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The effect of the tracer staggering on sea ice deformation fields

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Linear Kinematic Features (LKFs) are found everywhere in the Arctic sea ice cover. They are strongly localized deformations often associated with the formation of leads and pressure ridges. Viscous-plastic sea ice models start to generate LKFs at high spatial grid resolution, typically with a grid spacing below 5km. Besides grid spacing, other aspects of a numerical implementation, such as discretization details, may affect the number and definition of simulated LKFs.

In this contribution we will analyze the impact of the tracer staggering on the formation of LKFs. The tracer staggering is directly related to the representation of the sea ice strength which in turn detriments the length of the mayor axis of the yield curve. We show that in the case of triangular mesh that the staggering of the sea ice strength can be as important as the velocity staggering. To examine the effect we evaluate the simulation of a recently defined benchmark problem [1]. The simulations are performed with the Finite-Volume Sea IceOcean model and also with the academic software library Gascoigne.

REFERENCES

[1] Mehlmann, C. Danilov, S. Losch, Lemieux, J.F. Richter, R Blain, P. Hunke, E.C. Korn, P.: *Simulating linear kinematic features in viscous-plastic sea ice models on quadrilateral and triangular grids*,Journal of Advanced Earth System Modeling, 2021