



## Development of the Four-Dimensional Variational Global Ocean Data Assimilation System for Coupled Predictions in Japan Meteorological Agency

JMA uses the Four-Dimensional Variational (4DVAR) global ocean data assimilation system, named MOVE/MRI.COM-G3, for oceanic initialization in the coupled atmosphere-ocean prediction system. MOVE/MRI.COM-G3 is composed of the lower-resolution ( $0.5^\circ \times 1^\circ$ ) model, G3A, and the higher-resolution ( $0.25^\circ \times 0.25^\circ$ ) model, G3F. Temperature, salinity, and sea surface height observations are assimilated into G3A through a 4DVAR method, and the data-assimilated temperature and salinity fields are downscaled into G3F through Incremental Analysis Updates (IAU). The resulting G3F fields are used as oceanic initial conditions for the coupled predictions. In the evaluation, it is confirmed that the capacity of 4DVAR to reduce data misfits effectively through the comparison with assimilated Argo data. We also found that the bias and the Root Mean Square Error (RMSE) with respect to the independent Argo data that are not assimilated are reduced near the thermocline in the equatorial Pacific. In addition, the bias and the RMSE of the

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