Ocean Salinity Measurements and Applications from NASA's SMAP Mission

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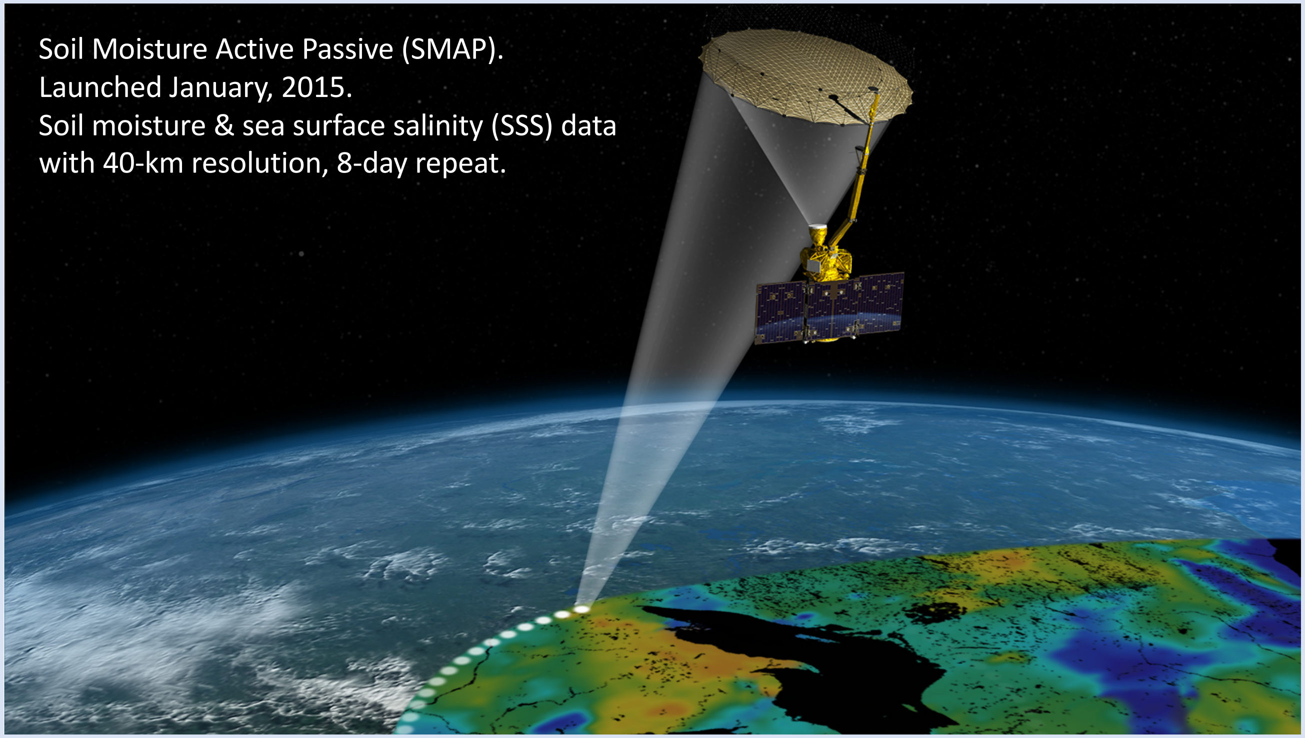
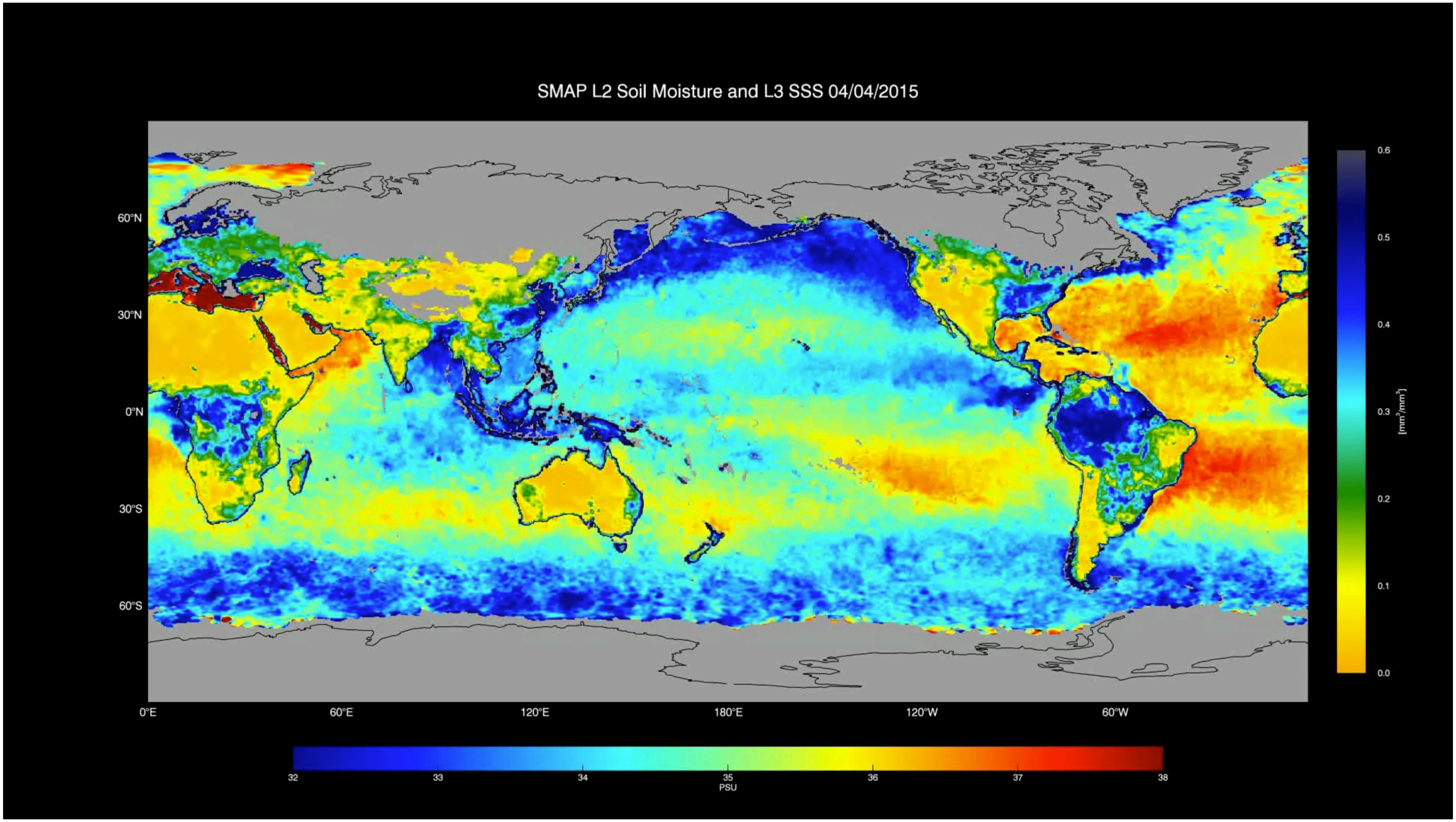


NASA Hyperwall presentation at EGU 2018. Government sponsorship acknowledged.

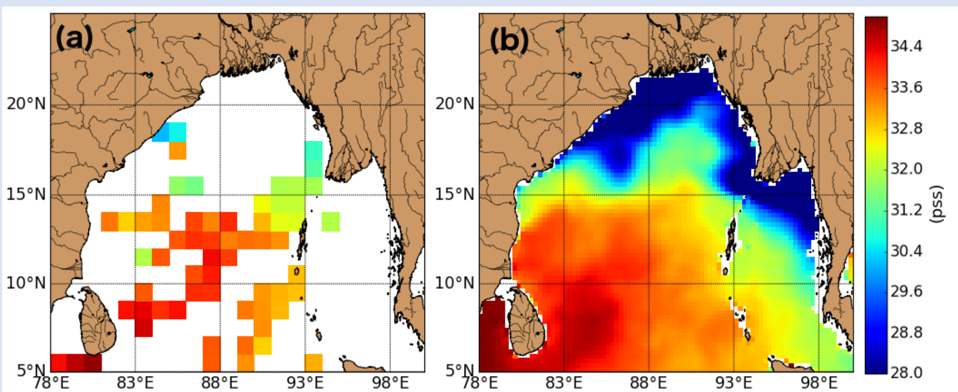

SMAP L2 Soil Moisture and L3 SSS 04/04/2015
60°N
30°N
0°N
30°S
60°S
0°E
60°E
120°E
180°E
120°W
60°W
0.6
0.5
0.4
0.3
0.2
0.1
0.0
[mm³/mm³]
32
33
34
35
36
37
38
PSU

SMAP provided unprecedented capability to study river plume variability and the underlying physical processes – Bay of Bengal example

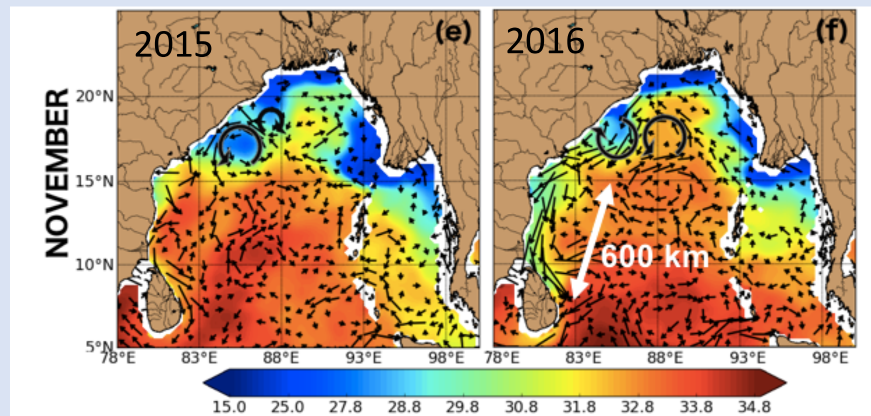
Fournier, Vialard, and Lengaigne et al. (2017)

Sep-Dec 2015 upper 5-m in-situ salinity averaged to 1° bins

Sep-Dec 2015 SSS from SMAP (same coverage in a week)



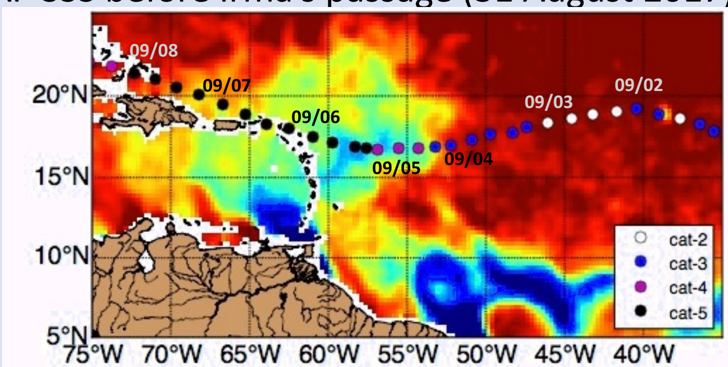
SMAP SSS superimposed on surface currents



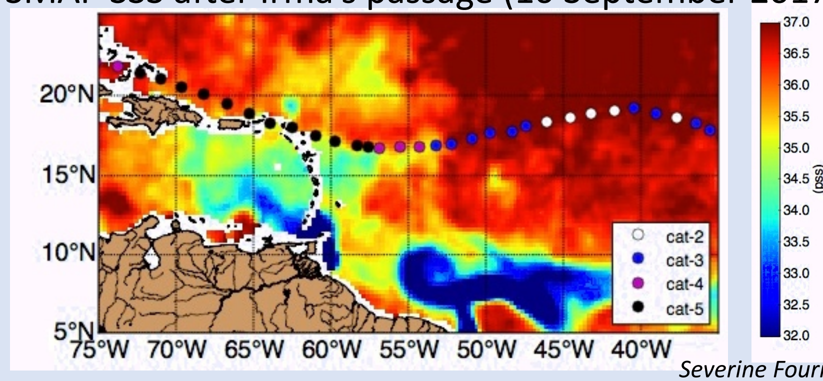
2016 Ganges-Brahmaputra plume extended much farther south than 2015, primary due to advection by a stronger coastal current in 2016 associated with the negative Indian Ocean Dipole forcing. Eddies secondary forcing. River discharge variation has little effect.

SMAP detected sea surface salinity (SSS) response to Hurricane Irma

SMAP SSS before Irma's passage (31 August 2017)

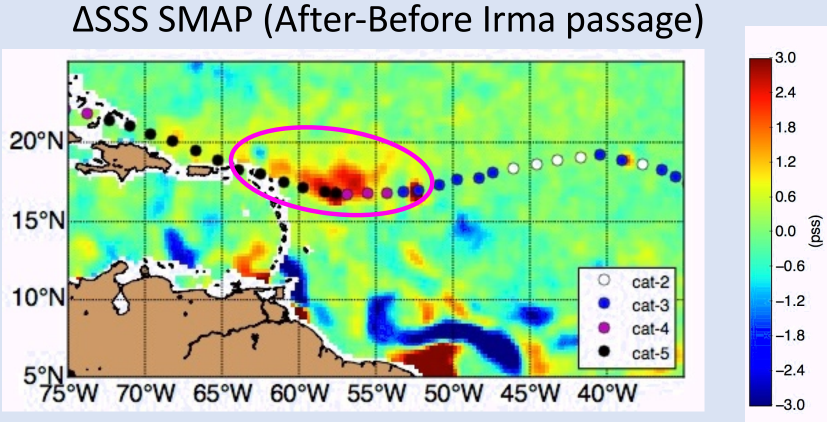


SMAP SSS after Irma's passage (10 September 2017)



Severine Fournier

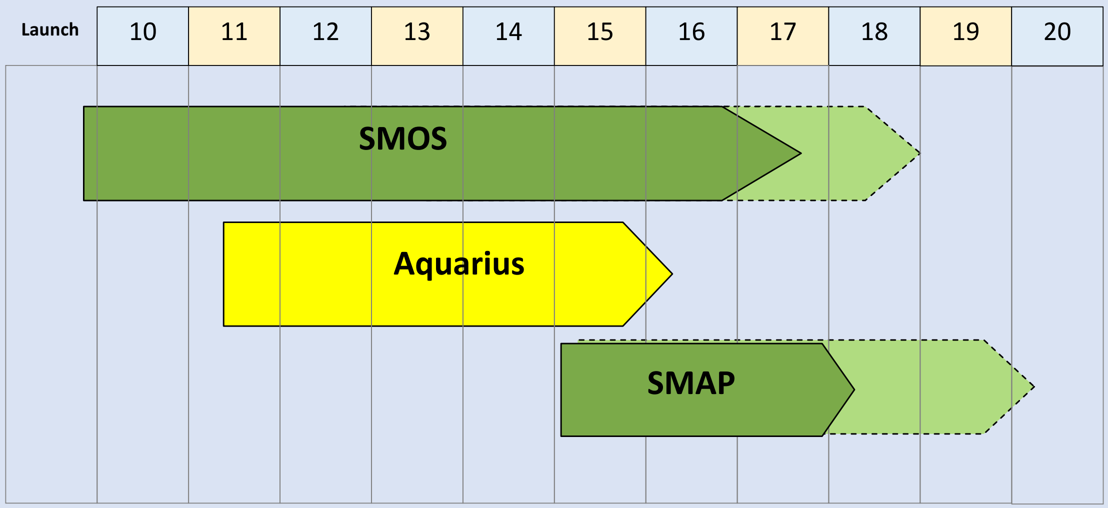
ΔSSS SMAP (After-Before Irma passage)



- SMAP detected a salty wake in the Orinoco River plume after Irma's passage (~2 pss), caused by the mixing of the fresh river plume water with subsurface saltier water

- SMAP provides new dataset to study oceanic response to tropical cyclones; important for for ocean and coupled model validations

Importance to continue satellite SSS missions



Gap beyond SMOS & SMAP

Continuity of satellite SSS is important to studies of oceanic linkages with climate variability & water cycle, impacts of extreme weather, and marine biogeochemistry.