Tuesday, October 9
Oral Session 4
14:40–15:40

15:20–15:40

LAGRANGIAN BIO-OPTICAL CHARACTERISTICS OF A MESOSCALE DIPOLE IN THE NORTH PACIFIC SUBTROPICAL GYRE

Mesoscale dynamics are the most energetic motions in the ocean and an important source of horizontal variability in open ocean ecosystems. Here we investigated the mesoscale physical and biogeochemical variability by measuring the differences between adjacent mesoscale eddies of opposite polarity. We deployed one Lagrangian optical profiler (Wirewalker, Del Mar oceanographic) in each eddy center resulting in the collection of ~1200 vertical profiles of hydrography, photosynthetically available radiation, oxygen, and optical proxies for pigment (fluorescence) and particle (scattering and beam attenuation) concentrations. The cyclonic and anticyclonic eddies of this study showed marked differences in their bio-optical characteristics whereby the cyclone contained more pigments and particles in the deep euphotic layer, near the depth of the chlorophyll maximum. Furthermore, the primary production of the deep euphotic community was also higher in the cyclone, as suggested when considering the amplitude of the diel oscillation of beam attenuation as a proxy for gross photosynthesis. The water column of the anticyclone contained distinct layers of particle accumulation including below the base of the surface mixed layer, around 75 meters, and at and below the chlorophyll maximum. The backscattering to beam attenuation ratio shows that different particles accumulated in different layers thus providing a proxy to identify different communities in the water column. Besides observing clear differences between the eddies, we measured temporal changes on relatively short time scales (~13 days) documenting that the North Pacific Subtropical Gyre, once thought to be a near steady state ecosystem, exhibits high frequency temporal variability.

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