INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

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This is to certify that

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has presented on

Mapping of flood inundated urban regions using Sentinel-1 SAR imagery for the 2018 and 2019 Kerala floods

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Mapping of flood inundated urban regions using Sentinel-1 SAR imagery for the 2018 and 2019 Kerala floods

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Floods are a common natural calamity causing immense impact on the natural and human ecosystem around the world. It is caused by combination of unfavourable, meteorological, hydrological and physical conditions. The study area is Vembanad Lake System in Kerala, India comprising of six watersheds namely Periyar, Muvattupuzha, Meenachil, Manimala, Pamba, and Achenkovil that drains into the lake. The state faced a severe flooding during the year 2018 and 2019 due to torrential rainfall. Thus, this study focuses on the assessment of flood inundation mapping utilising Sentinel-1 SAR imagery in Google Earth Engine (GEE) for the years 2018 and 2019, since it simplifies and streamlines the complicated and time- consuming pre-processing of Sentinel-1 SAR images. These images are pre-processed to eliminate the thermal noise, radiometric calibration, and terrain correction to compute the backscatter coefficients in decibels. After the step of pre-processing of Sentinel-1 VV and VH SAR images, speckle filter is applied for smoothing of images. As the correct choice of polarization optimizes the discrimination of flooded areas, the VH polarization is used, as it is more suitable for delimiting flooded areas. To identify the flood inundated region the difference between the two images are computed i.e. one before the flood scenario and the other during the flood scenario. The threshold is applied to the differenced image in order to distinguish the flooded region of the study. The same approach is used for all two years, and the most frequently flooded areas are determined. From the results, it is observed that the 4% and 3.21% area of the total region got flooded in 2018 and 2019 respectively. Apart from it, 14.7 sq. km of urban area flooded in 2018 whereas 7.26 sq. km of urban land flooded in the 2019 floods. Hence, this inundation maps can be utilised for the risk assessment and primary preventive measures. It also serves as a tool to warn the residents of the region about the hazards and the possibilities of the inundations at the time of heavy downpours in future.