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Assessing the Impact of Data Assimilation on Acoustic Predictions in Operational Global Ocean Models

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Since accurate representation of sound speed is a major objective for operational naval ocean models, metrics focusing on acoustically relevant properties are used to evaluate potential changes to the systems. In particular, planned upgrades to the U.S. navy's operational Global Ocean Forecast System (GOFS) addressed aspects of the water column significant for predictions of acoustic propagation: mixed-layer depth (MLD), sonic-layer depth (SLD), and below-layer gradient. These properties were only indirectly considered in prior approaches focused on minimizing expected errors in temperature and salinity. The latest global capability, GOFS 2.6, introduces use of MLD-modified synthetic profiles based on vertical projection of satellite sea surface height and temperature as a background for Navy Coupled Ocean Data Assimilation (NCODA) analyses of in-situ data. Evaluation relative to unassimilated in situ observations reveals the continuing progress of successive operational systems. Because of these demonstrated improvements over prior capabilities, forecasts from the Navy Coastal Ocean Model in GOFS 2.6 and higher resolution regional NCOM implementations were announced as the new standard for U.S. Navy Operational Sound Speed Prediction (NOSSP) on 21 Aug. 2008.