By Mihika Basu, Bangalore Mirror Bureau | Jun 23, 2016, 01.00 AM IST

The researchers, who chose Cauvery river basin for the study, have mooted a unique methodology, which can accurately predict land surface temperature at high resolution even under cloudy conditions.

According to experts, if scientists have temperature measurements with fine resolution, they can make better predictions about rainfall and floods. "The proposed methodology is the most feasible way to predict LST at high spatio-temporal resolution under cloudy conditions, in the absence of in-situ land surface temperature measurements at all land cover classes during the day and night," said Kumar. Land surface temperature is the radiative skin temperature of the uppermost part of the earth’s surface and its value may differ from the ambient air temperature.

"Land surface temperature and its difference with the air temperature is an important parameter that is needed for various applications, including evapotranspiration estimation, climate change, flood and drought prediction and environmental studies. LST varies spatially and temporally. If we have temperature measurements with fine resolution, we can make better predictions about rainfall and floods", said HR Shwetha, who was part of the research team. The researchers used sensor data from microwave antennae, installed on satellites, as microwaves can penetrate through clouds, facilitating measurement in cloudy conditions.

Though remote-sensing using microwaves is not new, it has been used for the first time in India for the estimation of LST. For their study, the researchers chose the Cauvery river basin, which occupies parts of Karnataka, Kerela, Tamil Nadu and Puducherry. They used data from NASA's polar synchronous satellite Aqua. It carries sensors called MODIS (Moderate Resolution Imaging Spectroradiometer) and AMSR-E (Advanced Microwave Scanning Radiometer). They resampled readings for one km resolution. Other data like latitude, longitude and altitude were also used. They employed artificial neural network-based models for different land cover classes and obtained relations between various parameters under clear sky conditions. With the assumption that these relations will hold good during cloudy conditions, the team could predict land surface temperatures under cloudy conditions.

The researchers found that the land surface temperature values predicted by the proposed method correlated well with the actual measured surface temperature values. Certain parameters of the evaluation process change with the land type, that is, whether the land is arid or vegetated. Cauvery basin mostly has forests and crop-lands, so the proposed method was tested for land, which had some vegetation. The findings have been published in the ISPRS Journal of Photogrammetry and Remote Sensing.

The team is working on facilitating the usage of the predicted LST in the estimation of evapotranspiration and soil moisture over the study region. "This is an important phenomenon in the water cycle and knowledge about this will help better rainfall prediction," said the findings.