Contribution ID: **24** Type: **Talk**

Finite Element discretization of sea ice dynamics

Wednesday, 29 January 2020 09:00 (30 minutes)

Subject of this talk are the mathematical challenges and the numerical treatment of large scale sea ice problems at high resolutions. The model under consideration goes back to Hibler ("A dynamic thermodynamic sea ice model", J. Phys. Oceanogr., Hibler 1979) and is based on a viscous-plastic description of the ice as a two-dimensional thin layer on the ocean surface.

We present the ICON sea ice model, which is part of the ICON Ocean model and consists of the first C-grid like finite-Element discretization of sea ice dynamics on triangles. The discretization is based on the Crouzeix–Raviart element with degrees of freedom at the edge midpoint of a cell. The advantage of the new staggering is the straight forward coupling to the ocean and the atmosphere model and its suitability for unstructured meshes.
In a study we compare the Crouzeix–Raviart element, Rannacher-Turek element, which is a realization of the Crouzeix–Raviart element on quadrilatrals to piecewise linear (P1) finite elements. The new discretization of sea ice dynamics is a promising spatial discretization as it shows in a comparison to piecewise linear (P1) finite elements, with degrees of freedom at vertexes of a cell, a similar number of linear kinematic features on a two times coarser mesh resolution and the same total deformation on four times coarser meshes.

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No

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