



Coupling GELATO 4 sea-ice model to NEMO 3: a new ocean/sea-ice model for global climate studies at CNRM

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A new configuration of the ocean-sea ice model in use at the Centre National de Recherches Météorologiques (CNRM, Météo-France, France) is presented. The sea-ice component of the global coupled model is an updated version of GELATO (Salas-Melia, 2002). GELATO is a dynamic-thermodynamic model, and includes elastic-visco-plastic rheology, redistribution of ice floes of different thicknesses, and also takes into account leads, snow cover and snow ice formation. The new version of GELATO sea-ice model includes also a tracer of ice age. GELATO 4 is coupled to the NEMO3.3 global ocean model (Madec et al., 2008), a hydrostatic, primitive equation, finite difference ocean model in the 1°-configuration ORCA1. In this new configuration, the straits in the Arctic Ocean are opened, leading to more realistic features in the sea-ice state compared to previous systems. Model performance is evaluated by performing a hindcast of the Arctic and Antarctic sea-ice covers, forced by the ERA40-based atmospheric forcing DFS4 (DRAKKAR Forcing Set 4, Brodeau et al., 2009) during the 1958-2004 period. To test the impact of a more refined description of melting sea-ice surface albedo, a new sea-ice albedo scheme was also implemented in GELATO. The scheme is based on Pedersen et al.(2009) parametrization, and includes melt ponds evolution. Performance with this latter refinement is also evaluated. The NEMO3.3-GELATO4 model is meant to be used at CNRM for Coupled Model Intercomparison Project phase 5 (CMIP5) experiments, and also for investigations dealing with seasonal-to-decadal predictability in the Arctic.