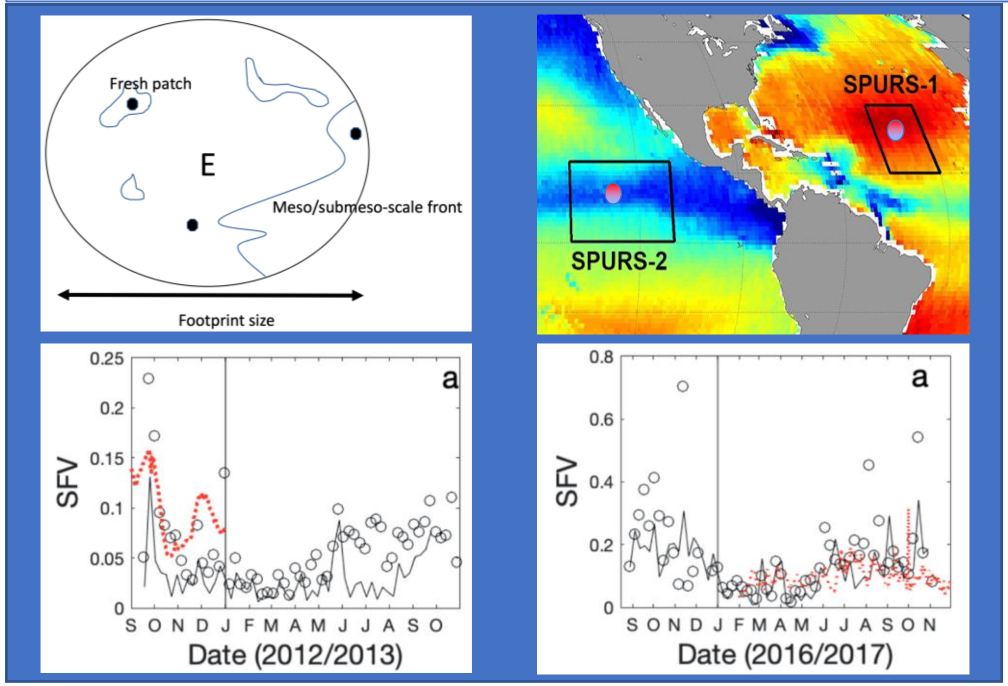
Subfootprint Variability of Sea Surface Salinity Observed during the SPURS-1 and SPURS-2 Field Campaigns



Upper left: Schematic showing a satellite footprint, some characteristic SSS variability, the estimation point for the satellite ("E") and three in situ validation measurements.
Upper right: Location of the SPURS field campaigns. The background is the mean SSS from SMAP.
Lower panels: SFV from SPURS-1 (left) and SPURS-2 (right). Circles are from *in situ* data, red dashed lines are the model and light black lines are from moorings.

Problem: Sea surface salinity (SSS) satellites have a large footprint (~100 km) due to the way in which they make their measurements. The satellite makes an average over this footprint, but ignores potentially significant variations within it, so called subfootprint variability (SFV). Verifying the accuracy of satellite measurement requires comparison with *in situ* instruments like Argo floats, but these may differ due to SFV and not measurement error.

Data and methods: Surface salinity data from the SPURS-1 and SPURS-2 campaigns in 2012-3 and 2016-7. Data from associated moorings and high-resolution model simulations. SFV was computed as a weighted standard deviation within an area the size of a satellite footprint.

Key findings: SFV time series were computed for both locations. Values of SFV were also computed. SFV was found to make up close to 10% of the total error depending on location.

Broader significance or implications: SFV is a significant source of mismatch between satellite and *in situ*, but has not been quantified on a global basis. These heavily-sampled regions tell us that SFV can be found using high-resolution models and mooring data, which are much more common than intensive field campaigns such as SPURS.

Publication source: Bingham, F. M. (2019) Subfootprint variability of sea surface salinity observed during the SPURS-1 and SPURS-2 field campaigns. *Remote Sensing*, 11(22), 2689;
DOI:10.3390/rs11222689