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Elastic-viscous-plastic rheology in the Louvain-la-Neuve sea-ice model: comparison of different spatial discretizations and different grid types

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The elastic-viscous-plastic (EVP) rheology is introduced in the Louvain-la-Neuve sea-ice model (LIM) to improve its numerical performance. Based on simulations, we will present a comparison of two spatial discretizations of the EVP dynamics: one based on the variational principle method outlined in Hunke and Dukowicz (2002) and another finite difference formulation physically identical but simpler and faster. Sea-ice dynamics is coded on both a B-grid and a C-grid, the latter in order to make the ice model formulation more consistent with the numerics of the oceanic general circulation model coupled to LIM. The C-grid facilitates a more accurate calculation of ice-ocean stresses and allows ice transport to take place through channels and straits one grid cell wide, something that is not possible on a B-grid. Numerical simulations presented here highlight the differences between these two grid types.