

EGU21-16194

<https://doi.org/10.5194/egusphere-egu21-16194>

EGU General Assembly 2021

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Global Flood Mapper: Democratising open EO resources for flood mapping

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Climate change has increased the frequency of flood events globally. Floods cause massive loss of life and cause the expenditure of billions of dollars. While it is important to curb floods caused by anthropogenic factors in the first place, it is equally important to reduce the impact in the aftermath of floods. The extent of past flood events is crucial for developing disaster management plans and flood hazard modelling. Due to the lack of capacity and availability of the funds with local officials, many past disasters remain unmapped and the information is just limited to total life loss and damage estimates.

Satellite data has been widely hailed as an alternative to drone and aerial surveys. And recent advances in open Earth Observation (EO) data availability, for instance, the Sentinel-1 SAR data by the European Space Agency (ESA), and cloud processing platforms such as the Google Earth Engine (GEE) have opened unprecedented opportunities for using EO data for hazard and disaster response efforts. Recent literature in the field of EO is witnessing an increasing number of the Sentinel-1 and GEE combination for flood mapping.

In the present work, we demonstrate the utility of a recently developed tool, the Global Flood Mapper (GFM), which is an open GEE application for rapid mapping of flood inundation extent using Sentinel-1 data. GFM uses a pre-flood time period to analyse numerous Sentinel-1 scenes of the same study area, this accounts for seasonal variation and has lesser noise as compared to other methods that use just one pre-flood scene. We map a couple of flood events across the globe to demonstrate the scalability and ease of using GFM. In addition, we analyse the flood hazard vulnerability of the state of Bihar in India using flood extent for the year 2018, 2019 and 2020 by delineating frequently flooding areas. This showcases yet another crucial utility of the GFM tool. GFM can support the flood extent mapping of the past events in addition to the rapid flood mapping of the current events, that could aid researchers and disaster managers for better flood preparedness and response.

We access GFM through the link available on this public repository: https://github.com/PratyushTripathy/global_flood_mapper