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Simulations of the Arctic Basin with a finite element sea-ice model

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We are currently developing a finite element model to simulate large-scale sea-ice dynamics in an Eulerian description. Our model has representations of both dynamic and thermodynamic sea-ice processes, and computes the ice pack velocity pattern and its thickness and concentration distribution. Sea-ice is assumed to behave as a two-dimensional viscous-plastic continuum in dynamical interaction with atmosphere and ocean. The vertical growth/melt rate of the ice is computed by the zero-layer model of Semtner (1976). The thermodynamic processes include a parameterization of the different heat fluxes interacting with the ice. A simulation of the Arctic ice pack is carried out on a realistic mesh by using NCEP/NCAR reanalysis of the atmospheric fields to drive our model. We compare the simulated ice velocity, thickness and concentration patterns with those derived from satellite and buoy measurements. Finally, a study of the influence of the type of interpolation for the ice thickness and concentration and of the grid resolution on the results is presented.