GLOBAL DAILY INUNDATION MAPPING REQUIRES...

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Global near real-time daily inundation mapping using VIIRS satellite imagery and deep learning

Alex Saunders[1], Jonathan Giezendanner[1], Fritz Policelli[2], Beth Tellman[1], Rohit Mukherjee[1]

[1]University of Arizona
[2]NASA Goddard Space Flight Center

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Alex Saunders is a PhD student in the Social [Pixel] Lab (PI Dr Beth Tellman).
More info: alex-saunders00.github.io
Contact: **alexsaunders@arizona.edu**

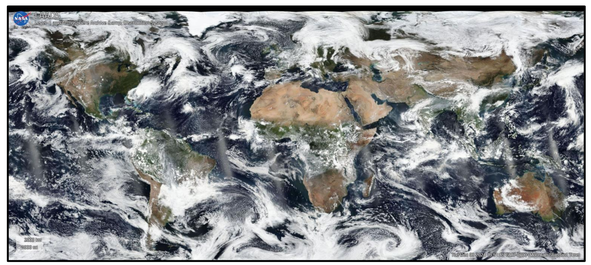
Research in the Social [Pixel] Lab seeks to understand and address the consequences of global environmental change using data driven approaches.
More info: beth-tellman.github.io

Photo: 2017 NSW Floods, Australia (ABC News)
†Li et al., 2018. Automatic near real-time flood detection using Suomi-NPP/VIIRS data. *RSE*.

#1 REAL-TIME FEED OF MULTISPECTRAL SURFACE REFLECTANCE IMAGERY

→ Daily images from VIIRS, six bands: Red, Green, Blue, NIR, SWIR1, SWIR2

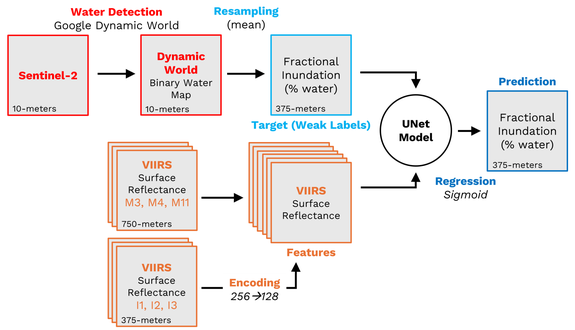
→ Data via NASA L1 and Atmospheres Archive and Distribution System



#2 DEEP LEARNING MODEL THAT FUSES INPUTS AT MULTIPLE RESOLUTIONS WITH FAST RUN-TIME

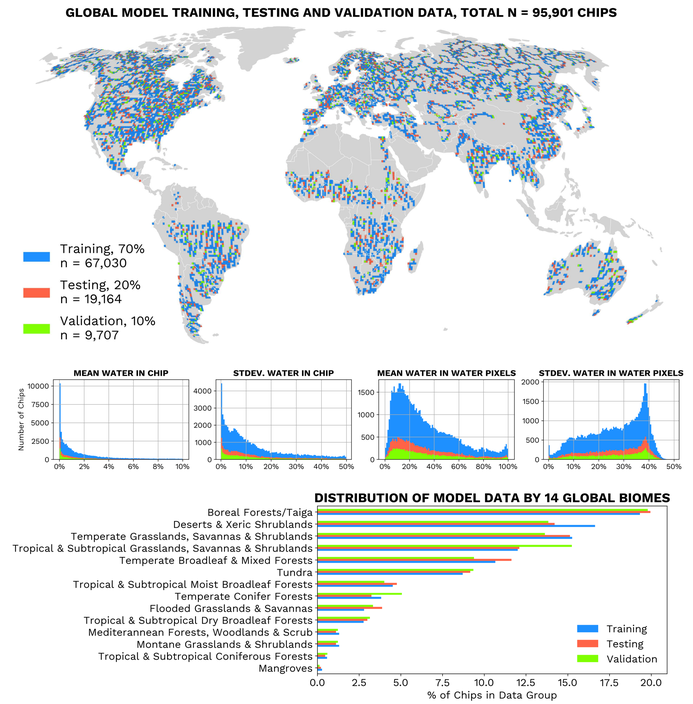
→ Bands encoded at native resolution

→ Predictions average run-time < 1 minute



#3 GLOBAL WEAK LABELS ACROSS DIVERSE BIOMES AND WATER CHARACTERISTICS

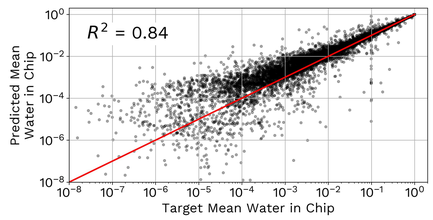
→ Cloud-free Dynamic World water instances sampled globally over two-years

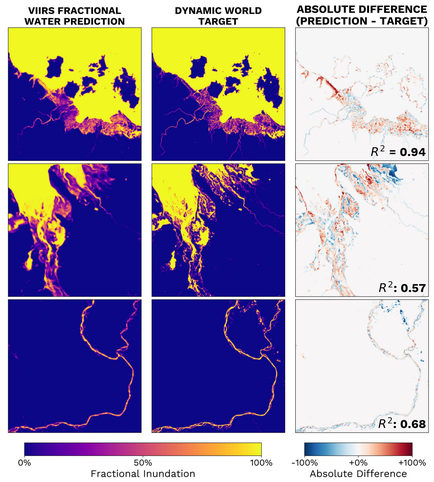


#4 TWO-STAGE GLOBAL VALIDATION AND EVALUATION

I. GLOBAL WATER INSTANCES

→ 10% hold-out chips: R^2=0.84



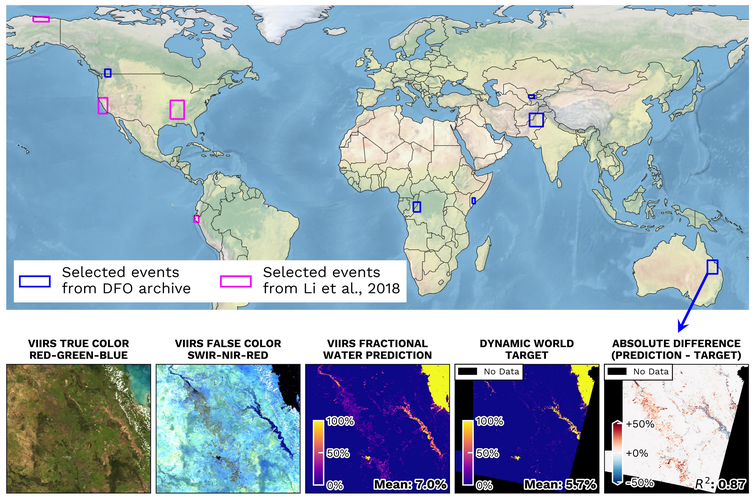


II. GLOBAL FLOOD EVENTS

→ Six major events with Dynamic World ground-reference selected from the Dartmouth Flood Observatory archive

→ Additional four events to compare with NOAA-GMU VIIRS Flood Mapping Algorithm (Li et al., 2018†)

→ Evaluate against existing NASA NRT flood maps



The University of Arizona is developing a global inundation model in collaboration with the NASA Goddard Space Flight Center. The model uses VIIRS satellite imagery to map fractional inundation globally every day at 375-meters resolution. If deployed, the model will be NASA's first operational flood mapping service which uses machine learning.

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