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Using a model-of-models approach and remote sensing technologies to improve flood disaster alerting

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Floods are happening regularly in almost all places of the world and impact people, societies and economies, causing widespread devastation that can be hard to recover from. Yet, accurately predicting and alerting for floods is challenging, primarily since flood events are very local in nature and processes causing a flood can be very complex. In an era of open-access geospatial data proliferation as well as data and model interoperability, it makes sense to leverage on existing data and models, many of which are underutilized by decision-making applications. Thus, the objective of the project is to develop an open-access rapid alerting and severity assessment component for global flooding based on existing models and observation data sources. We do this within the DisasterAWARE platform of the Pacific Disaster Center (PDC).

This paper will outline the proposed concept of model-of-models that will leverage existing flood-hazard modeling capabilities, illustrating products that we will leverage, such as: GLOFAS (Global Flood Forecasting Feeds) probabilistic hydrologic data, IMERG (The Integrated Multi-satellite Retrievals for GPM) observed precipitation grids, GDACS (Global Disaster Alerting Coordination System) anomaly points, GFMS (Global Flood Monitoring System) depth above baseline grids, the NASA MODIS (Moderate Resolution Imaging Spectroradiometer) and Dartmouth Observatory flood maps, as well as new models as they are developed. We will further combine the flood hazard data with existing exposure data to estimate property loss using a probabilistic fragility approach. With the use of an end-to-end deep learning framework, structural damage will be detected using different remote sensing data. The approach will further incorporate other, non-routinely-generated remotely-sensed products for ground-truthing for areas and events where and when such products are available.

The existing resilience and capacity of communities to rapidly respond to and recover from flood impacts will be incorporated into the severity determination on an administrative area and

watershed risk basis. This model-of-models approach will leverage major efforts, improve reliability and reduce false triggers by ensuring two or more models agree.