# Enhancing research in ocean-water cycle linkages using satellite salinity measurements

Tong Lee, NASA Jet Propulsion Laboratory, California Institute of Technology

- Ocean salinity, integrating the effects of E-P and continental runoff effects, is an important indicator of ocean-water cycle linkages.
- Since 2010, satellites (SMOS, Aquarius, SMAP) have provided global sea surface salinity (SSS) measurements down to ~40 km & weekly scales.
- This presentation provides three examples of using satellite SSS to study ocean-water cycle linkages.

(1) Land-sea linkage:

SMAP SSS & soil moisture during & after the May-2015 extreme flooding in Texas, revealing a previously unidentified freshwater plume (as large as the Mississippi River plume), impacting marine ecosystem in the Gulf of Mexico (Fournier et al. 2016, GRL).

SMAP SSS & SM - 2015-05-11

SMAP SSS & SM - 2015-08-05
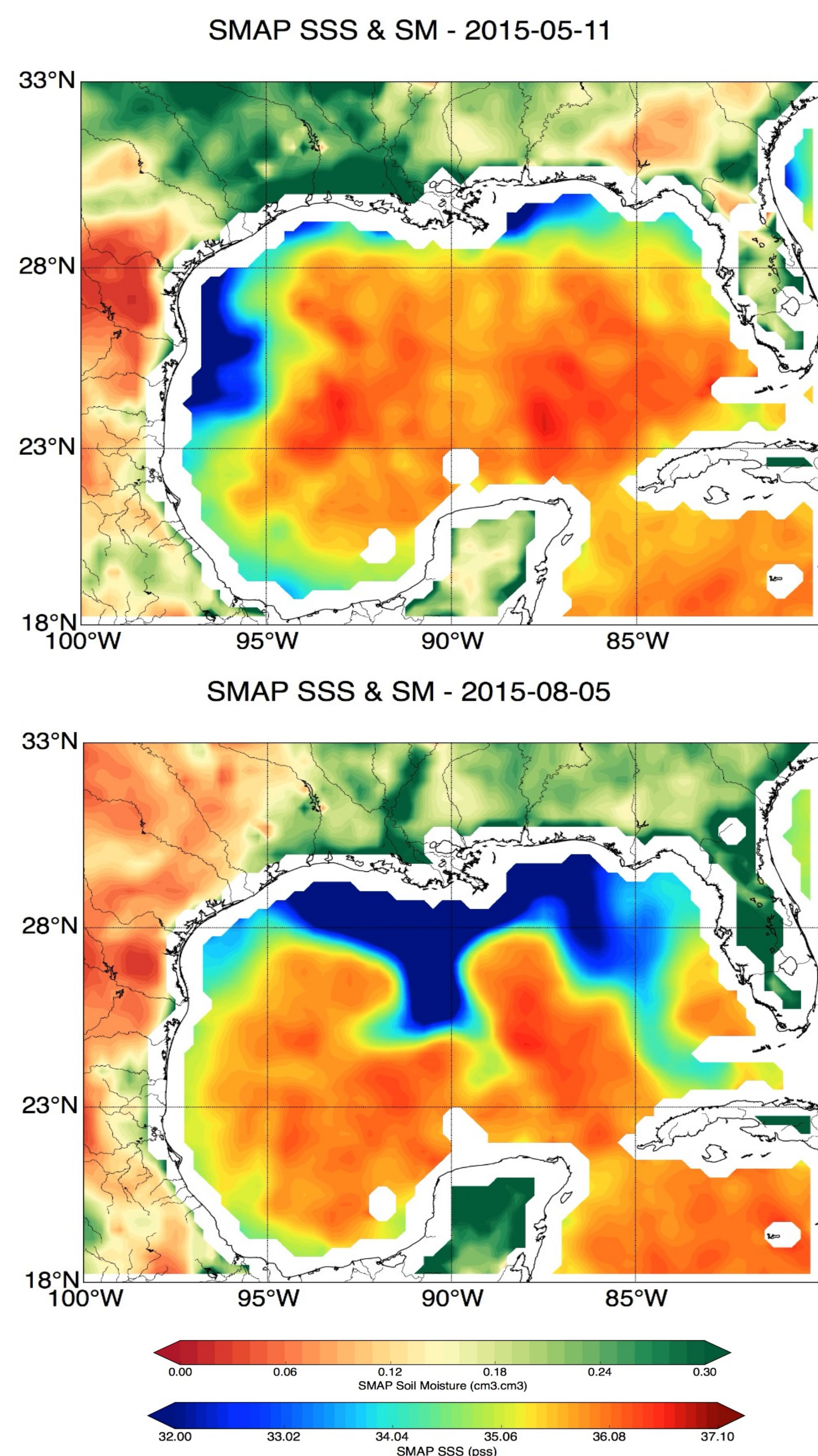
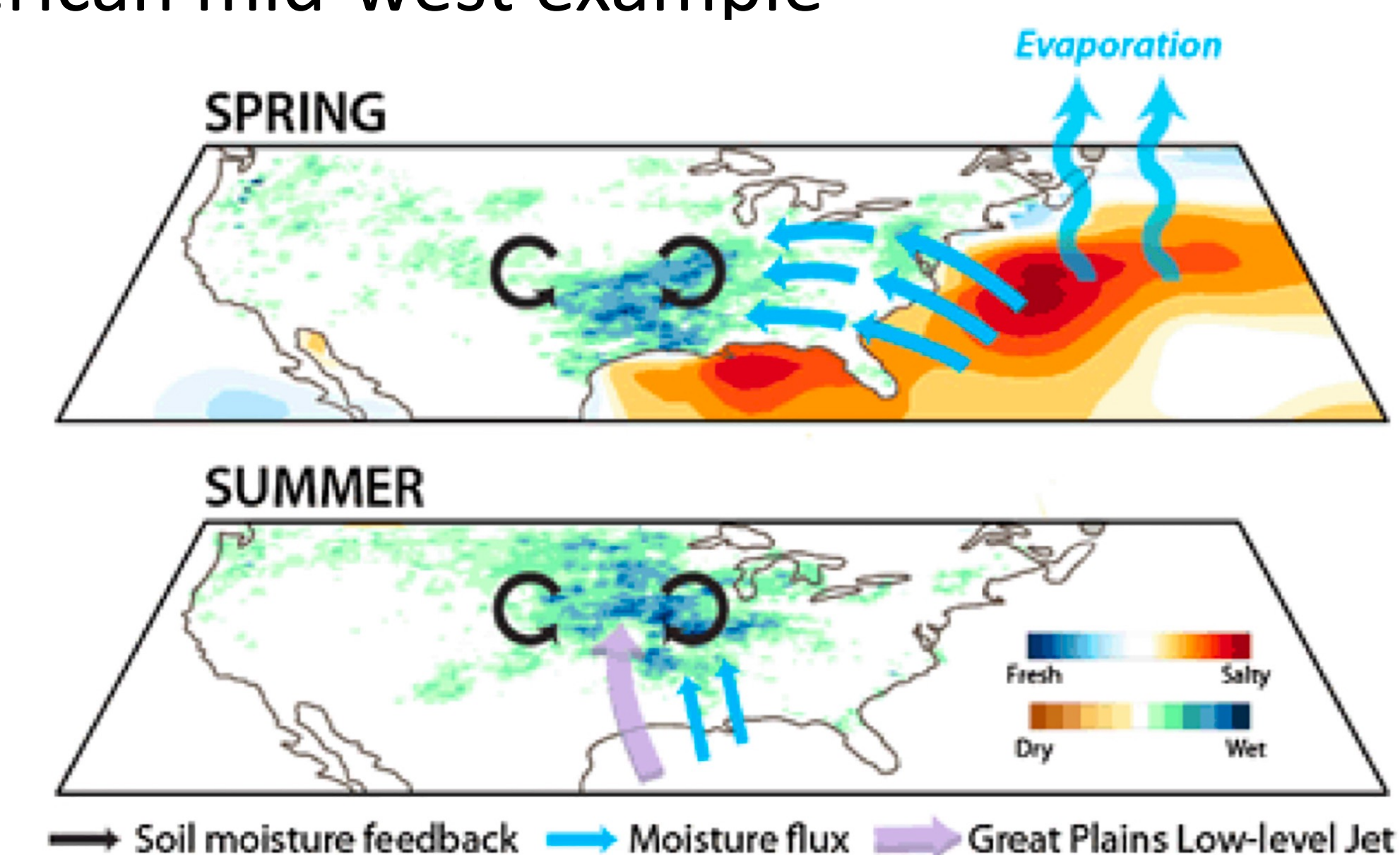## (2) Impact of water cycle on ocean circulation:

Monsoonal precipitation over the Maritime Continent & runoff from Borneo during boreal winter/spring impact seawater density & sea level, significantly weakening the Indonesian throughflow, which is the tropical chokepoint of the global ocean circulation (Lee et al. 2019, Nature Comm.)

SMAP Soil Moisture and Salinity 03/07/2018
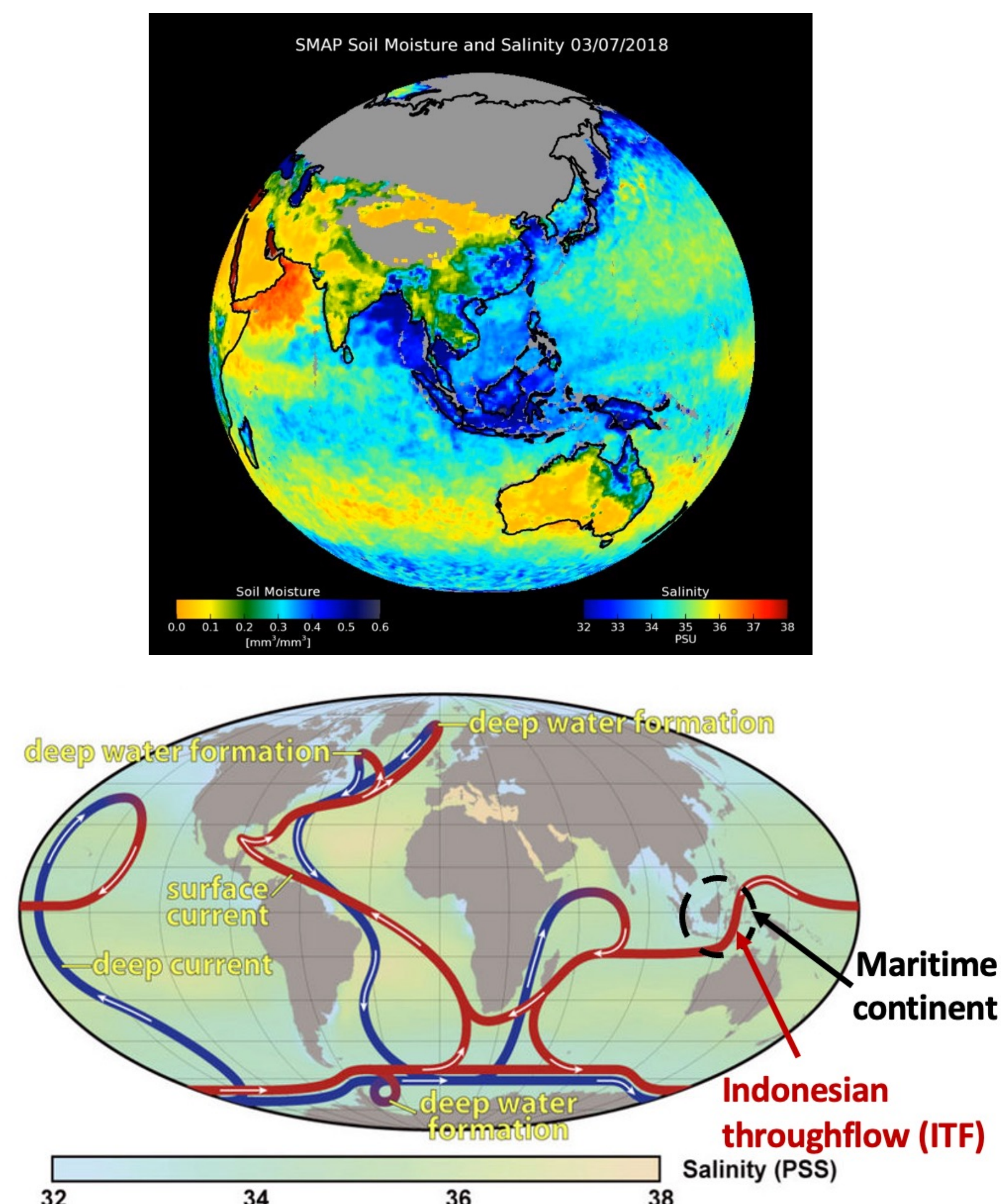
(3) SSS as a predictor of terrestrial precipitation:

There are increasing number of applications using SSS as a predictor for terrestrial rainfall predictions on subseasonal-to-seasonal time scales (e.g., Li et al. 2016, Sci. Adv., Li et al. 2016 J. Clim., Li et al. 2018, Clim. Dyn.), including real-time predictions sponsored by the U.S. government.

American mid-west example

African Sahel example https://www.whoi.edu/press-room/news-release/salty-oceans-rainfall/