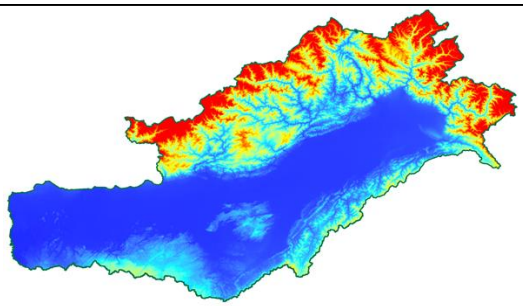
ESTIMATION OF WATER LEVEL OF BRAHMAPUTRA RIVER USING SCATTEROMETER (OSCAT/ SCATSAT-1) DATA

P.K. Gupta, Rohit Pradhan and R P Singh

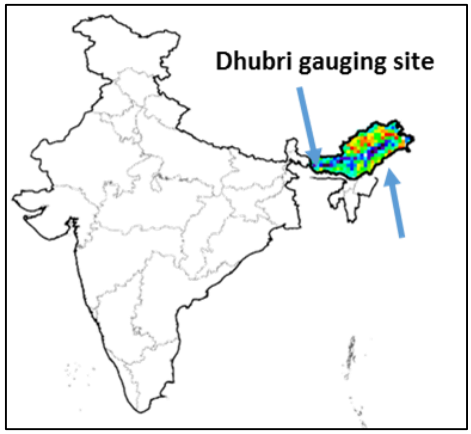
Land Hydrology Division
Geosciences, Hydrology, Cryosphere Sciences and Applications Group (EPSA)
Space Applications Centre, ISRO
Ahmedabad-380015

The Brahmaputra River originates from Tibet (China) passes through India and submerges in Bay of Bengal in Bangladesh; make its total journey of 2900 km. It has a braided river morphology which flows in India about 750 km. The flow regime of the river is largely dominated by runoff generated by monsoon precipitation, with high flows occurring between July to September and low flows during January to March. The river normally peaks during the period of July and August with 51156 $m^3 s^{-1}$ mean annual flood discharge at Pandu gauging station.



Digital Elevation Model of Brahmaputra Basin (Blue low elevation and red high elevation region)

Satellite based remote sensing of river hydrodynamics is important application in hydrology. Basin level rainfall and associated soil wetness influences the fluctuations in river water levels through process of surface runoff in the downstream. Microwave remote sensing provides the observations of earth‘s hydrological variables regardless of day/night and atmospheric conditions. Water being a polar molecule has very high sensitivity in microwave wavelengths due to orientation polarization property. In the active microwave remote sensing, information about the object’s physical structure and electrical property is retrieved by analyzing the backscattering signal.



Scatterometer observations provide information on wetness which is modelled at the catchment scale to estimate basin wetness index and subsequently river water level fluctuations. Present study carried out over Brahmaputra river basin at gauging site Dhubri (downstream of river) using OSCAT/SCATSAT-1 sigma0 data (high resolution SIR datasets). OSCAT dataset has been used for the model development. Estimated river water level variations between 26.12 to 27.2 meter from msl during October 2016 using SCATSAT-1 SIR data.

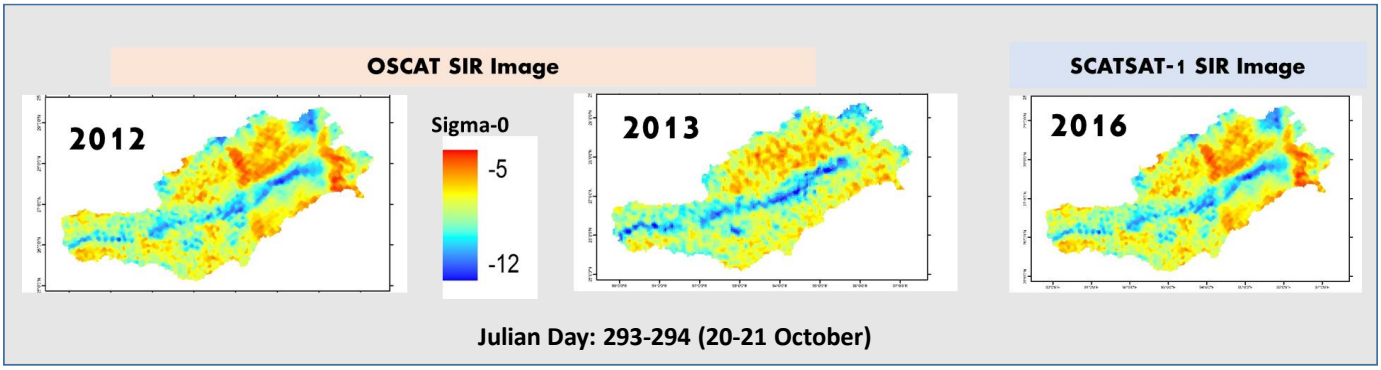


Fig. Scatterometer based backscatter coefficients variation in the Brahmaputra river catchment

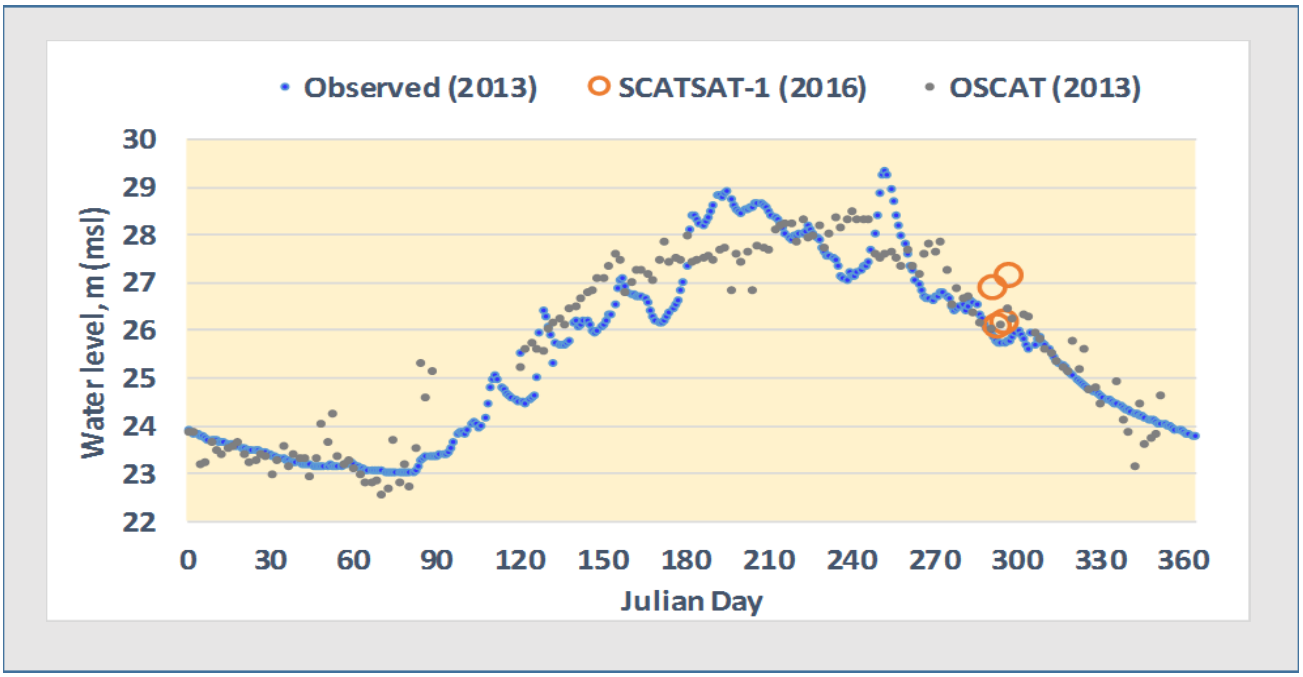


Fig. River water level fluctuations for the year 2013 (OSCAT and modeled) along with SCATSAT-1 estimated water levels for October 2016.