

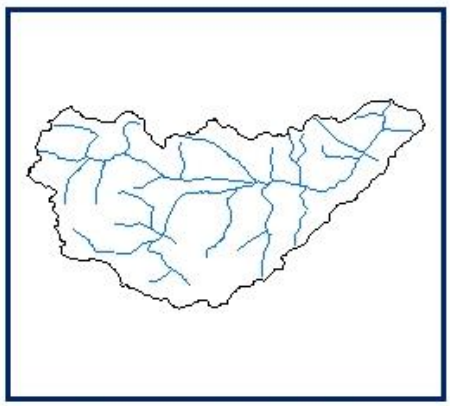
10 5 0 10 20 30
Kilometers

SNOW COVER MAP : DRASS SUB-BASIN

DATA NOT AVAILABLE



07 JUNE 2015



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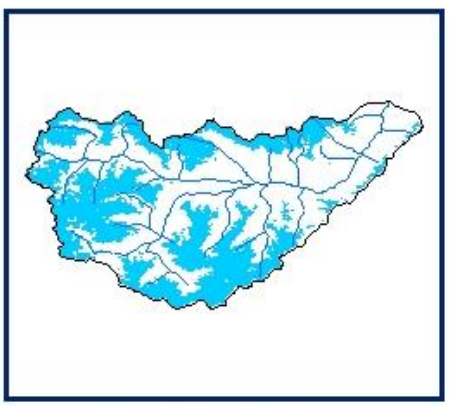
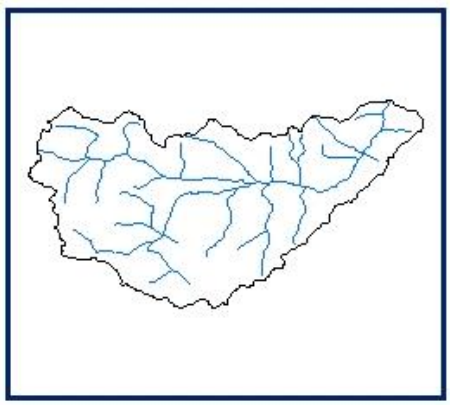


20 JUNE 2015



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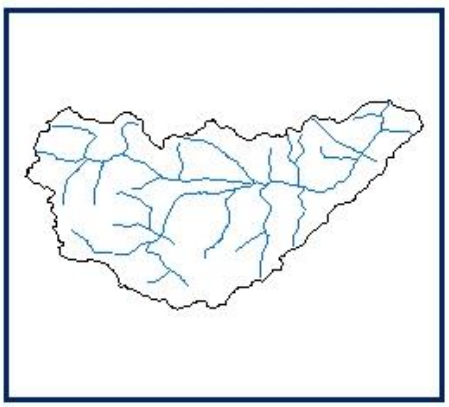


DATA NOT AVAILABLE

SNOW

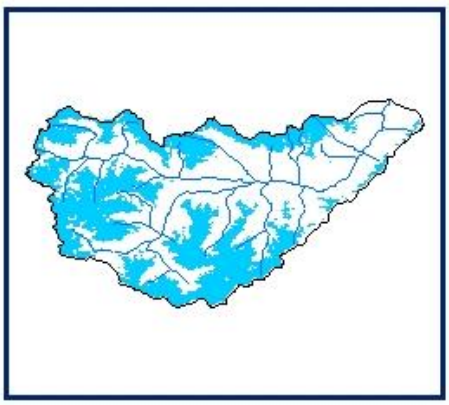
20 10 0 20 40 60

Kilometers

10 DAILY SNOW COVER MAP : DRASS SUB-BASIN

DATA NOT AVAILABLE

DATA NOT AVAILABLE



DATA USED
20 JUNE 2015

SNOW

10 5 0 10 20 30
Kilometers

SURU SUB-BASIN

AREAL EXTENT OF SNOW (5 DAILY)

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

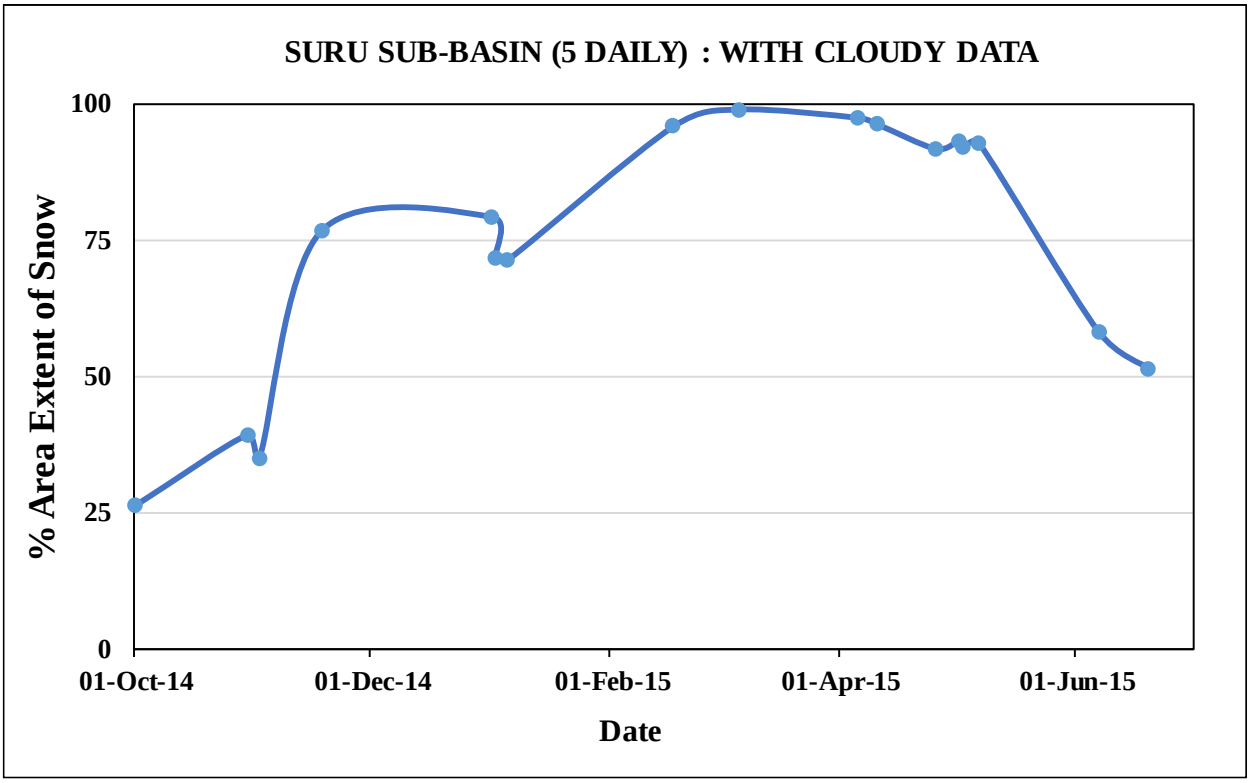
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	01-Oct-2014	936	26	**2**	30-Oct-2014	1401	39
November 2014							
3	02-Nov-2014	1253	35	**4**	18-Nov-2014	2744	77
January 2015							
5	01-Jan-2015	2836	79	**6**	02-Jan-2015	2571	72
7	05-Jan-2015	2549	71				
February 2015							
8	17-Feb-2015	3431 (C)	96				
March 2015							
9	06-Mar-2015	3544	99				
April 2015							
10	06-April-2015	3488	98	**11**	11-April-2015	3443	96
12	26-April-2015	3284	92				
May 2015							
13	02-May-2015	3339	93	**14**	03-May-2015	3296	92
15	07-May-2015	3324	93				
June 2015							
16	07-June-2015	2080	58	**17**	20-June-2015	1839	51

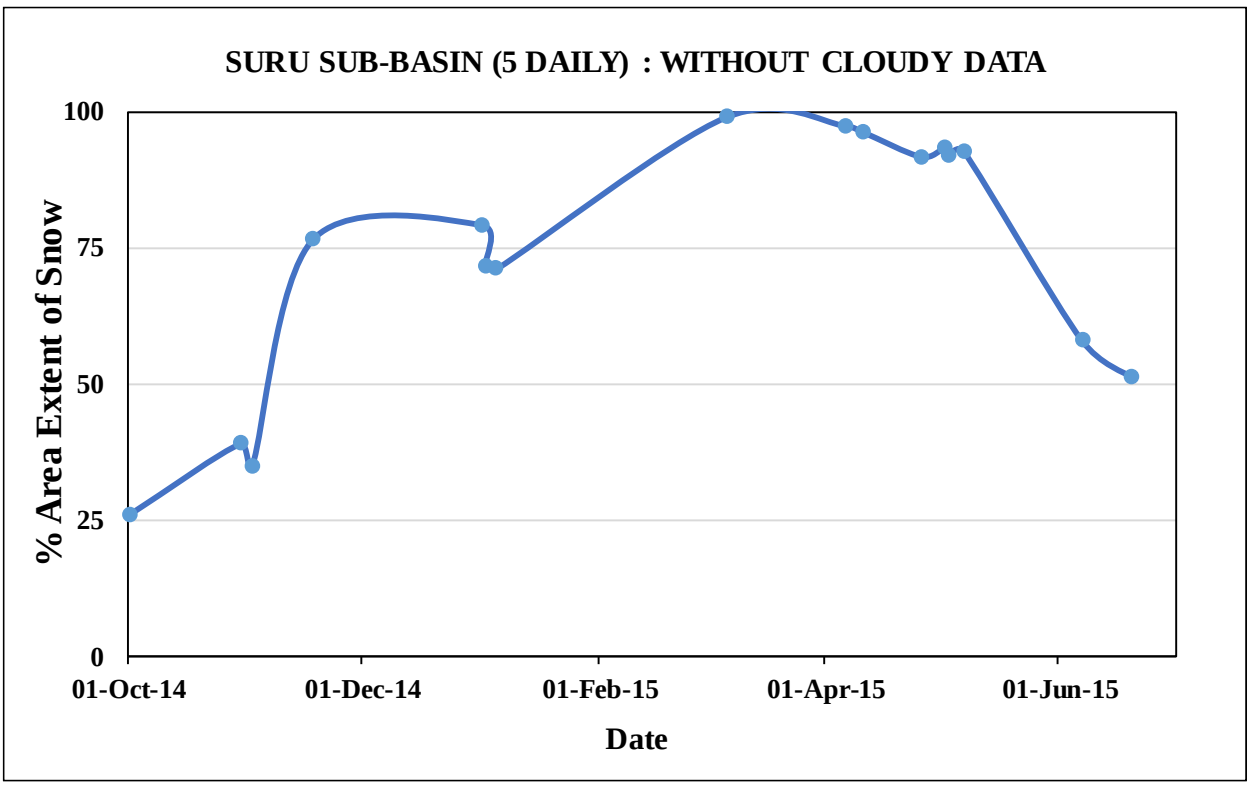
AREAL EXTENT OF SNOW (10 DAILY)

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

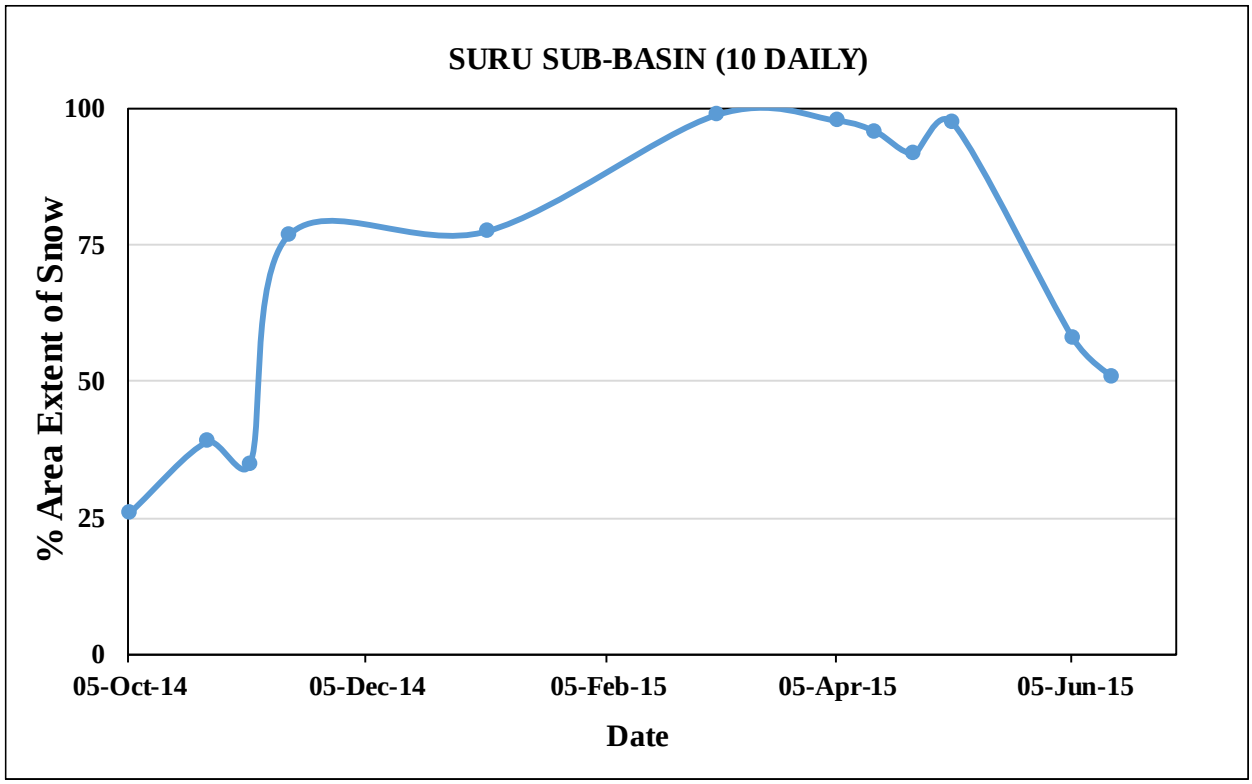
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
October 2014							
1	01-Oct-2014	936	26	**2**	30-Oct-2014	1401	39
November 2014							
3	02-Nov-2014	1253	35	**4**	18-Nov-2014	2744	77
January 2015							
5	05-Jan-2015	2777	78				
March 2015							
6	06-Mar-2015	3544	99				
April 2015							
7	06-April-2015	3488	98	**8**	11-April-2015	3443	96
9	26-April-2015	3284	92				
May 2015							
10	05-May-2015	3487	98				
June 2015							
11	07-June-2015	2080	58	**12**	20-June-2015	1839	51

SNOW COVER DEPLETION CURVE



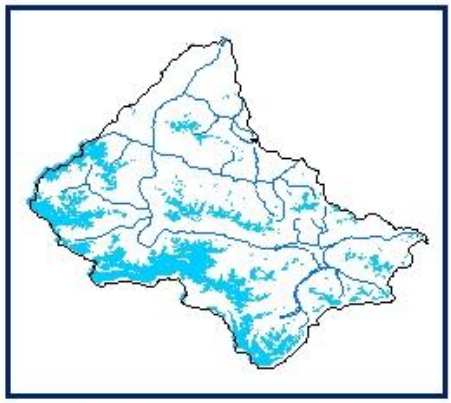


SNOW COVER DEPLETION CURVE

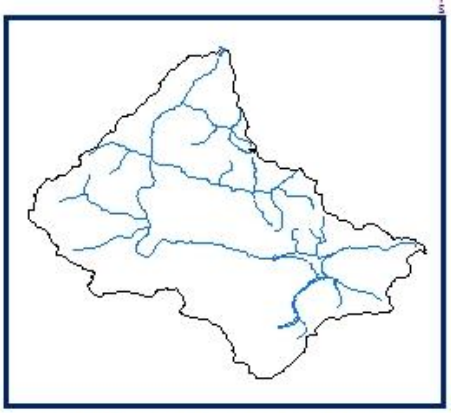


SNOW COVER MAP

SNOW COVER MAP : SURU SUB-BASIN



01 OCTOBER 2014



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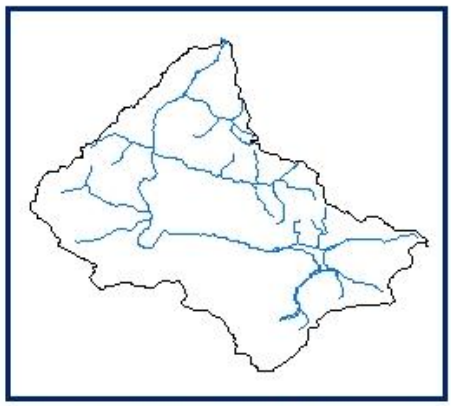

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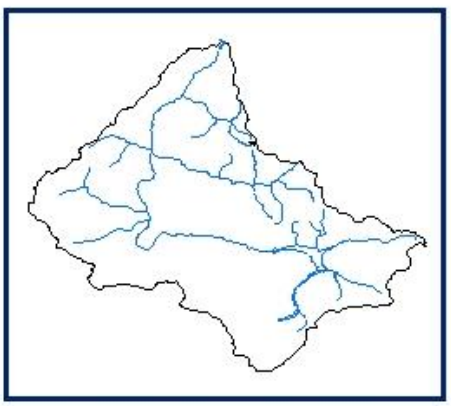

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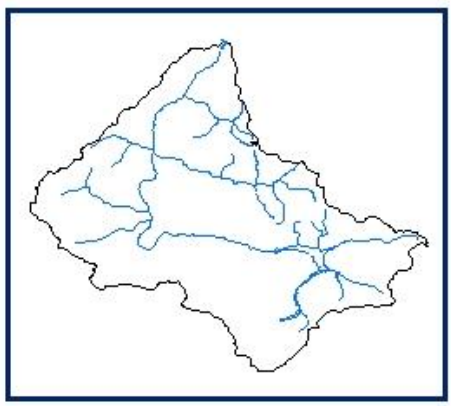


DATA NOT AVAILABLE

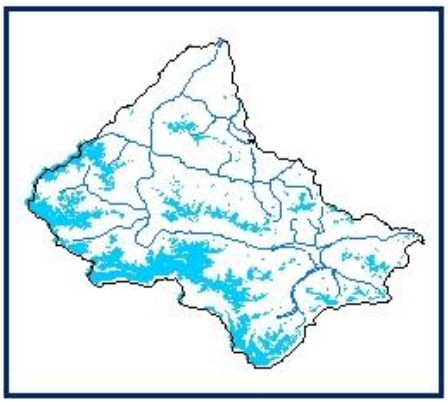
30 OCTOBER 2014

SNOW

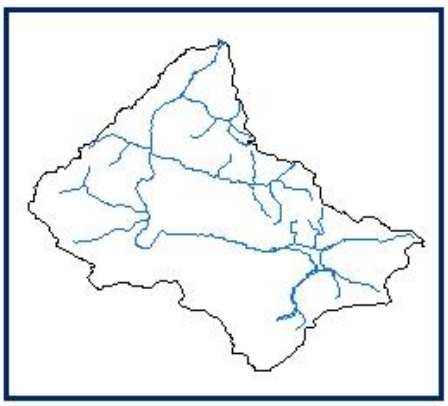
25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : SURU SUB-BASIN



DATA USED
01 OCTOBER 2014



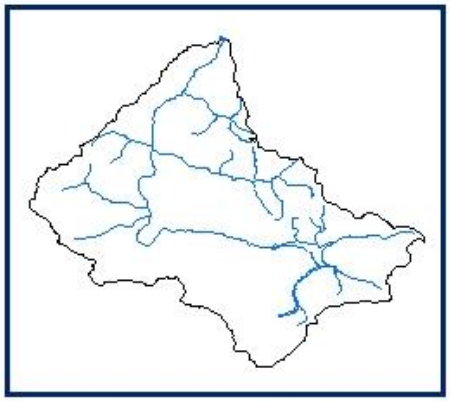
DATA NOT AVAILABLE

DATA USED
30 OCTOBER 2014

105 0 10 20 30
Kilometers

SNOW

SNOW COVER MAP : SURU SUB-BASIN



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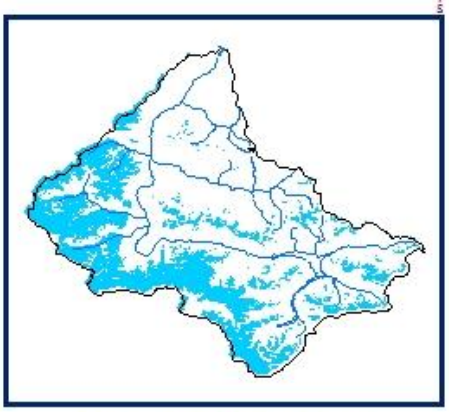
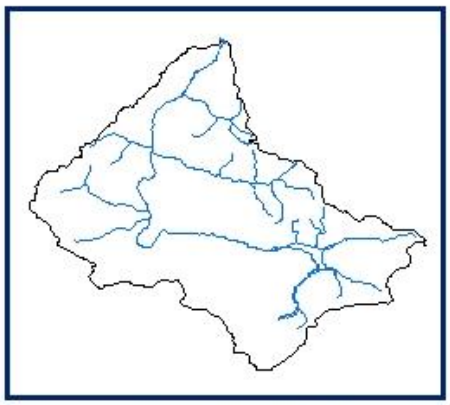


02 NOVEMBER 2014



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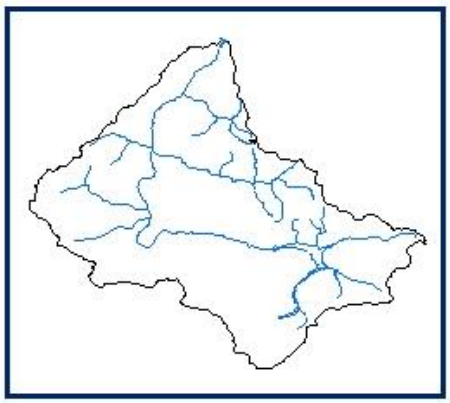

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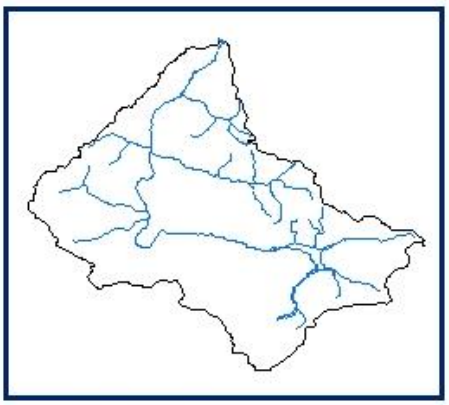


DATA NOT AVAILABLE

SNOW

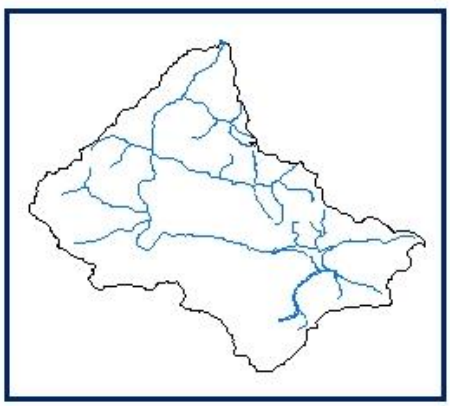
25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : SURU SUB-BASIN

DATA USED
02 NOVEMBER 2014

DATA USED
18 NOVEMBER 2014



DATA NOT AVAILABLE

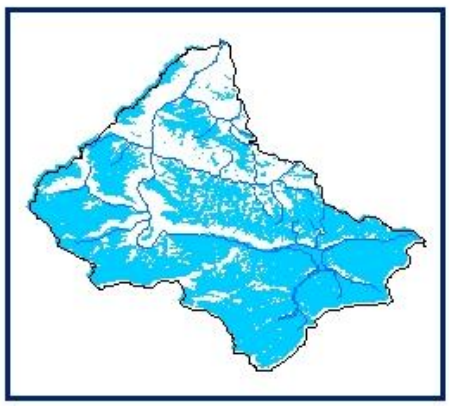
SNOW

105 0 10 20 30
Kilometers

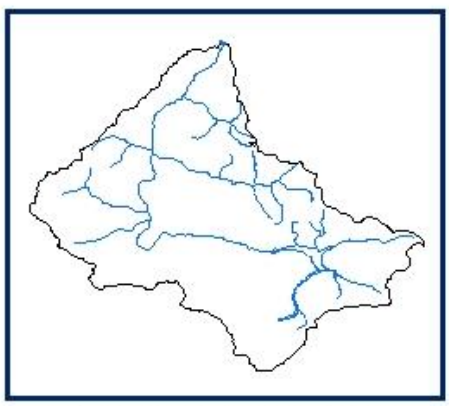
SNOW COVER MAP : SURU SUB-BASIN

01 JANUARY 2015

02 JANUARY 2015



05 JANUARY 2015



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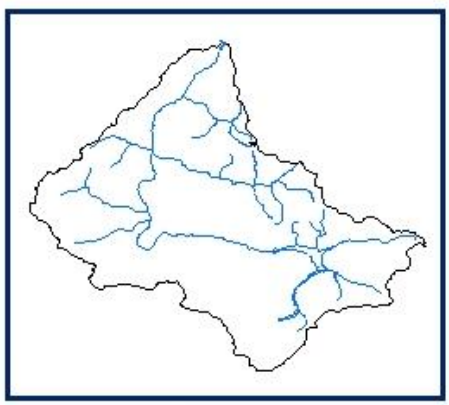

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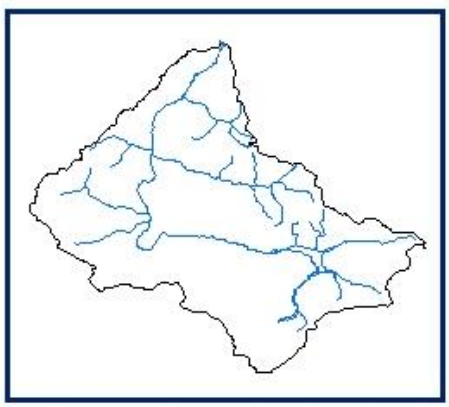


DATA NOT AVAILABLE

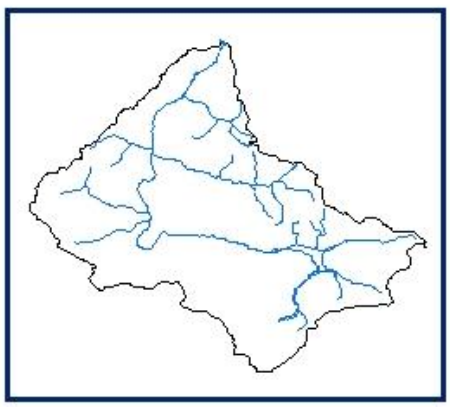
SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : SURU SUB-BASIN

DATA USED
01 JANUARY 2015
02 JANUARY 2015
05 JANUARY 2015



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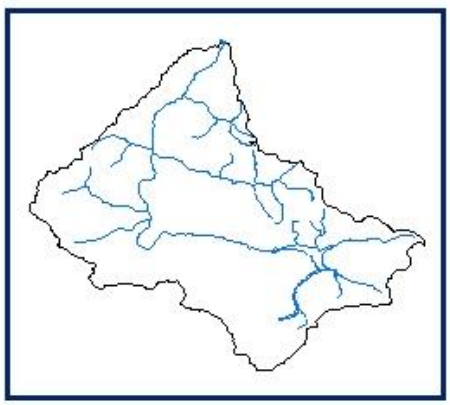
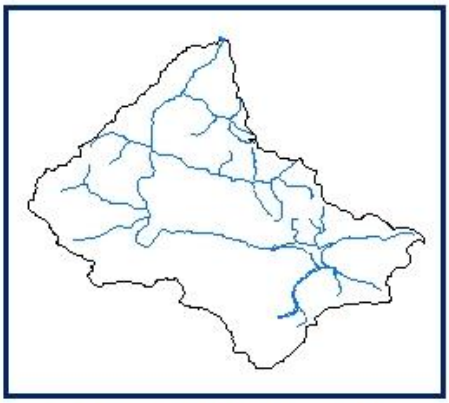


DATA NOT AVAILABLE

105 0 10 20 30
Kilometers

SNOW

SNOW COVER MAP : SURU SUB-BASIN



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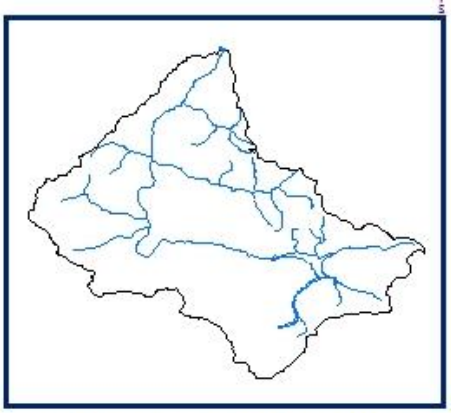

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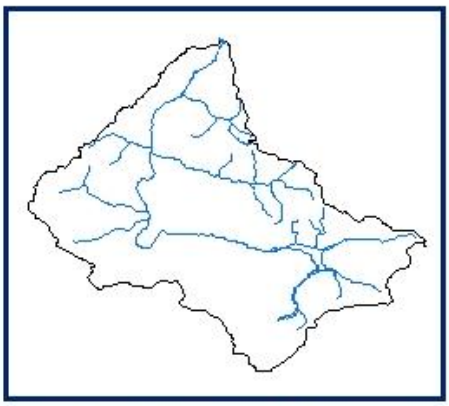

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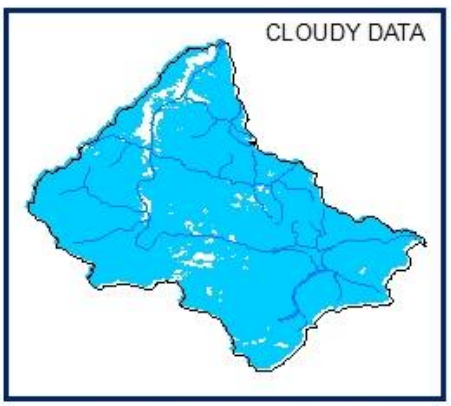
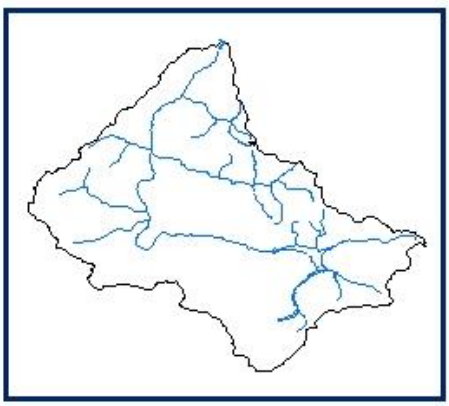


17 FEBRUARY 2015



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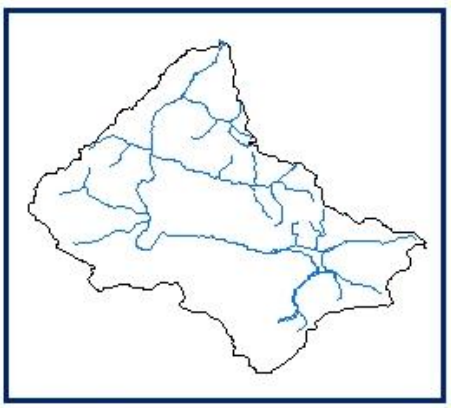


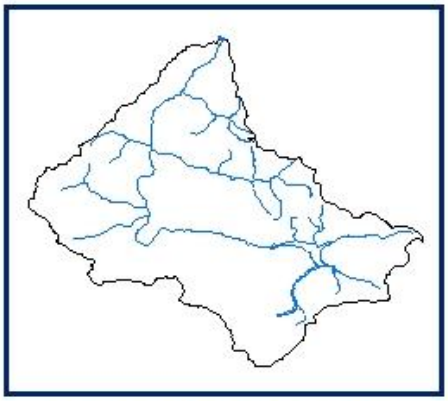
DATA NOT AVAILABLE

SNOW

25 12.5 0 25 50 75

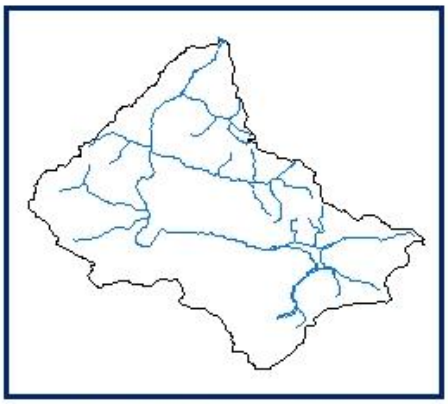
Kilometers

SNOW COVER MAP : SURU SUB-BASIN



DATA NOT AVAILABLE

06 MARCH 2015



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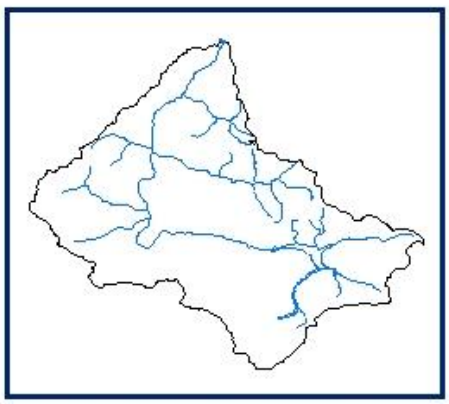

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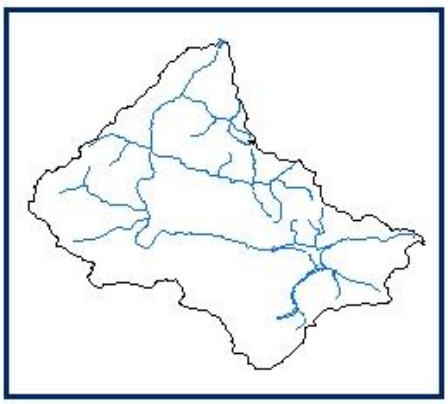

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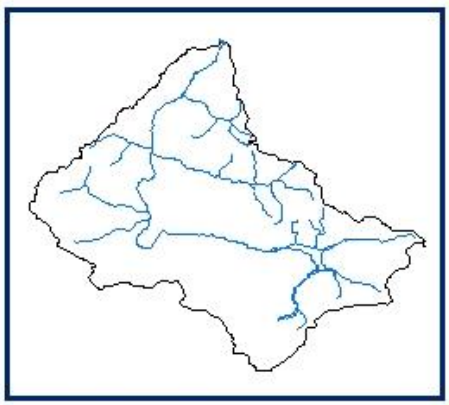


DATA NOT AVAILABLE

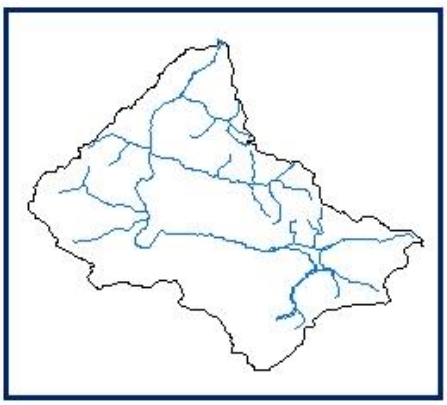
SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : SURU SUB-BASIN

DATA USED
06 MARCH 2015



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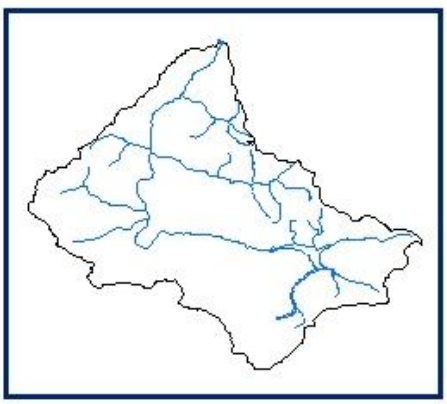
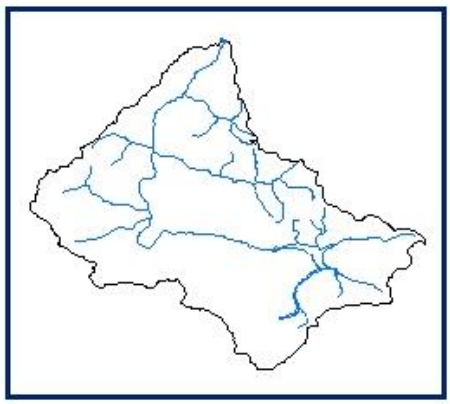


DATA NOT AVAILABLE

105 0 10 20 30
Kilometers

SNOW

SNOW COVER MAP : SURU SUB-BASIN



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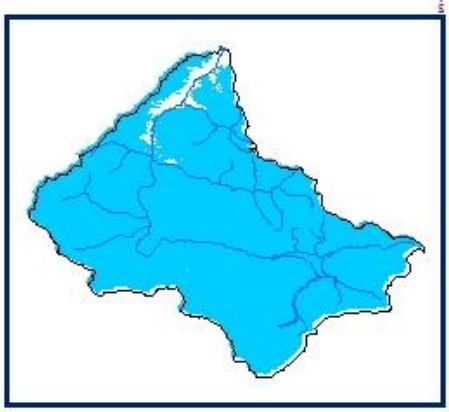
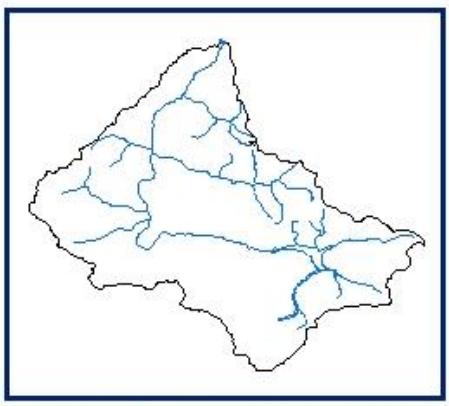


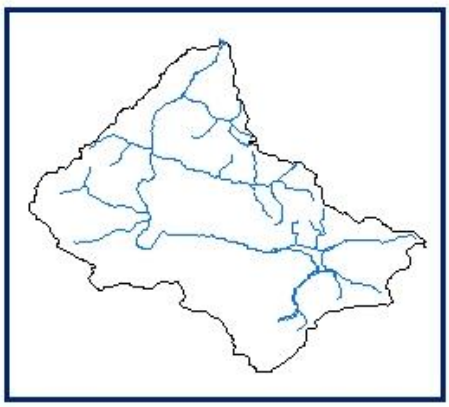
06 APRIL 2015

11 APRIL 2015



DATA NOT AVAILABLE

26 APRIL 2015



DATA NOT AVAILABLE

SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : SURU SUB-BASIN

DATA USED
06 APRIL 2015

DATA USED
11 APRIL 2015

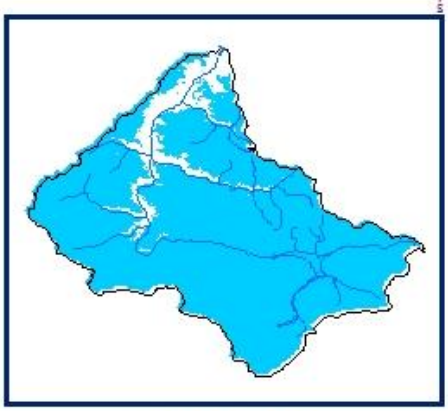
DATA USED
26 APRIL 2015

SNOW

105 0 10 20 30
Kilometers

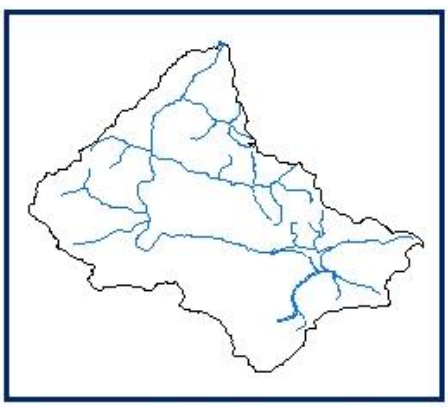
SNOW COVER MAP : SURU SUB-BASIN

02 MAY 2015



03 MAY 2015

07 MAY 2015



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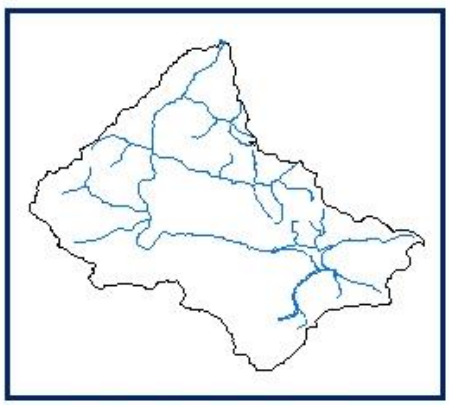

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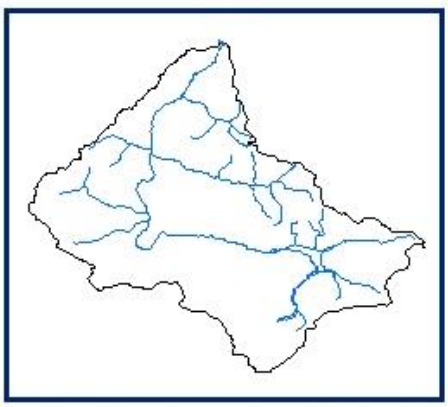


DATA NOT AVAILABLE

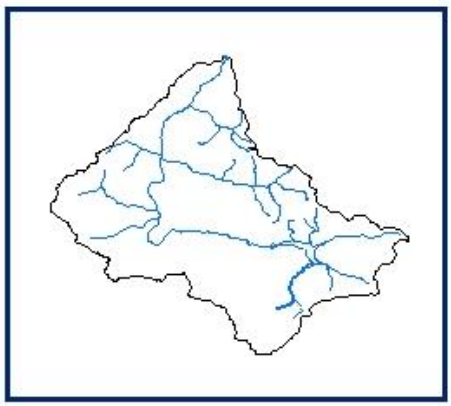
SNOW

25 12.5 0 25 50 75

Kilometers

10 DAILY SNOW COVER MAP : SURU SUB-BASIN

DATA USED
02 MAY 2015
03 MAY 2015
07 MAY 2015



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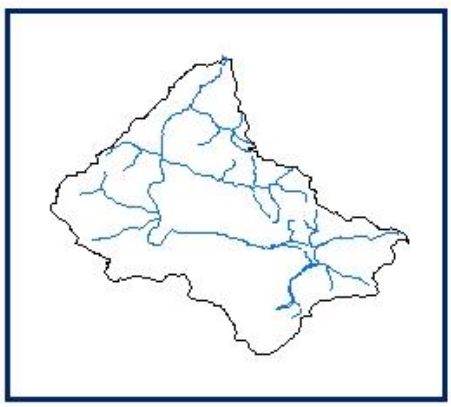
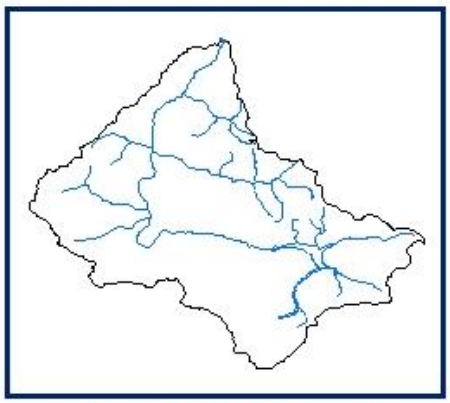


DATA NOT AVAILABLE

105 0 10 20 30
Kilometers

SNOW

SNOW COVER MAP : SURU SUB-BASIN



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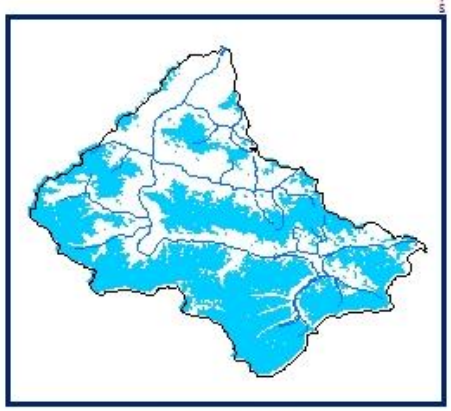
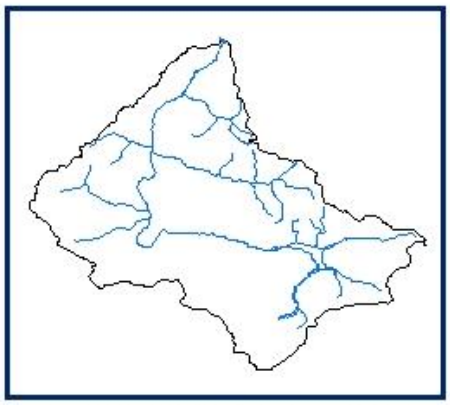


07 JUNE 2015



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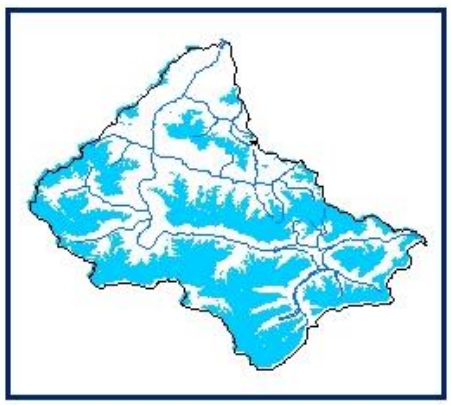
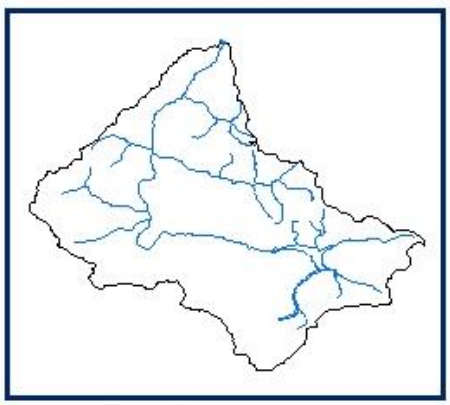


20 JUNE 2015



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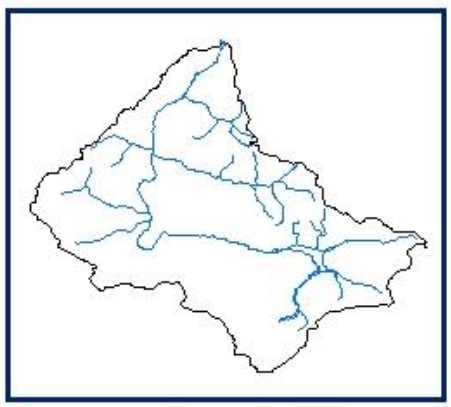


DATA NOT AVAILABLE

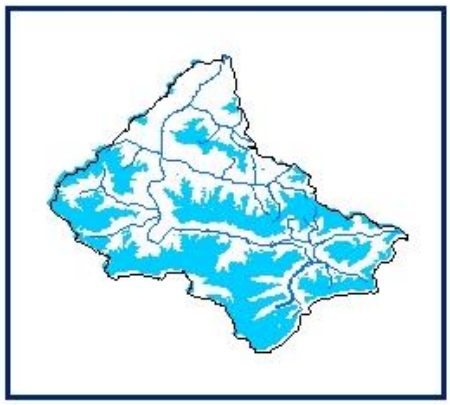
SNOW

25 12.5 0 25 50 75

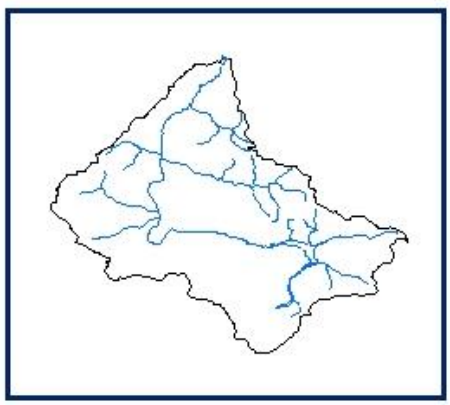
Kilometers

10 DAILY SNOW COVER MAP : SURU SUB-BASIN

DATA USED
07 JUNE 2015



DATA USED
20 JUNE 2015



DATA NOT AVAILABLE

SNOW

105 0 10 20 30
Kilometers

ZASKAR SUB-BASIN

AREAL EXTENT OF SNOW (5 DAILY)

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

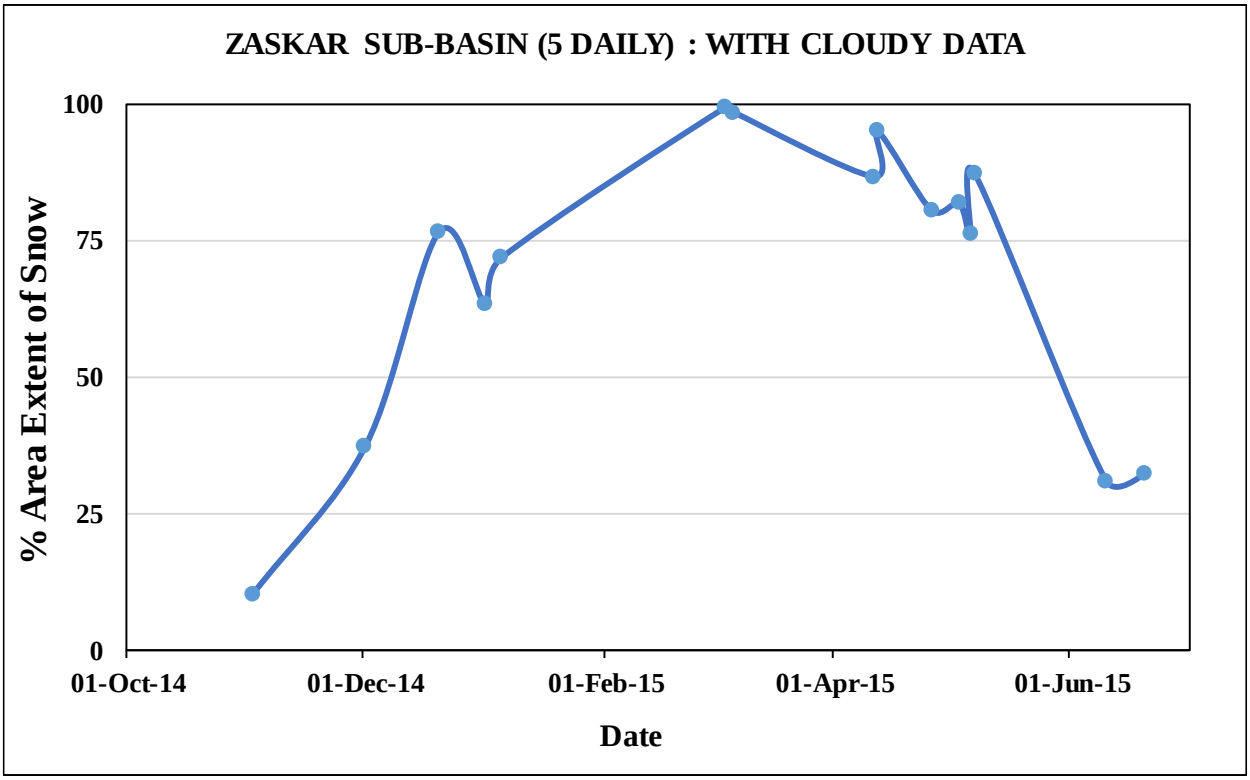
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
November 2014							
1	02-Nov-2014	1568	11				
December 2014							
2	01-Dec-2014	5615	38	**3**	20-Dec-2014	11466	77
January 2015							
4	01-Jan-2015	9469	63	**5**	05-Jan-2015	10747 (C)	72
March 2015							
6	04-Mar-2015	14880 (C)	100	**7**	06-Mar-2015	14730 (C)	99
April 2015							
8	11-April-2015	12975	87	**9**	12-April-2015	14213 (C)	95
10	26-April-2015	12046	81				
May 2015							
11	03-May-2015	12265	82	**12**	06-May-2015	11384	76
13	07-May-2015	13077	88				
June 2015							
14	10-June-2015	4657 (C)	31	**15**	20-June-2015	4848	33

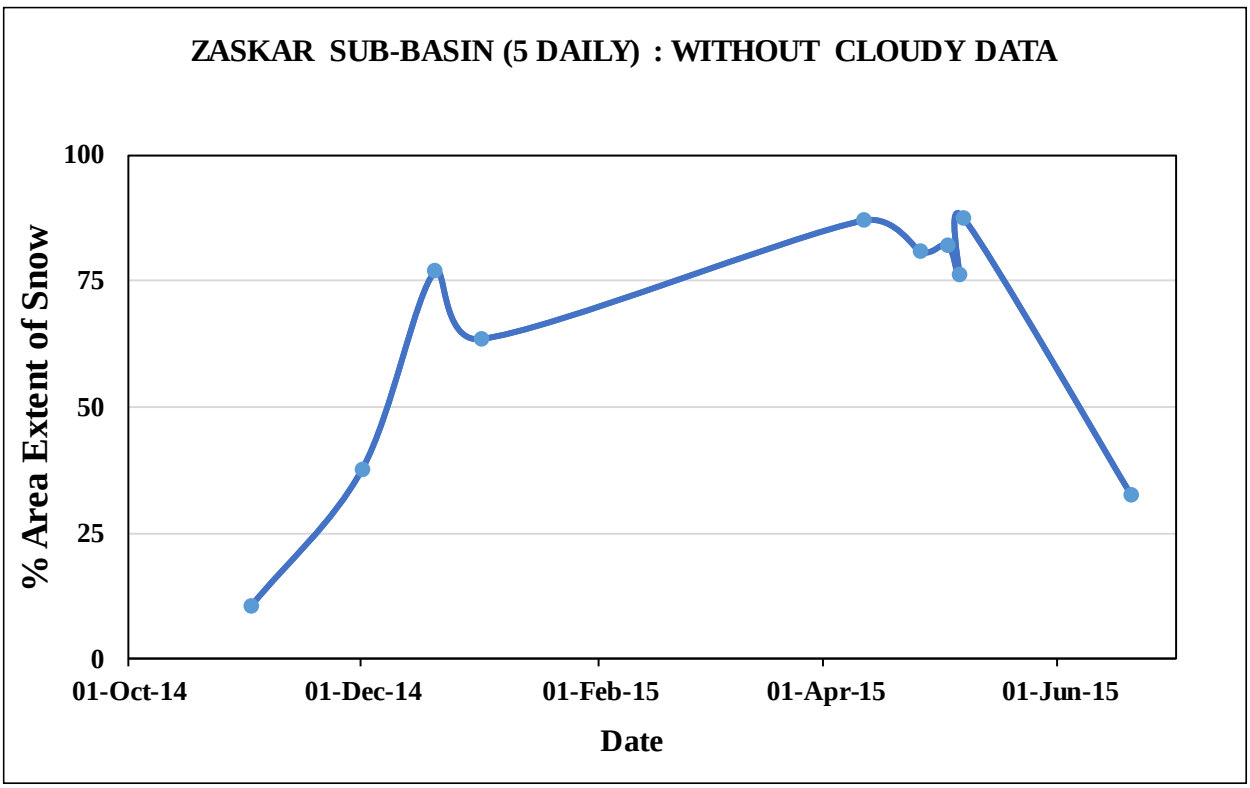
AREAL EXTENT OF SNOW (10 DAILY)

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

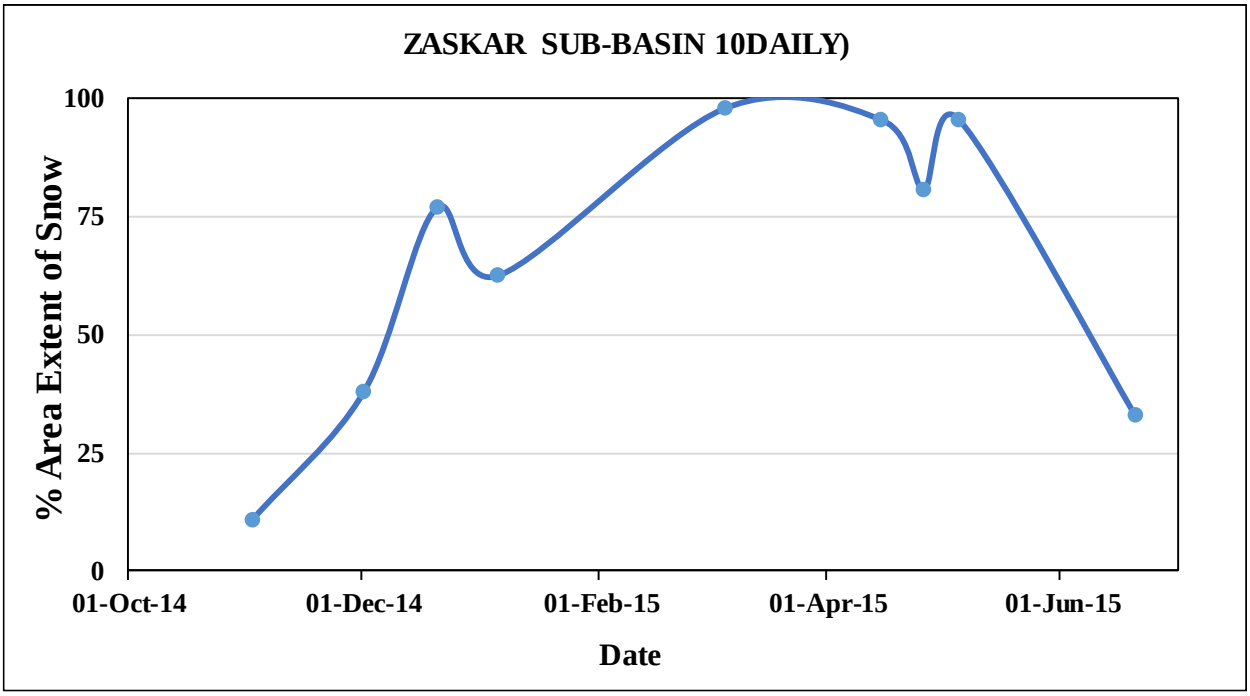
S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
November 2014							
1	02-Nov-2014	1568	11				
December 2014							
2	01-Dec-2014	5615	38	**3**	20-Dec-2014	11466	77
January 2015							
4	05-Jan-2015	9342	63				
March 2015							
5	05-Mar-2015	16183	98				
April 2015							
6	15-April-2015	14250	96	**7**	26-April-2015	12046	81
May 2015							
8	05-May-2015	14274	96				
June 2015							
9	20-June-2015	4848	33				

SNOW COVER DEPLETION CURVE





SNOW COVER DEPLETION CURVE



SNOW COVER MAP

SNOW COVER MAP : ZASKAR SUB-BASIN

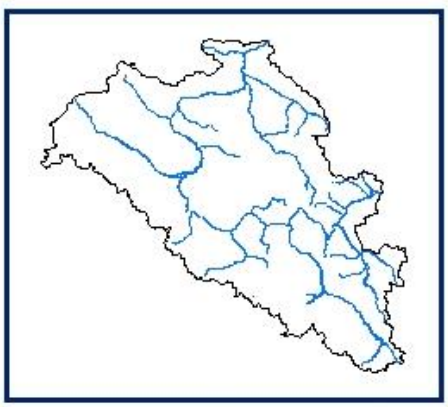
DATA NOT AVAILABLE

02 NOVEMBER 2014

DATA NOT AVAILABLE

DATA NOT AVAILABLE

DATA NOT AVAILABLE



DATA NOT AVAILABLE

SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : ZASKAR SUB-BASIN

DATA USED
02 NOVEMBER 2014

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

30 15 0 30 60 90
Kilometers

SNOW COVER MAP : ZASKAR SUB-BASIN

01 DECEMBER 2014

DATA NOT AVAILABLE

DATA NOT AVAILABLE

20 DECEMBER 2014

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : ZASKAR SUB-BASIN

DATA USED
01 DECEMBER 2014

DATA NOT AVAILABLE

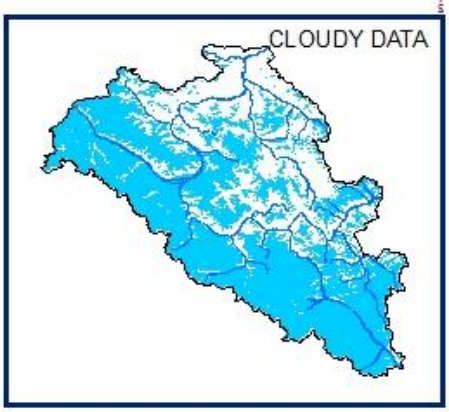
DATA USED
20 DECEMBER 2014

SNOW

30 15 0 30 60 90
Kilometers

SNOW COVER MAP : ZASKAR SUB-BASIN

01 JANUARY 2015



05 JANUARY 2015

DATA NOT AVAILABLE

DATA NOT AVAILABLE

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : ZASKAR SUB-BASIN

DATA USED
01 JANUARY 2015
05 JANUARY 2015

DATA NOT AVAILABLE

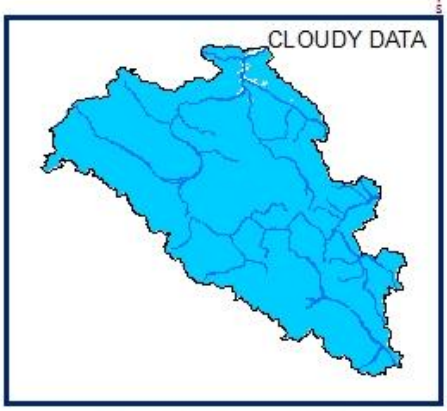
DATA NOT AVAILABLE

SNOW

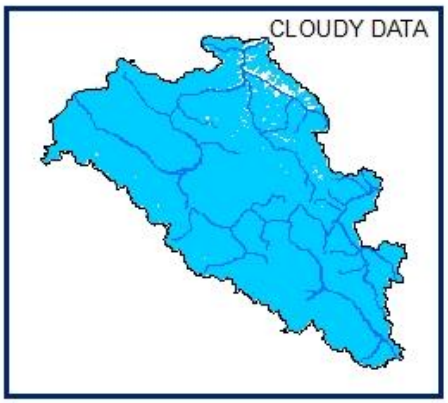
30 15 0 30 60 90
Kilometers

SNOW COVER MAP : ZASKAR SUB-BASIN

DATA NOT AVAILABLE



04 MARCH 2015



06 MARCH 2015

DATA NOT AVAILABLE

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : ZASKAR SUB-BASIN

DATA USED
04 MARCH 2015
06 MARCH 2015

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

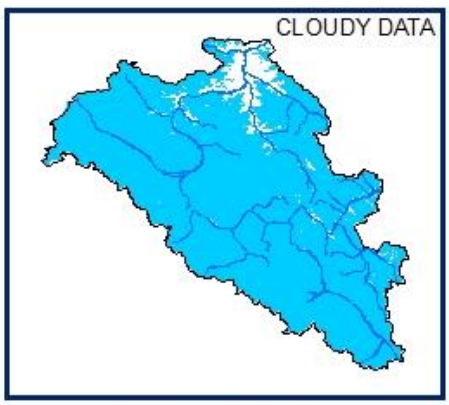
30 15 0 30 60 90
Kilometers

SNOW COVER MAP : ZASKAR SUB-BASIN

DATA NOT AVAILABLE

DATA NOT AVAILABLE

11 APRIL 2015



12 APRIL 2015

26 APRIL 2015

DATA NOT AVAILABLE

SNOW

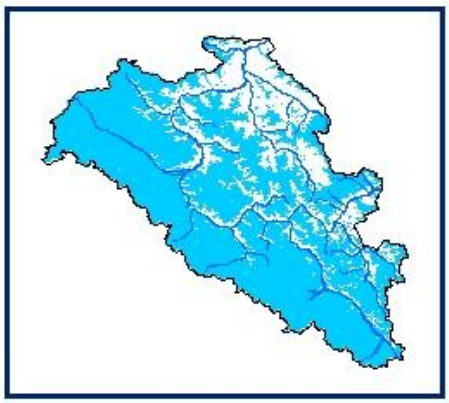
50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : ZASKAR SUB-BASIN

DATA NOT AVAILABLE

DATA USED
11 APRIL 2015
12 APRIL 2015



DATA USED
26 APRIL 2015

SNOW

30 15 0 30 60 90
Kilometers

SNOW COVER MAP : ZASKAR SUB-BASIN

03 MAY 2015

06 MAY 2015

07 MAY 2015

DATA NOT AVAILABLE

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : ZASKAR SUB-BASIN

DATA USED
03 MAY 2015
06 MAY 2015
07 MAY 2015

DATA NOT AVAILABLE

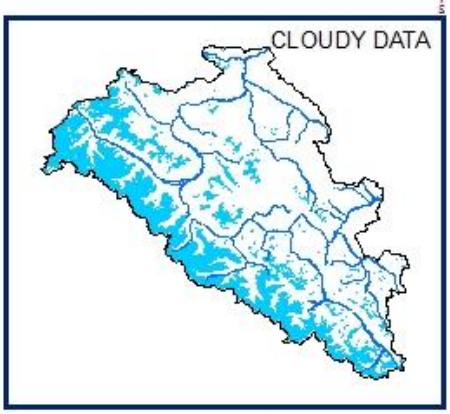
DATA NOT AVAILABLE

30 15 0 30 60 90
Kilometers

SNOW

SNOW COVER MAP : ZASKAR SUB-BASIN

DATA NOT AVAILABLE



10 JUNE 2015

DATA NOT AVAILABLE

20 JUNE 2015

DATA NOT AVAILABLE

DATA NOT AVAILABLE

SNOW

50 25 0 50 100 150

Kilometers

10 DAILY SNOW COVER MAP : ZASKAR SUB-BASIN

DATA NOT AVAILABLE

DATA USED
20 JUNE 2015

DATA NOT AVAILABLE

SNOW

30 15 0 30 60 90
Kilometers