**Remote Sensing of Ocean Salinity**

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Salinity of ocean water is important for understanding ocean circulation and climate. Salinity together with temperature determine water density, and the large scale, density driven circulation (thermohaline circulation) of the ocean moves vast amounts of water and heat. Salinity also reflects the balance of evaporation and precipitation, and knowledge of salinity is helpful for understanding the role of the oceans in the global hydrologic cycle. Salinity affects the conductivity of sea water and changes in salinity change the emissivity of the water. The change in thermal emission is sufficiently strong in the long microwave portion of the spectrum (L-band) to be measured with modern spaceborne radiometers. This is a challenging measurement. Not only is the dynamic range of the signal small (several Kelvin) but there are competing factors such as the effects of surface roughness and radiation from the atmosphere which tend to mask the desired signal. But the measurement can be made and with an accuracy appropriate for meaningful science applications. Two sensors, Aquarius and SMOS, are currently in space producing global maps of the sea surface salinity field. A third SMAP will be launched early in 2015. Aquarius is unique among these L-band sensors in that it was designed specifically to monitor sea surface salinity. Aquarius includes a number of special features that address the challenges of measuring salinity, including a scatterometer to correct for roughness, a polarimetric channel to help correct for Faraday rotation, and fast sampling to help mitigate man made interference (RFI). Aquarius was launched in 2011 and has been producing maps of salinity since it was turned on in August of that year. The maps reflect the balance between evaporation and precipitation expected in the salinity climatology, but they also show dynamic features such as changes in the Bay of Bengal in response to the Indian Monson and freshwater plumes associated with river outflow. Now, with more than three years of data, a look is also possible at the inter-annual changes in the global salinity field.