Contribution ID: **20** Type: **Poster presentation**

Collocated Argo-Hyperspectral Infrared Satellite Measurements: An Idea

Argo temperature and salinity (T & S) profiles form an integral part of ocean data assimilation (DA) systems. Similar is the case with Hyperspectral infrared (IR) satellite measurements for any atmospheric DA system. However, these two "essential"measurement platforms are not necessarily collocated in space and/or time. In this presentation we explore a few possibilities of collocating them, its impact on coupled DA and broadly speaking, earth system analyses.

There is no single observational platform that can measure from the abyss of the ocean to the top of the atmosphere. However, the goal of a coupled DA system is to come up with an estimate of the state of the earth system that precisely spans that space. In this talk we explore how present technology could be effectively leveraged to yield observations across the air-sea interface. We propose ascent timing of Argo floats (i.e., the timing at which Argo floats measure T & S profiles) such that they match the Hyperspectral IR measurements from polar orbiting satellites. Although implementing this proposal would require coordinated effort between oceanographic in situ observation communities and space agencies, it is expected that such cooperation will have immense benefits. Just as the Argo T & S profiles provide "full"column information of the ocean, the Hyperspectral IR soundings provide atmospheric column information, through brightness temperature (BT) measurements in various wavelengths. The coupled DA systems include numerical weather prediction systems, which routinely assimilate BTs, since they use a radiative transfer model that relate physical state variables (not only atmospheric temperature and humidity but also sea surface temperature, salinity, and wind speeds, etc) to BT. In the first half of our talk we will lay out the details of these ideas and possible challenges. Second half of the talk will focus on using this information to improve and calibrate coupled background error covariances, which is a key for successful coupled data assimilation. We anticipate this topic to bring common interests of OceanPredict task teams: OS-Eval TT, CP-TT and DA-TT to tackle a bigger problem of how to maximize synergy between in situ and satellite observations: that would include a range of ocean observing systems (moorings, buoys, floats) and satellite IR, microwave, scatterometer, radar altimetry.

Which theme does your abstract refer to?

Coupled data assimilation (ocean, atmosphere, sea-ice, waves, biogeochemistry, etc)

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Session Classification: Poster session 1

Track Classification: Coupled data assimilation