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PRIMARY PRODUCTIVITY ALGORITHM ROUND ROBIN (PPARR) OF SATELLITE-BASED MODELS FOR THE ARCTIC OCEAN

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Autochthonous primary production is the major source of energy for the Arctic Ocean (AO) ecosystem, as in most ecosystems. Reproducing current patterns of AO primary production is essential to understand the physical and biogeochemical controls in the present and the future. Primary Productivity Algorithm Round Robin activity (PPARR) provides a framework such that the skill and sensitivities of net primary productivity (NPP) estimated using satellite-based algorithms, coupled global/regional climate models, and earth system models can be assessed in the AO. We present here the results from 32 ocean color-based models that estimate depth - integrated marine NPP with respect to a unique pan-Arctic data set (1998-2011) that includes in situ NPP, chlorophyll *a* concentration, mixed layer depth (MLD), euphotic layer depth, and sea surface temperature (SST) as well as physical parameters derived from satellite observations, climatology, and/or re-analysis (MLD, SST, photosynthetically available radiation, and bio-optical variables). Twenty four cases with different sources of input variables were provided to all participating models. Average model skills, determined by variability and mean difference between model estimates and observations, using root-mean square difference (RMSD), were very consistent for all models. Due to the inherent variability of the in situ data, chlorophyll *a* was the primary influence on satellite-based model performance and its data source (satellite vs. in situ) had the strongest effect. In general, model estimates better represented the mean NPP and its statistical distribution when in situ chlorophyll *a* data, rather than satellite-derived chlorophyll *a* data, were used. Therefore, satellite algorithm improvement for these complex Arctic waters will likely increase the skill of ocean color-based models. Continual feedback, modification and improvement of the participating models and the resulting increase in model skill are the primary goal of the PPARR AO exercise.