Global flood risk from advanced modeling and remote sensing in collaboration with Google Earth Engine

First continental-scale comparison of flood hazard between multi-year satellite observations and 2-D model simulations

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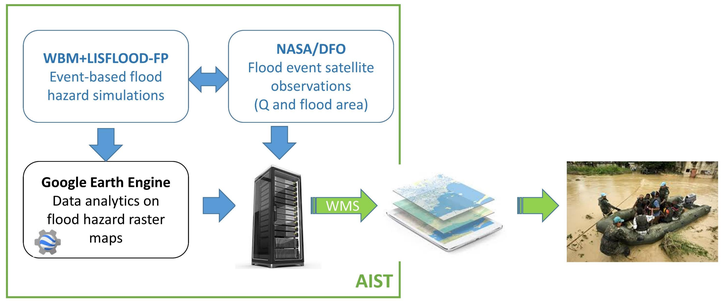
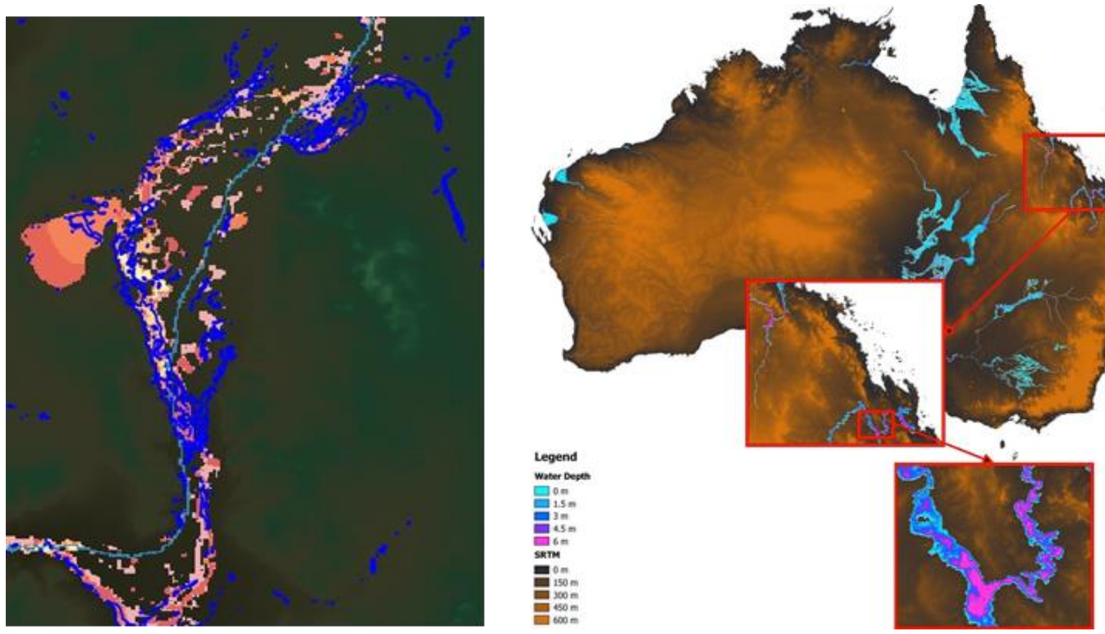
Objective. Floods are among the most damaging and costliest natural disasters. Annual damages by floods amount to many US$100 billions and by 2050, damage by floods in coastal areas alone is projected to reach US$1 trillion annually. Remotely sensed information on flood events coupled with advanced 2D flood inundation simulations can be game-changing in assisting governments and reinsurance markets globally. This project will use big data analytics technology (Google EE) as well as interoperability web mapping services to seamlessly distribute flood hazard layers from advanced remote sensing and inundation modeling to end-users. In a first instance, the project proposes to do this for Australia, Africa and the US, but eventually the whole world.

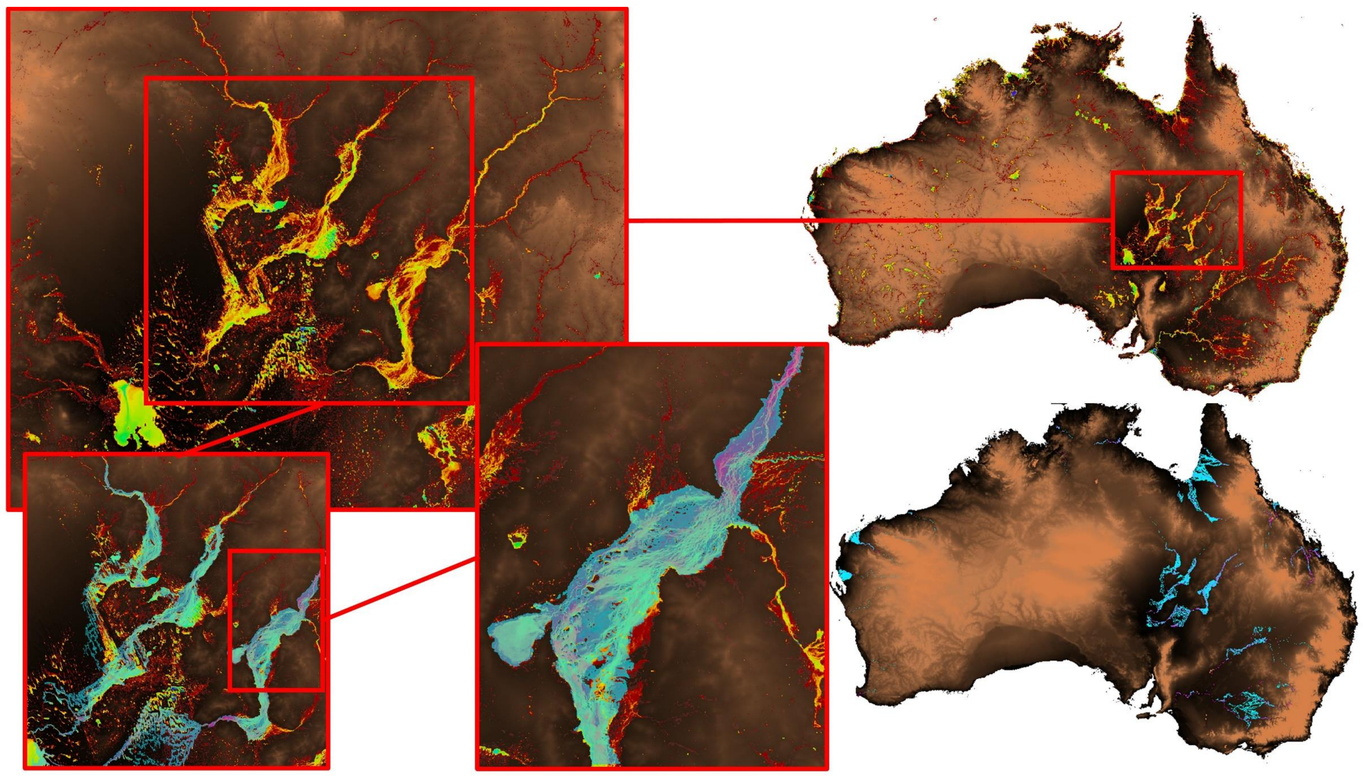




Above. Frequency of inundation map of LISFLOOD-FP over 40-years (1973-2012). The map shows in light pink approximately a 1:10 year inundation and in darker pink a 1:40 year inundation. The flood extent in blue is a MODIS imaged event in early 2011 (according to the fit, may indicate approximately a 1:30 year event)

Right. An aerial photo of the flooded Queensland town of Eromanga. Large swathes of the state's southwest have been declared disaster areas (March 2010).

Below. Number of times water was detected between 1987 and 2014 by Landsat-5 and -7. Frequently observed water (such as permanent lakes and dams) is shown in purple and blue, down through green to infrequently observed water (such as floods) in yellow, and finally to very low percentages in red. ©Geoscience Australia



Above. Overlay map showing maximum inundation depth over the 40-year simulation, downscaled onto the 90 m SRTM-DEM (using Google's EE API), on top of the 28-year Landsat observations.

Above. Maximum extent of historic model simulations overlain on maximum historic Landsat observations (inundated area: ~17,000 km^2).

Predicted correct (flooding): 89.6%; Area in error: 10.9%

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