SMAP observes flooding from land to sea: The Texas event of 2015

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Floods can have damaging impacts on both land and sea, yet studies of flooding events tend to focus on only one side of the land/sea continuum. Here we present the first two-sided analysis, focusing on the May 2015 severe flood in Texas. Our investigation benefits from simultaneous measurements of land-surface soil moisture and sea surface salinity from NASA’s recent Soil Moisture Active Passive (SMAP) mission as well as ancillary data. We report the comprehensive chronology of the flood event: above average rainfall preceding the flood caused soils to saturate; record rainfall then generated record river discharge; subsequently, an unusual freshwater plume associated with anomalous ocean currents formed in the north-central Gulf of Mexico. Together with the Mississippi River plume further east, the Texas plume created a rare “horseshoe” pattern that have potential biogeochemical implications. Such integrated land/sea analysis of flood evolution can improve impact assessments of future extreme flooding events.