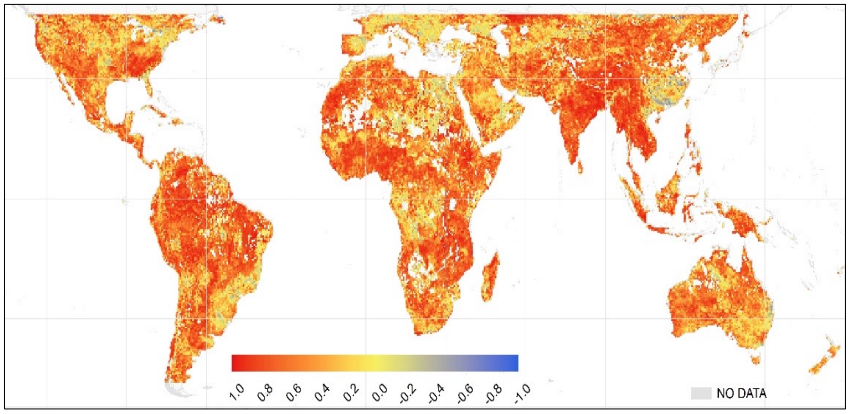
SMAP Surface Inundation Observations for Informing Real-Time Global Flood Modeling

Problem: Real-time global flood monitoring and early warning systems are constrained by large underlying model uncertainty. Comparing model flood results against observation benchmarks can verify & improve model performance, but is challenging due to lack of reliable global flood observations.

Finding: We investigate global consistency of surface fractional water (fw) inundation retrievals from SMAP vs modeled runoff from the UMD Global Flood Monitoring System (GFMS). Favorable SMAP-GFMS correspondence (r≥0.4) over majority (64%) of global domain; stronger correlations in drier climates with low to moderate vegetation cover and large seasonal flood range. Synchronous flood dynamics over 33% of global domain, but up to a 3-month lag indicated between SMAP fw & GFMS flooding in other areas.

Monthly SMAP fw and GFMS Runoff Correlation
(June 2015 – May 2016)



Maximum pixel-wise Pearson correlations between monthly SMAP fw and GFMS runoff over the GFMS domain (50˚N/S by 180˚E/W), where the fw record is temporally lagged up to 3 months; masked areas shown in white.

Impact: SMAP & GFMS provide complimentary information on water storage changes affecting precipitation-driven runoff and flooding, which may enable enhanced global flood predictions.

Wu, Kimball, Zhou, Alfieri, Luo, Du, Huang, 2019. Evaluation of real-time global flood modeling with satellite surface inundation observations from SMAP, *Remote Sensing of Environment*