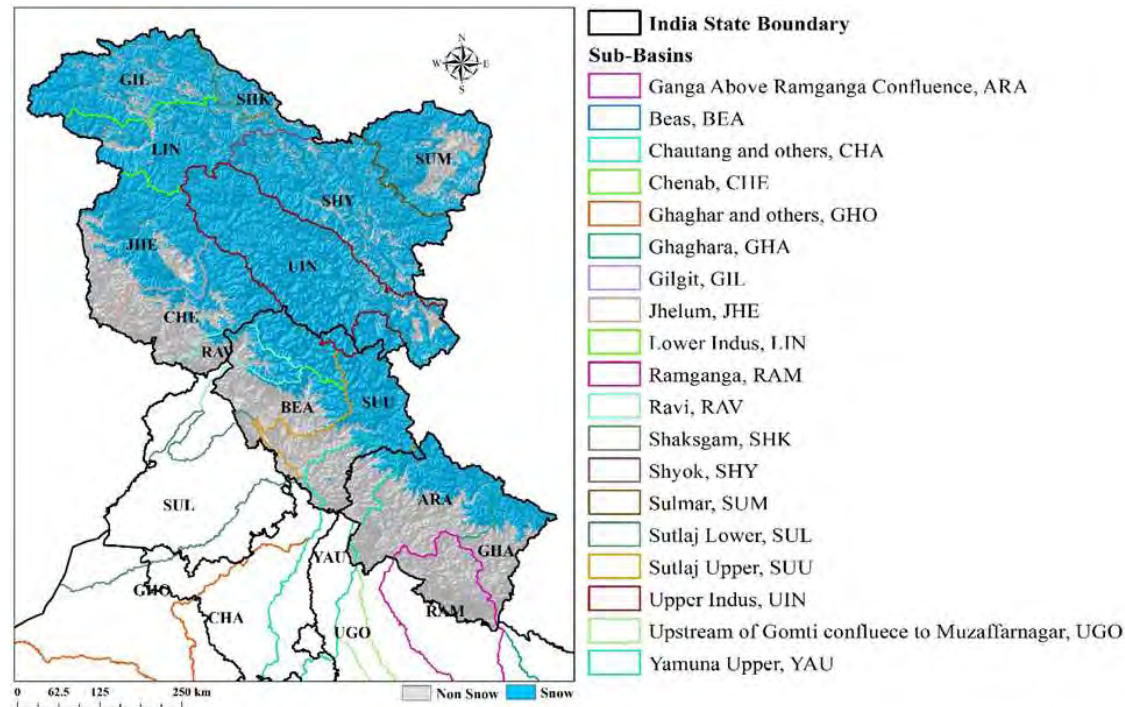


# Long Term Snow Cover Area Mapping and Snow Water Equivalent Retrieval for North West Himalaya (NWH).

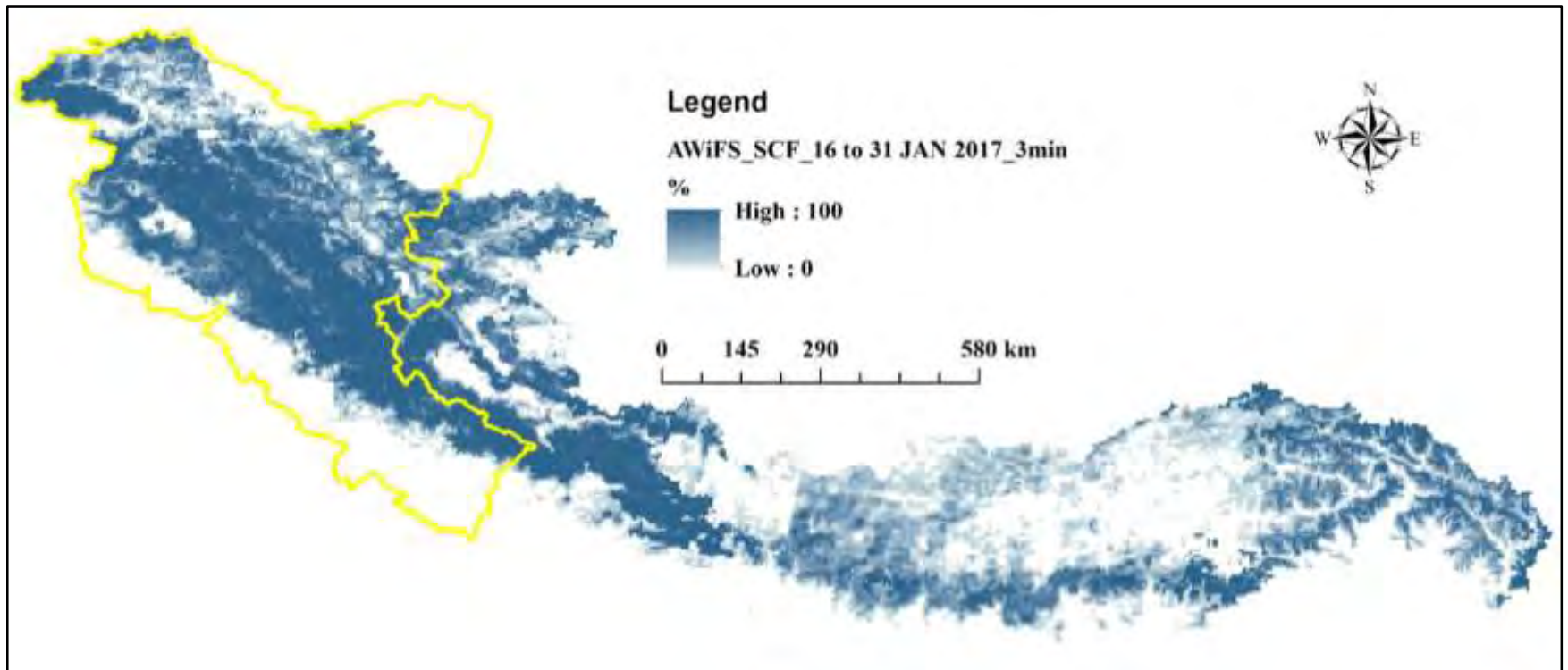


**Indian Institute of Remote Sensing  
Indian Space Research Organisation  
DoS, Govt. of India  
4, Kalidas Road, Dehradun**



## AWiFs: Snow Fraction Data Product (2014-18)

- Bi-monthly available
- Nov-Feb month data analyzed
- 3 min (5 km) spatial resolution

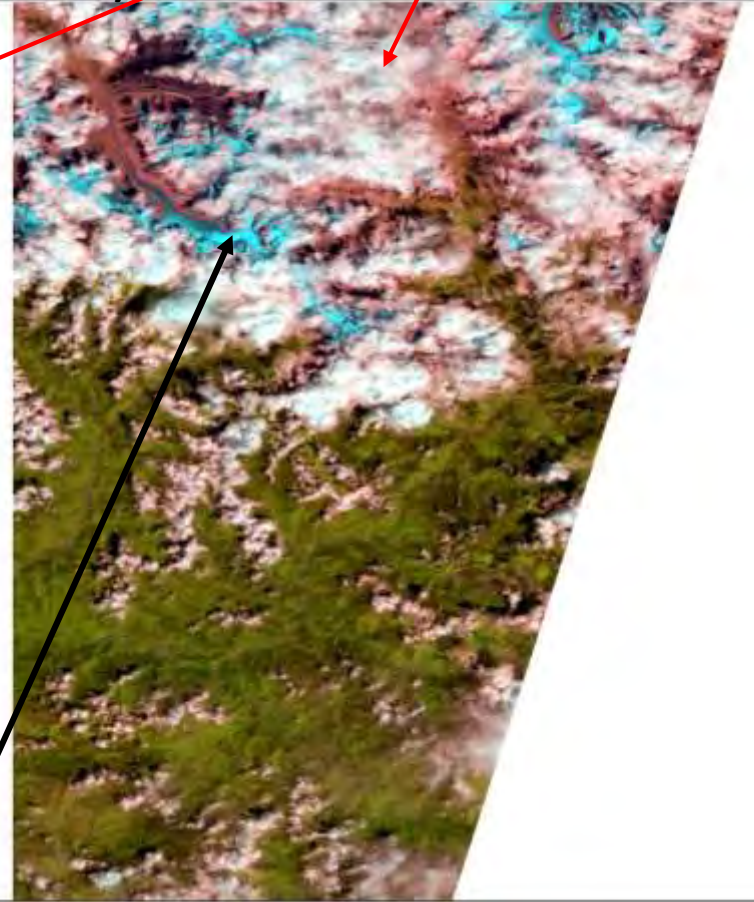
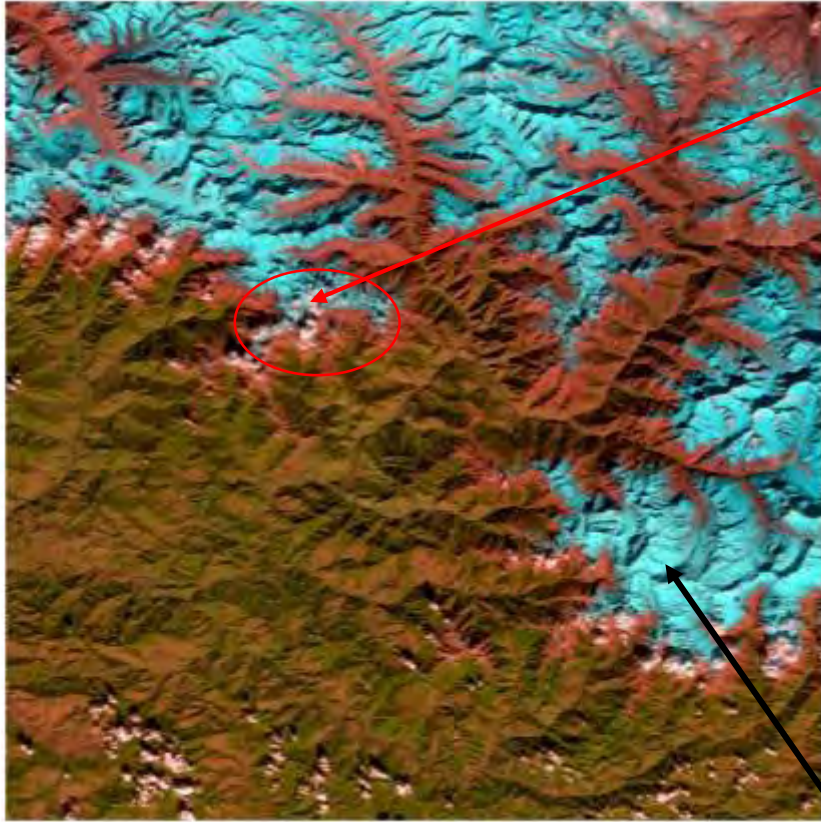
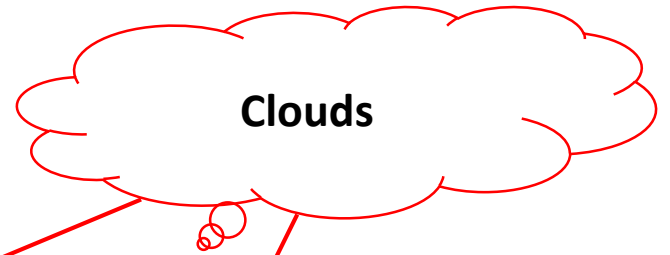


Source : <https://bhuvan.nrsc.gov.in>



# Major Problem in Snow Cover Area Mapping

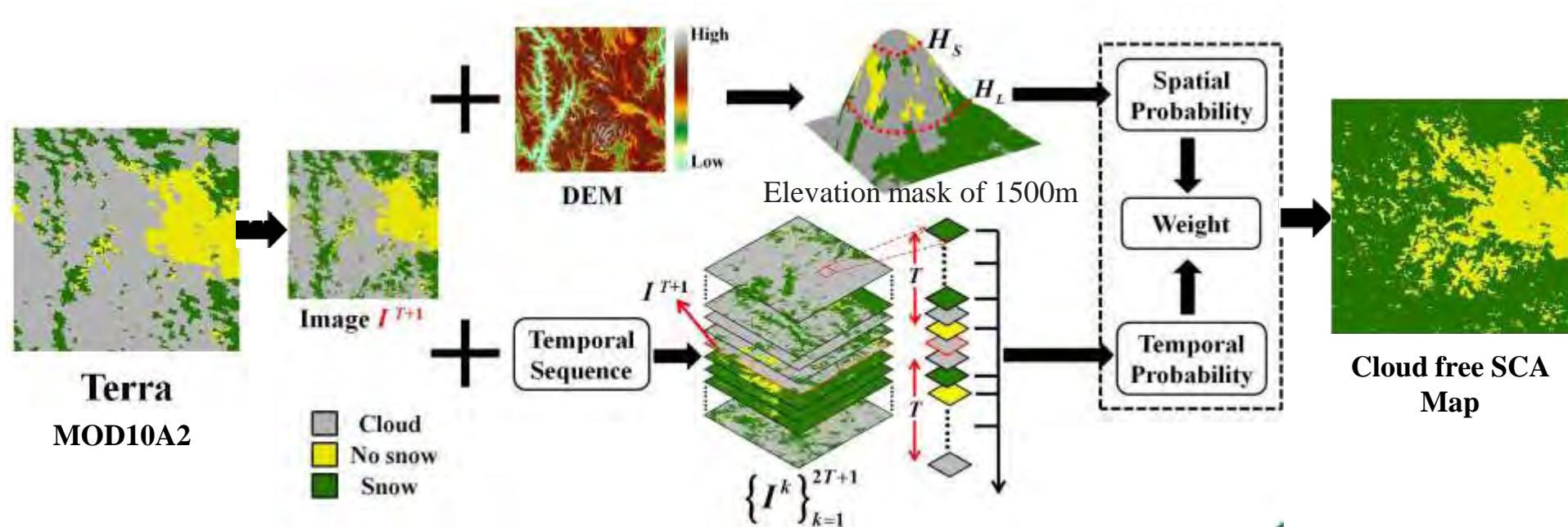
AWiFS Images (FCC : 4-3-2)



Snow

Source : <https://bhuvan.nrsc.gov.in>

# Methodology for SCA Mapping



**Long Term data was pre-processed**

- ❖ Batch processing using Geospatial Data Abstraction Library (GDAL)

**To automate the SCA mapping process**

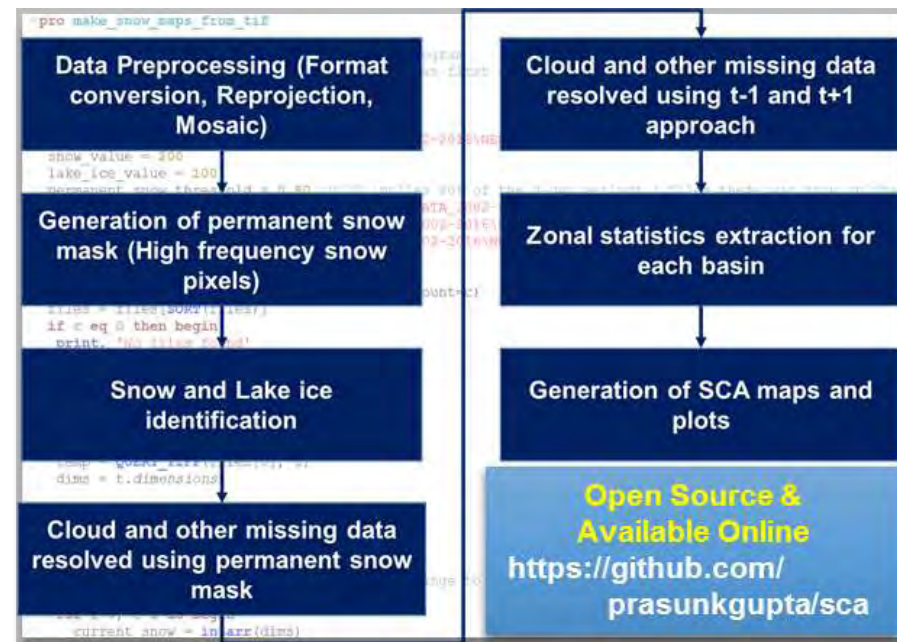
- ❖ Tool was developed in IDL

**The two stage process gives two outputs**

- ❖ Permanent snow cover map
- ❖ Temporal SCA maps

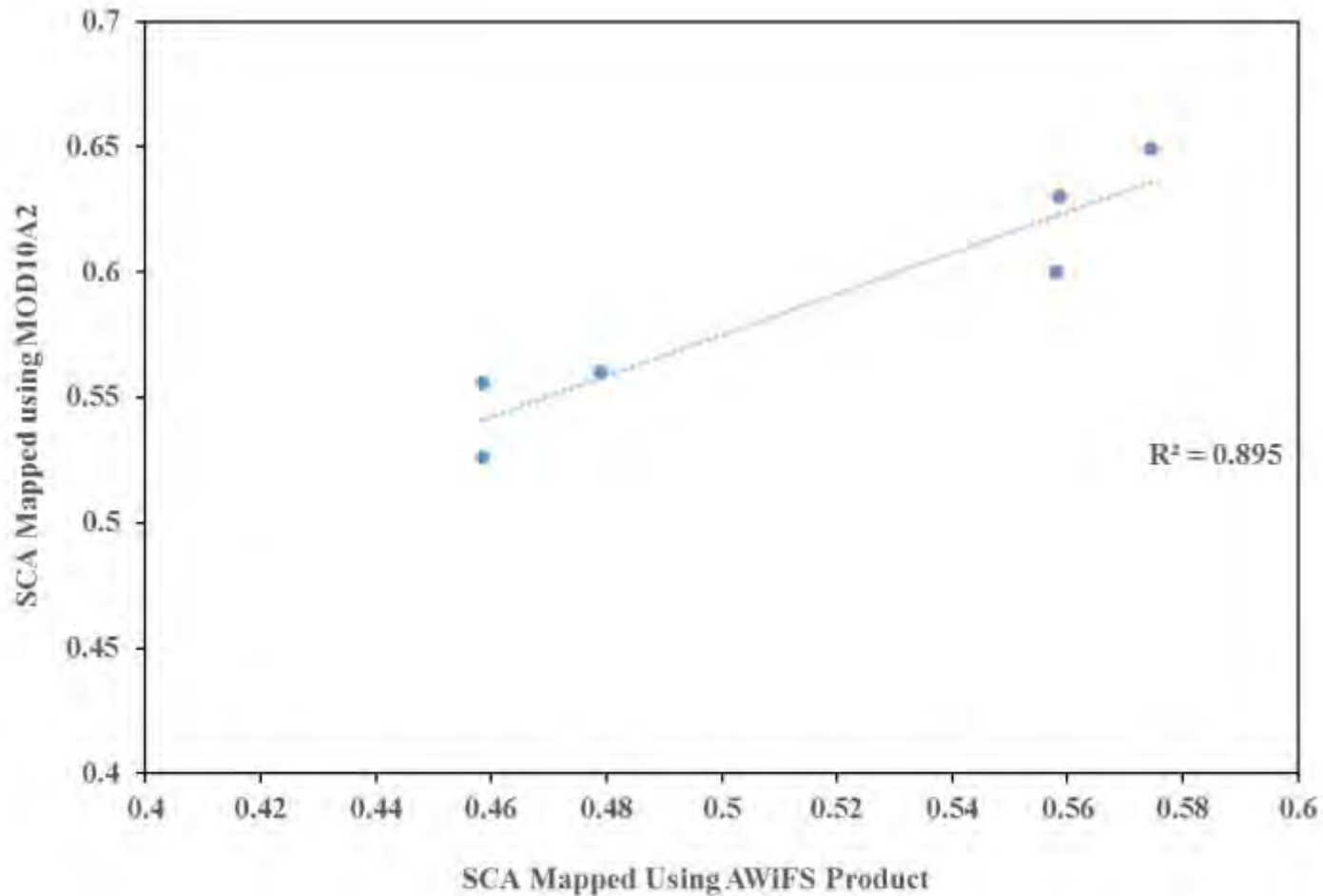
**To automate zonal statistics extraction**

- ❖ Tool was developed in IDL



# Validation of SCA mapped using MOD10A2 product

- ❖ SCA from AWiFS snow cover fraction products has been used to validate the SCA mapped using MOD10A2

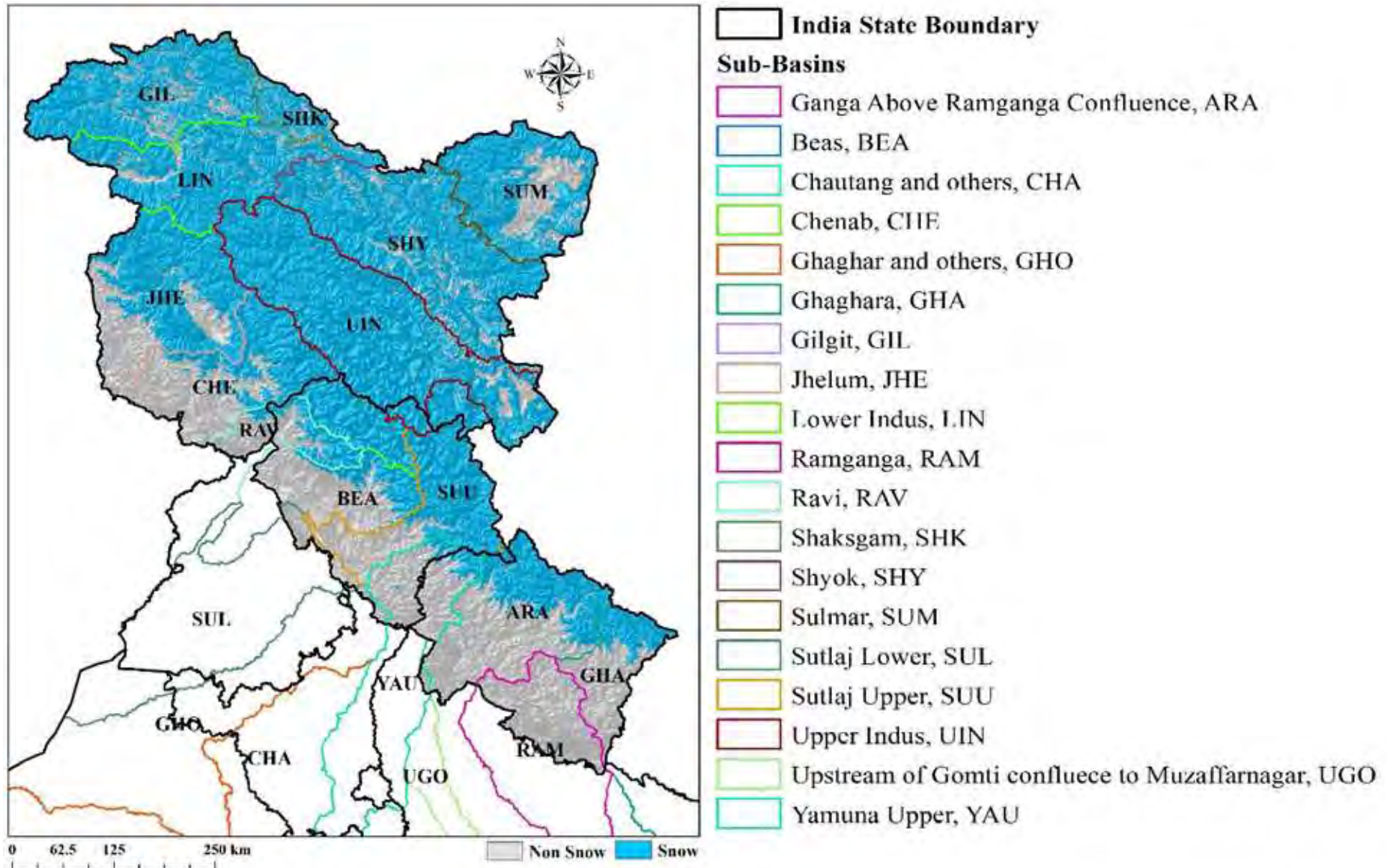


$R^2 = 0.895$

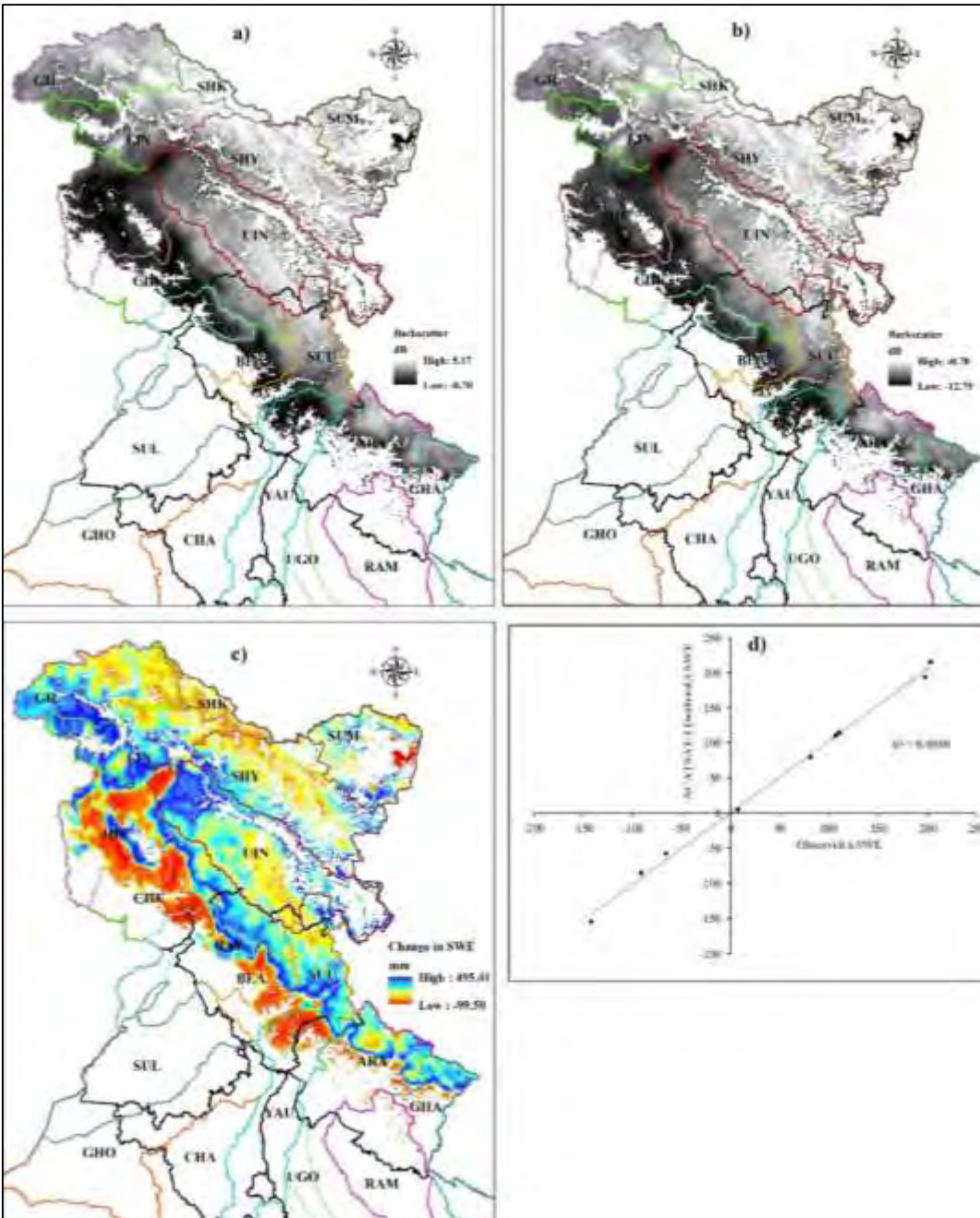
Percent error = 7 to 16 %



# Eight day maximum SCA in 2<sup>nd</sup> week of February 2017 derived from MOD10A2 product



This Figure corresponds to maximum SCA (around 67%) in winter of 2016-17



a) Backscatter 1<sup>st</sup> week January 2017, b) Backscatter 2<sup>nd</sup> week January 2017, c) Change ( $\Delta$ ) in SWE Derived from SCATSAT-1, d) Relationship between observed and SCATSAT-1 derived  $\Delta$  SWE at Dhundi, Manali.

- ❖ The calibrated relation was then used to quantify changes in SWE in other river basins in NWH.
- ❖ It was analysed that SWE has **decreased** by **37 mm** from 1<sup>st</sup> week of March to 1<sup>st</sup> week of April, 2017 in Jhelum River sub-basin which is in concurrence to **14% decrease in SCA** during same time period.



# Outcome

- ❖ Long term SCA of entire NWH region.
- ❖ Tools to map SCA and extract basin wise statistics.
- ❖ Algorithm to retrieve SWE and  $\Delta$  SWE using SCATSAT-1 data.....

