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Retrieving of oceanic salinity from simulated SMOS data by a new scheme

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European Space Agency will launched the first salinity satellite SMOS used for remote sensing global salinity and soil moisture at a sun-synchronous orbit in 2009. The payload on the satellite is a synthetic aperture microwave radiometer (MIRAS) which is an innovative instrument designed as a two dimensional interferometer for acquiring brightness temperatures (TB) at L-band (1.4 GHz). The two-dimensional MIRAS interferometer allows measuring TBs at large incidences for fully polarization. As the satellite moves, a given location within the 2D field of view is observed from different view angles.

In the paper, a new retrieval scheme was developed to inverse sea surface salinity from SMOS TBs at multi-incidence angles in a pixel, utilizing their internal relationships of emissivity and incidence angles. Any Stokes parameter in a pixel are first fitted to incidence angles in two or three order polynomial, then the smoothed data are to be used for retrieving SSS.

Usually, one method of retrieving SSS is begun with applying a single set measurements in an angle for extracting SSS information, then those retrieved SSS are to be averaged to get much accurate results. Another method is first to average all possible measurements at the same angle, and then to retrieve SSS in order to reduce the noise in a single glance. The two methods are definitely suffered the problem that the noises in a single observation could not be removed completely. Furthermore, oceanic TBs are variant all the time, and the noise within instruments and oceanic states all may lead to the variations.

This scheme in the paper will be very robust and more accurate than some other methods, especially when there exit random Gauss noises in the measurements of a given angle. Another benefit using this scheme in the paper is that the method is not sensitive to the system calibration biases in the sensor, while it may even find them, which may be served as a mean to evaluate calibration precisions.