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Surface drifters measuring sea water salinity

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Surface drifters have been introduced in the early 1990s by P.P. Niiler to measure the salinity of the near-surface water as well as its temperature. First, they were deployed to document large scale advection of surface salinity fronts, such as during TOGA-COARE (1991). More recently, salinity drifter data were used for three purposes:
1 – provide in situ data coverage for validation of sea surface (SSS) products, such as provided by band-L microwave radiometry from satellite missions, Aquarius, SMOS, SMAP
2 – provide data for better understanding upper ocean response to air-sea interactions, such as during rainfall, or near-surface warming during low wind events
3 – provide estimates of surface advection of salinity features and their contribution to ocean freshwater budget

We will review the drifters that have been deployed and where data were collected, the challenges encountered in correcting the data, ongoing plans and future developments. A comparison of salinity data of more than 60 SVP drifters to SMOS and Aquarius SSS fields in the North Atlantic subtropical gyre illustrates the potential for validating products from satellite missions over more than a year (SPURS-1 2012-2013 experiment). Data collocated during tropical rain events illustrate a short-term response of near-surface salinity and temperature that can be quantified, although we lack precise collocated wind data. It is rather consistent with independently-derived surface salinity response to rain based on SMOS salinity retrievals, and model estimations. An extreme case of close to 10 psu near-surface salinity drop due to rainfall is presented. Recent salinity drifter deployments in the rainy region of the eastern Pacific ITCZ (SPURS-2 2016 experiment) illustrate the small time and space scale variability associated with freshwater lenses in this region. Some data from a new tag (surpact) will be presented with simultaneous estimates of sea state, rain rate, temperature and salinity during rain events. Finally, we will illustrate from the SPURS data how large arrays of surface salinity drifters contribute to estimate the horizontal steering of surface salinity field by meso-scale features.