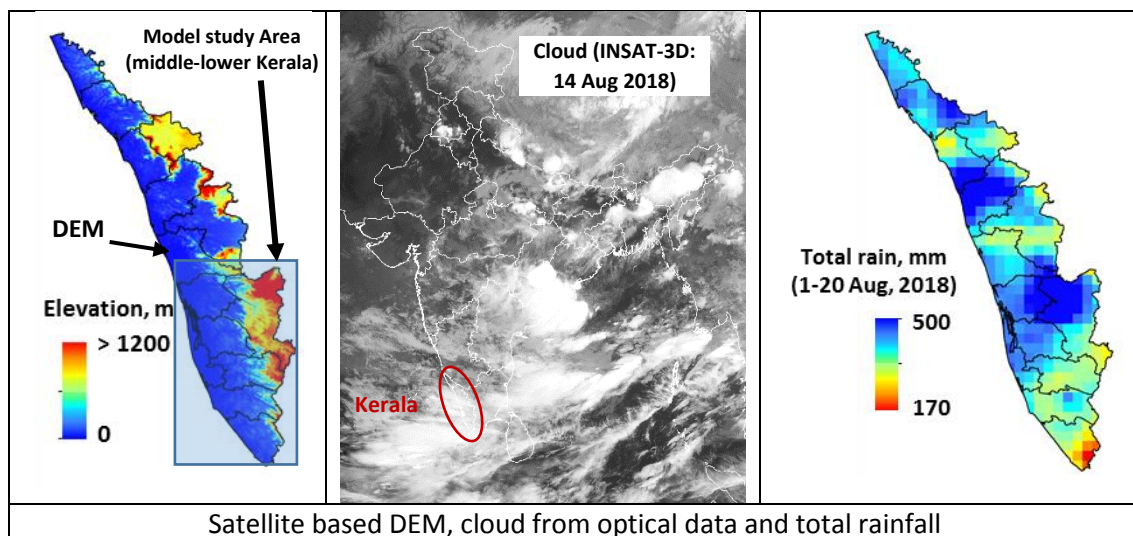


## SATELLITE BASED OBSERVATIONS AND MODELING OF FLOOD

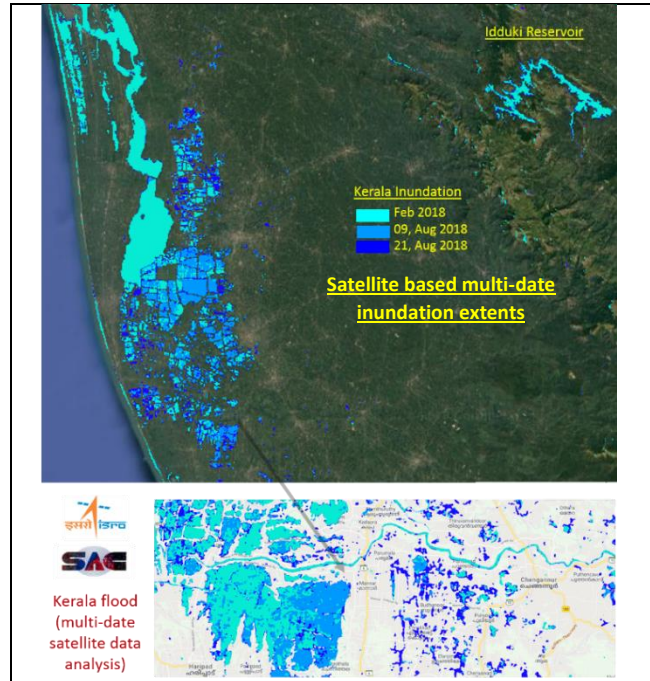
Flood is a devastating natural disaster experienced generally during monsoon months due to torrential rainfall over different regions of India. This not only leads to large impact on the socio-economic life of the country but also result in large-scale destruction of life and property. Recent advancement in the field of remote sensing has played an important role in detection and monitoring of flood situations over the affected regions which are approximately 40 Mha area in India. Optical remote sensing (INSAT-3D/3DR) helps in monitoring various meteorological parameters such as rainfall, cyclone, onset of monsoon etc. but are unable to capture the surface water in cloudy conditions. In this regard, microwave region of the electromagnetic spectrum is helpful because it can penetrate the cloud and detect the surface water extent. Sensors like Synthetic Aperture Radar (SAR) are used for high spatial resolution mapping of extent of surface water but presently operate at coarser temporal resolutions (10-12 days). Real aperture radars like Scatterometers and, Altimeters and Radiometers are also used to supplement flood information though at coarser spatial resolutions. Hydrological models have the potential to fill the gap of coarser temporal resolutions offered by microwave sensors and can be used to monitor the progress of flooding on daily basis with quantitative estimates.

Recently, Kerala has received incessant rainfall in the hilly as well as in flat regions exceeding more than 164 % of the usual rain during August month. Extreme heavy rainfall created flood situations in southern parts of Kerala with Pathanamthitta, Alappuzha, Ernakulam, Alleppey and Thrissur as the worst affected districts in 100 years”.

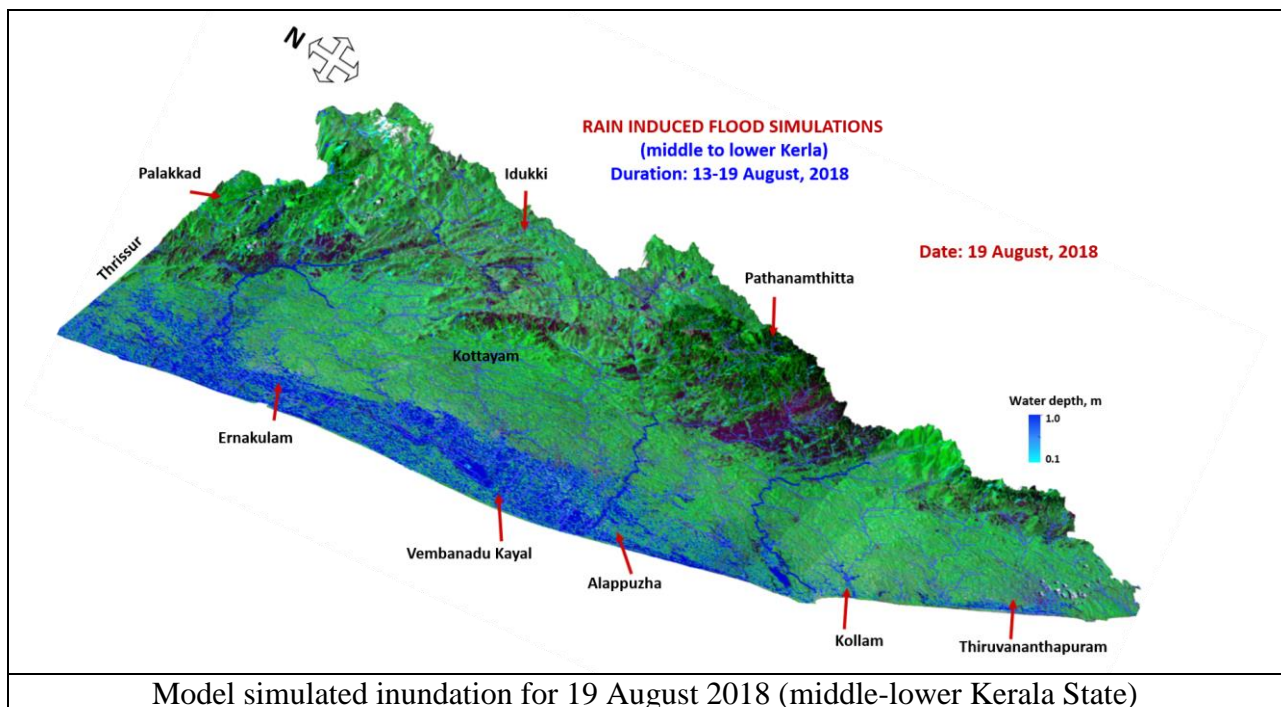


Multi-sensor observations especially Synthetic Aperture Radar which penetrate through the cloud were obtained over middle portion of the Kerala State. Multi-date data from Sentinel-1 provided information of inundation extents for pre and during flood time period. Most of the region experienced severe flood during 14-17 August, 2018 due to extreme rain.

Microwave sensor provide repeat observations for every 10-12 days that limit the monitoring of the progression of flood scenario which buildup and recedes quickly.



Due to lack of satellite based high temporal observations (required daily, available 10-12 days) model simulations were performed to monitor the progression/recession of flood. Inundation simulations for middle-lower Kerala covering Pampa and Periyar rivers provided daily spatial maps of surface water extent and, depth and helped to monitor flood scenarios.



Satellite retrieved and model estimated jointly gave a good insight for tracking the flood scenario on daily basis. Presently, satellite remote sensing technology provide accurate information of surface water with high spatial resolutions. However, limited by the coarser temporal resolutions especially for the flood monitoring and forecasting. For tracking the extreme events, a hybrid approach involving satellite sensing and model simulations are needed until we have the constellation of satellites offering 1-2 days repeat observations.

