

SPATIO-TEMPORAL VARIATION OF SNOW COVER IN A PART OF BRAHMAPUTRA BASIN BASED ON MODIS/TERRA

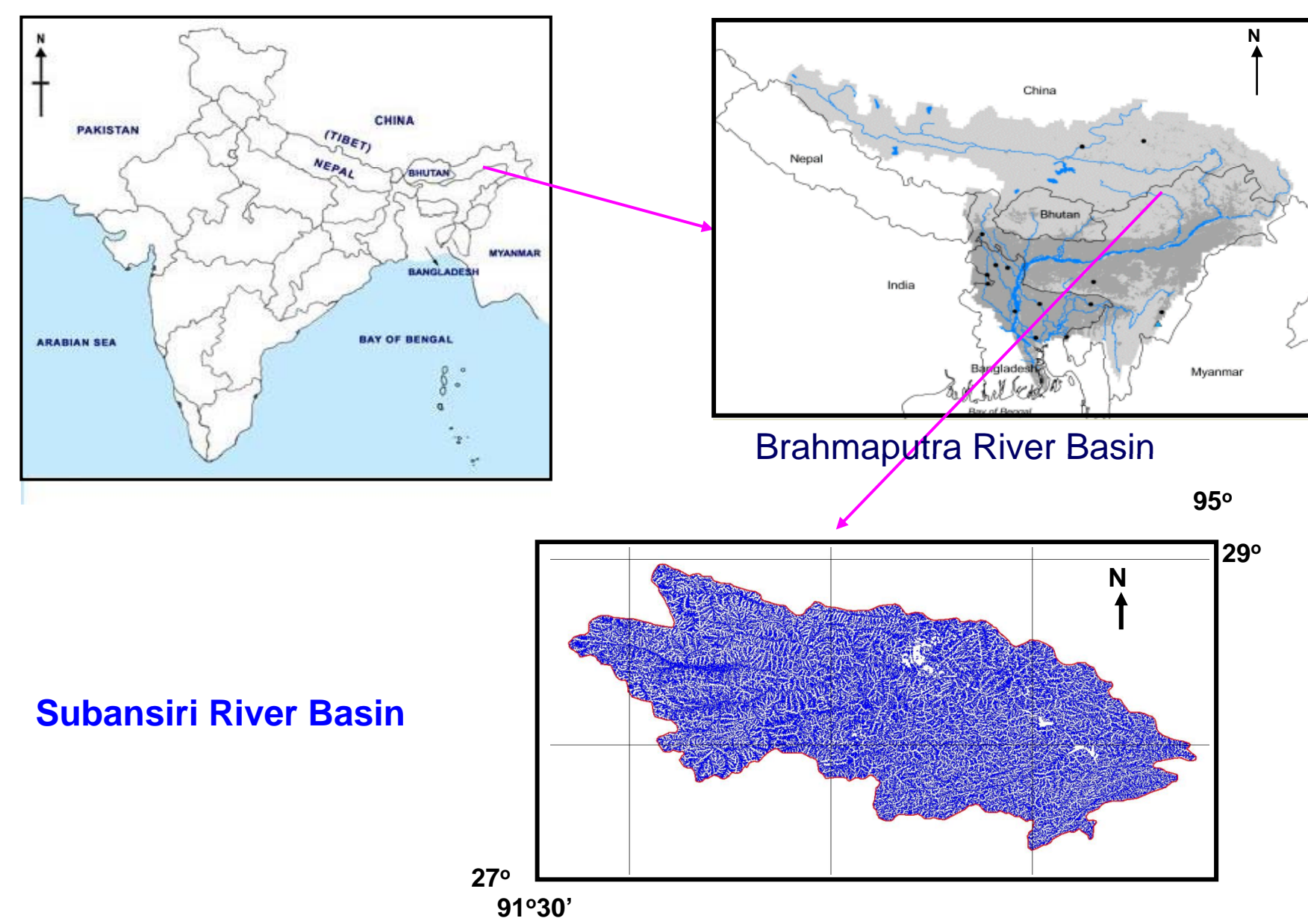
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OBJECTIVES

- To estimate snow cover area using MODIS satellite data
- To estimate spatial and Temporal distribution of snow cover area in Subansiri basin

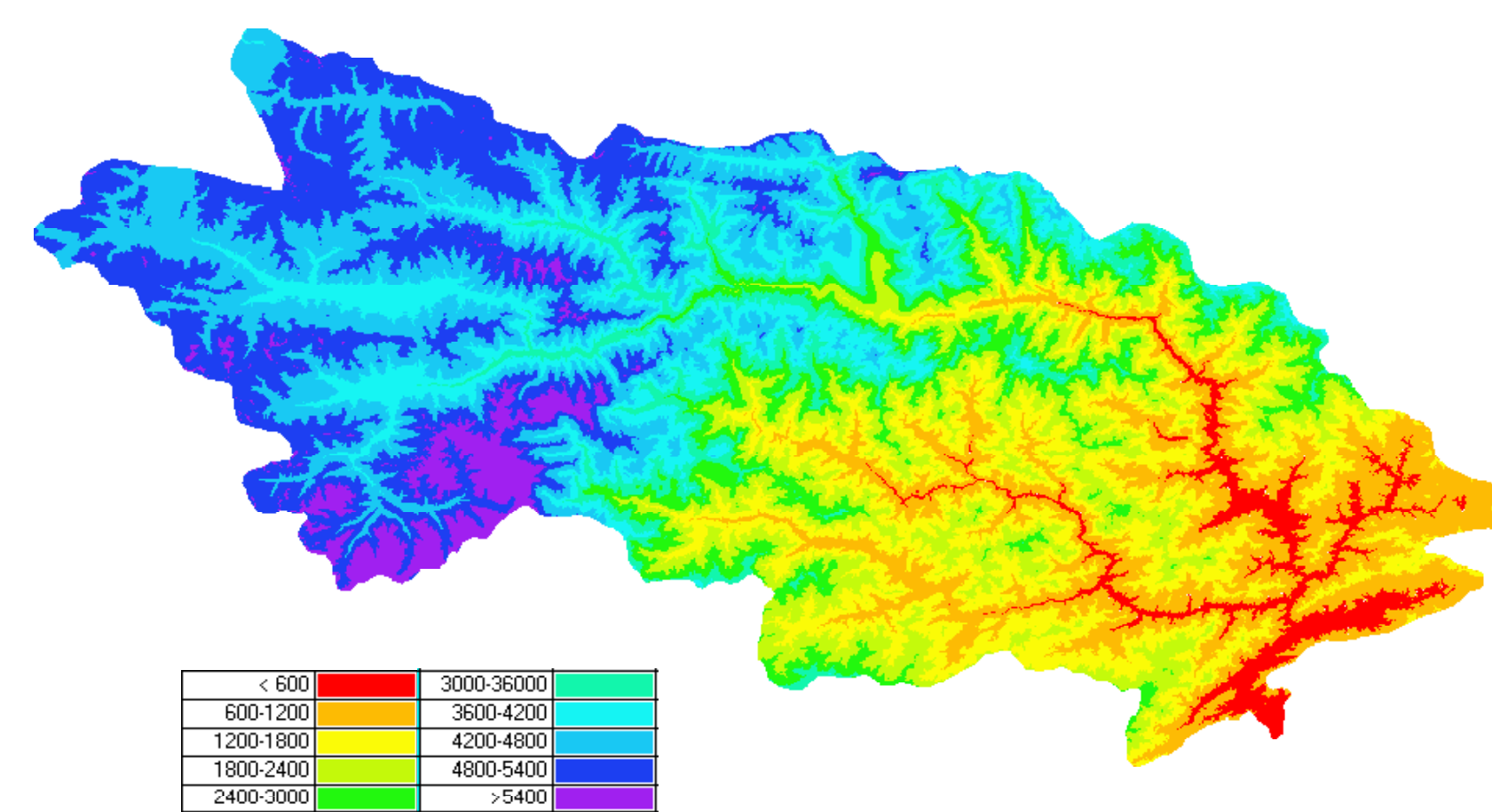
STUDY AREA



SUBANSIRI RIVER BASIN

- Subansiri River (Tsari Chu in Tibet) originates beyond Great Himalayan range (Central Himalaya) at 5340 m altitude, traverses Lesser Himalaya, Outer Himalaya, joins Brahmaputra in the plains of Assam
- Biggest tributary of Brahmaputra within India, Fed by numerous snowed tributaries and contains 91 glaciers within India, huge Hydropower potential in India
- Basin area = 28,000 Sq Km, River length = 442 Km,
- Average annual rainfall = 2,150 mm, Average annual discharge = 755,771 m³/s,
- Average annual suspended load = 992 ha.m, Sediment yield = 959 ton/sq.km/year

DEM OF SUBANSIRI BASIN



MATERIAL AND METHODOLOGY

Data

- Survey of India toposheets at a scale of 1:250,000
- Satellite data of MODIS TERRA
 - MOD10A2 data has been used for a period of eight years, i.e. October 2000 to September 2008.
 - MOD10A2 are 8-day composite snow data products at a resolution of 500m.
- SRTM DEM

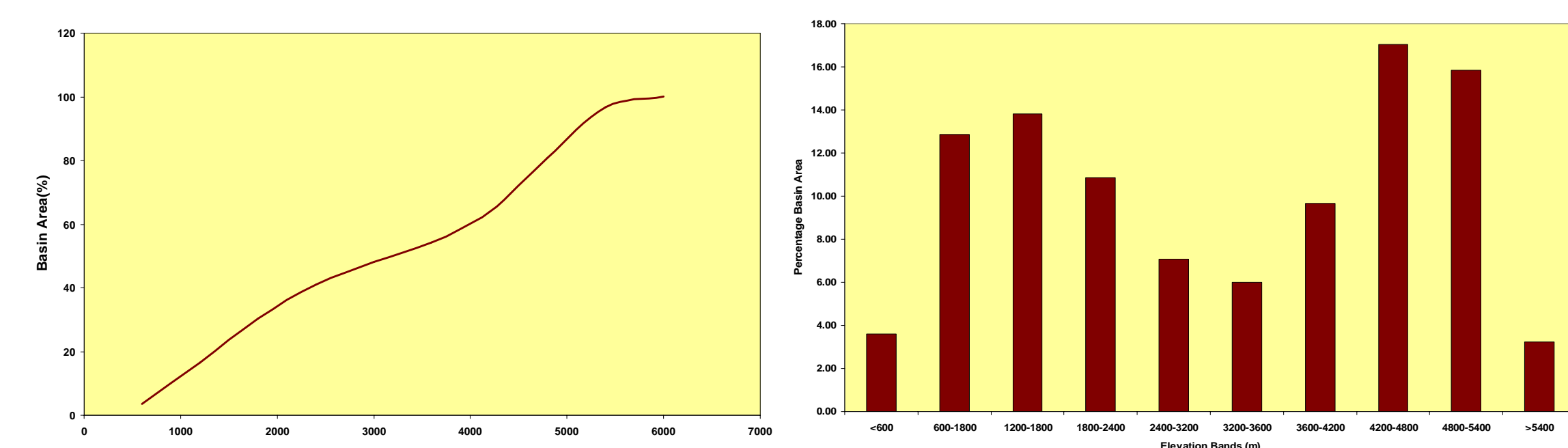
The Algorithm of snow-cover

Snow has two properties: 1) high reflectance in the visible (MODIS band 4); 2) low reflectance in the short-wave infrared (MODIS band 6). The Normalized difference Snow Index (NDSI) for MODIS is:

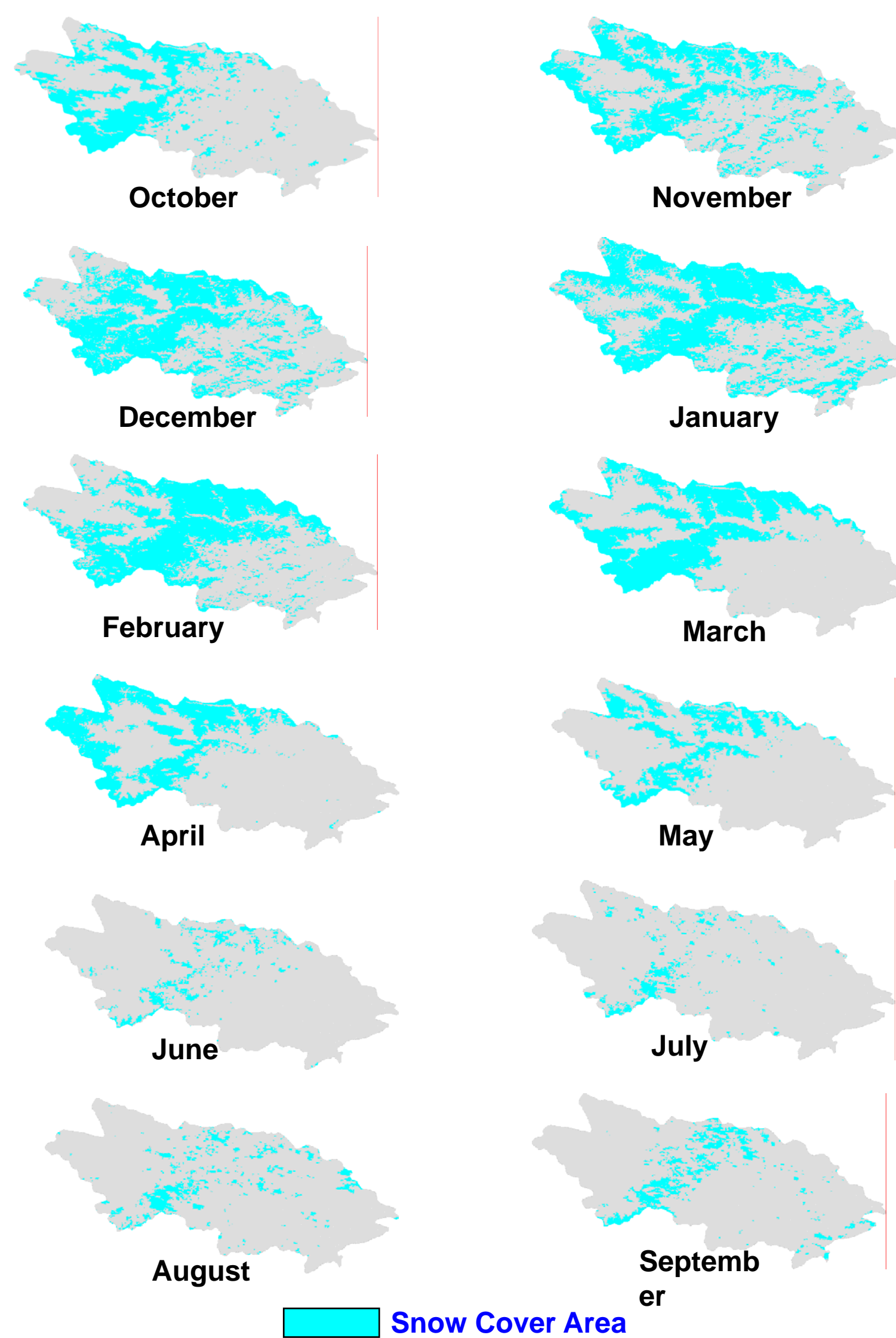
$$NDSI = \frac{\text{Band 4} - \text{Band 6}}{\text{Band 4} + \text{Band 6}}$$

Snow is characterized by much higher NDSI values than other surface types. Pixels with NDSI of greater than 0.4 are considered snow covered and the pixels with slightly-lower NDSI, but high NDVI (>0.1) values can be considered as snow-covered forests.

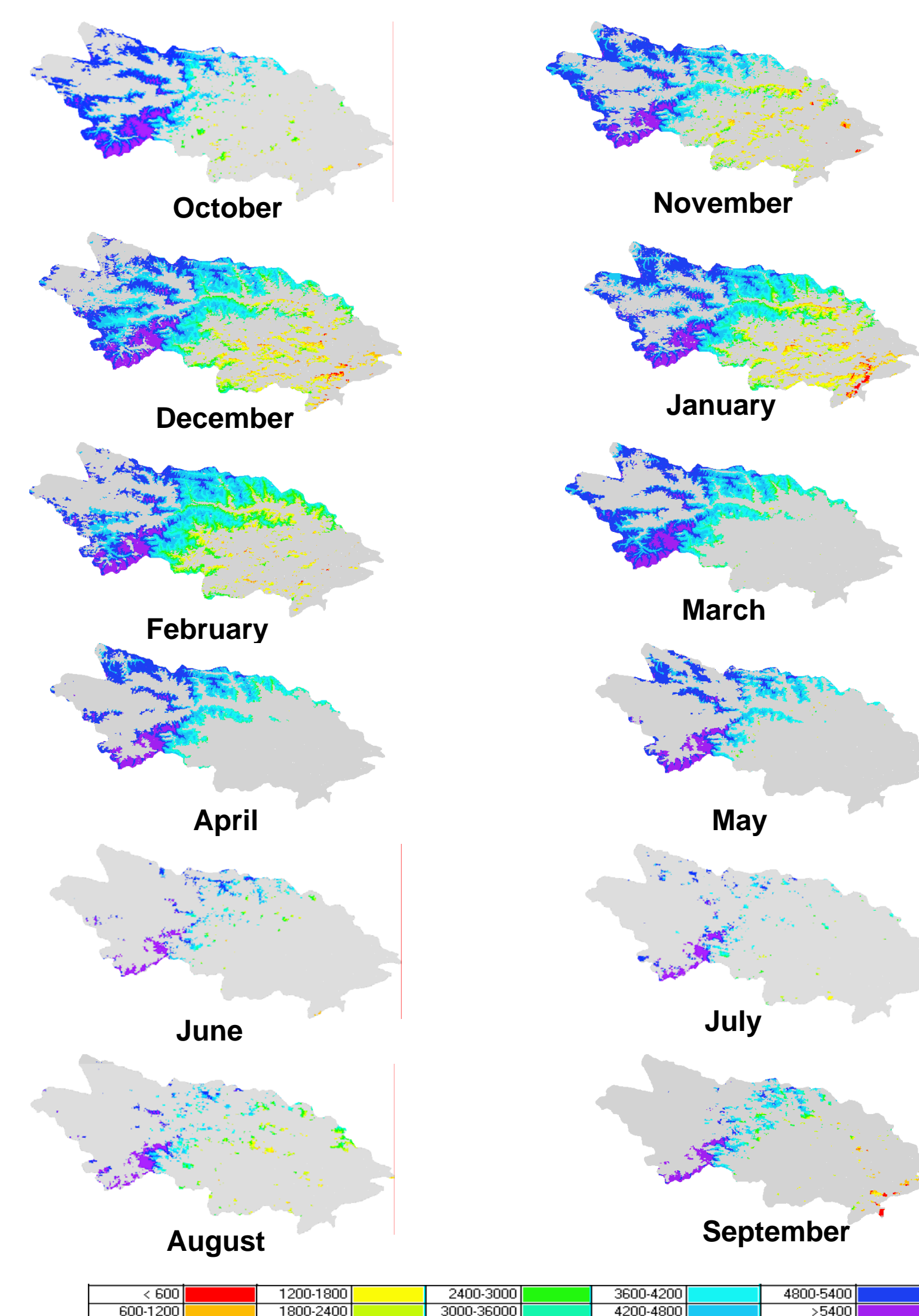
AREA-ELEVATION RELATIONSHIP IN SUBANSIRI BASIN



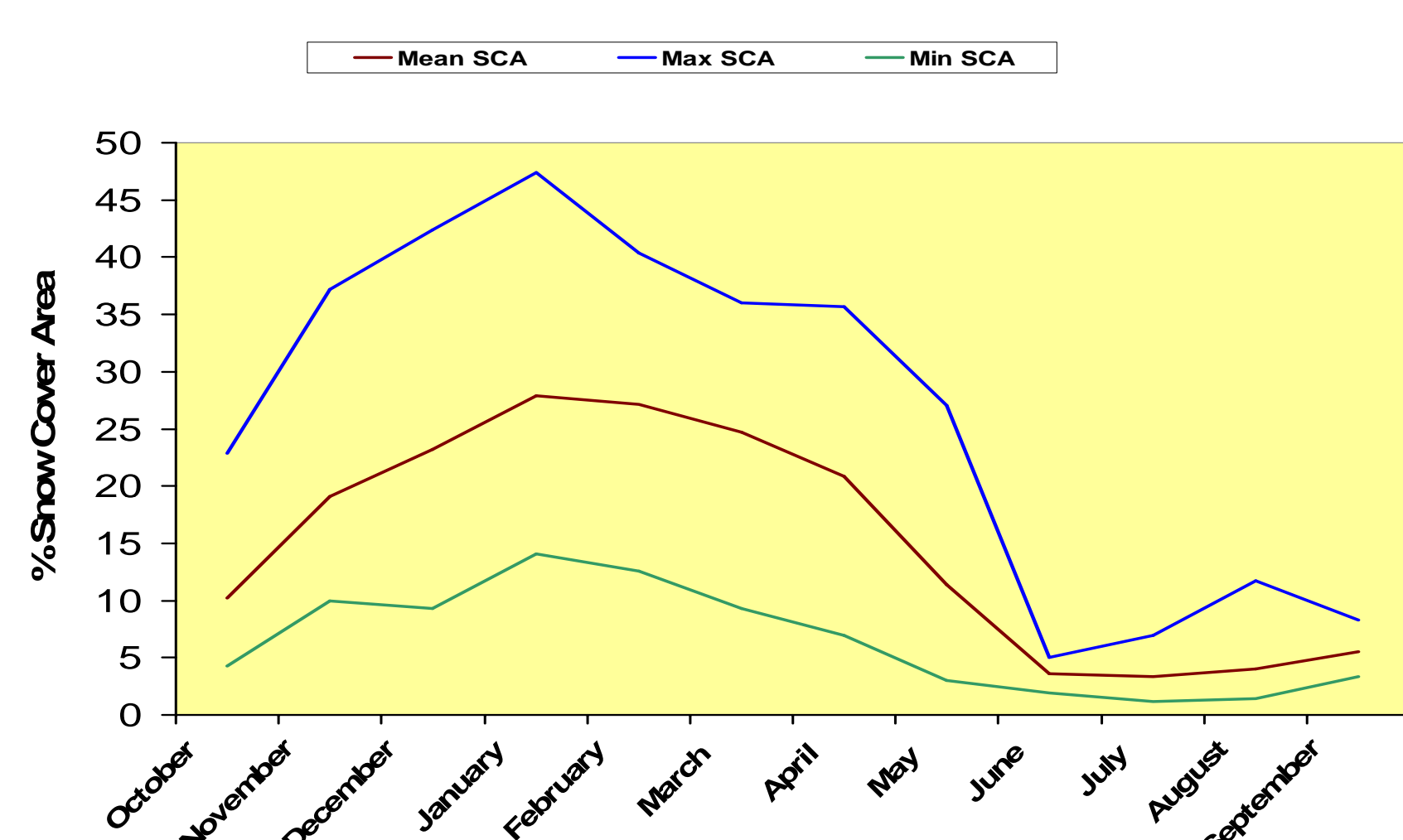
SNOW COVER IN SUBANSIRI BASIN



SPATIAL AND TEMPORAL VARIATION OF SNOW COVER AREA IN VARIOUS ELEVATION BANDS



TEMPORAL VARIATION OF SCA IN SUBANSIRI BASIN (2000-2008)



SNOW COVER IN DIFFERENT ELEVATION RANGES (2000-2008)

