ISSM Coulomb Model Description

Helene Seroussi

Model Description

1. Model name: Ice Sheet System Model [*Larour et al.*, 2012]

2. Stress balance approximation: 2d Shallow Shelf Approximation (SSA, *MacAyeal* [1989]), $A = 2.0 10^{-17} Pa^{-3} a^{-1}$

3. Basal friction: Coulomb friction law [*Tsai et al.*, 2015] with $\alpha = 0.5$ and $\beta = 1.0 10^4 Pa^{1/3} a^{1/3}$

4. Spatial discretisation: finite element with triangular mesh, uniform 1 km unstructured mesh

5. Time discretization: semi-implicit with $\Delta t = 0.25$ yr

6. Grounding line: position based on hydrostatic equilibrium, sub-element parameterization of grounding line position (SEP1 in *Seroussi et al.* [2014])

7. MISMIP3d: HSE improved with sub-element grounding line parameterization

Convergence study

Grounding line position

Grounding line position at the begining of experiment Ice1r, end of experiment Ice1r and 100 into experiment Ice1ra. Results are show for uniform meshes with a spatial resolution of 2 km, 1 km and 500 m.

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Grounding line positions at 1km resolution

Grounding line positions at 500m resolution
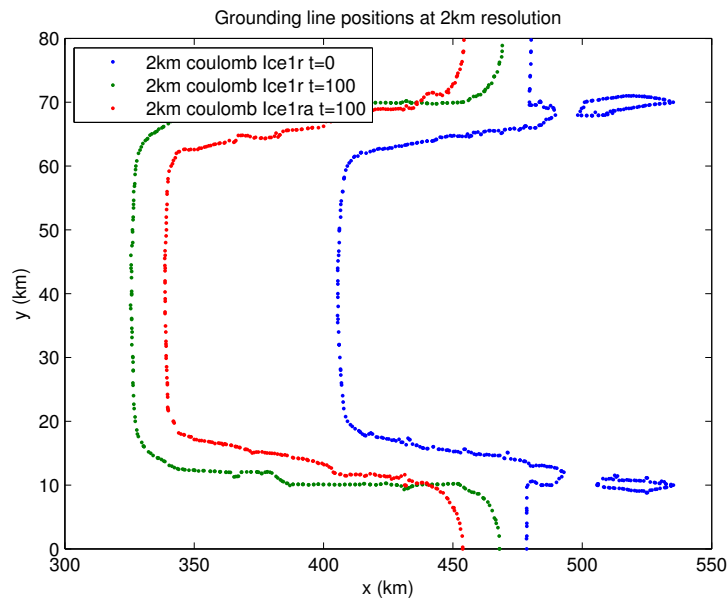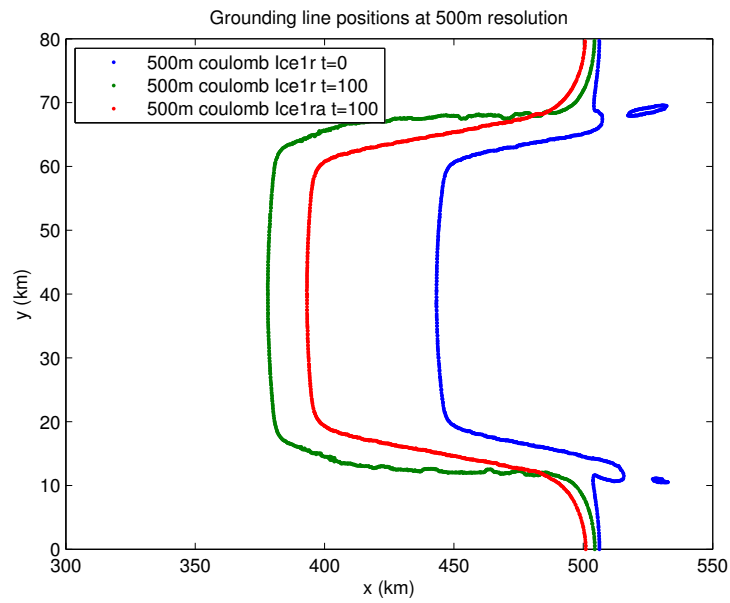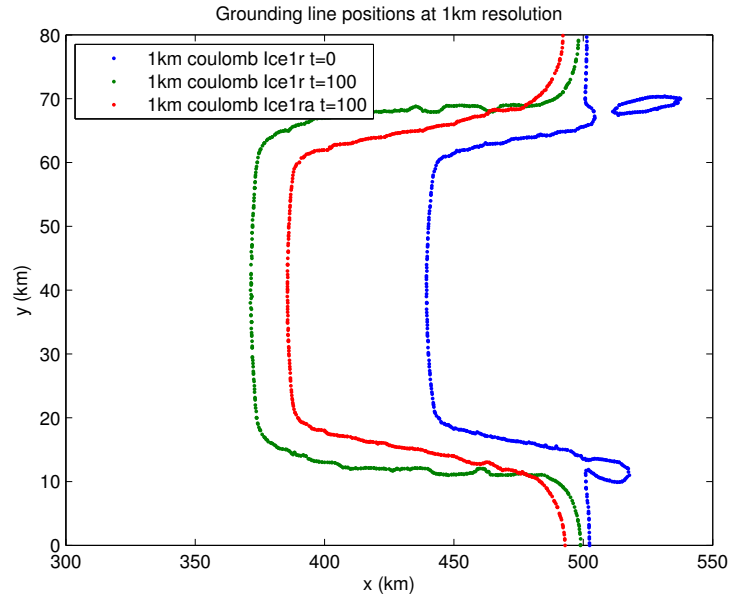
Volume above floatation

Evolution of ice volume above floatation with for experiment Ice1r (first 100 years) and experiment Ice1ra (last 100 years) for the three mesh resolution.

Evolution of ice volume above floatation
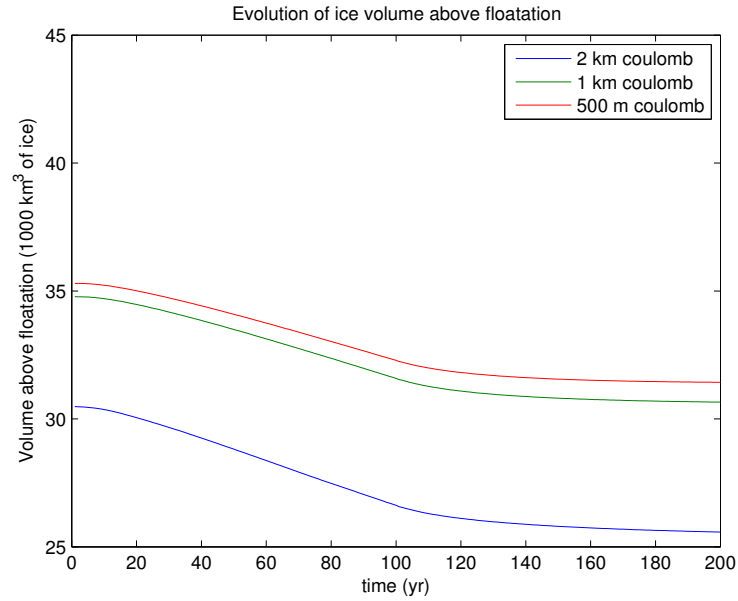
Ice volume

Evolution of ice volume with for experiment Ice1r (first 100 years) and experiment Ice1ra (last 100 years) for the three mesh resolution.

Evolution of ice volume
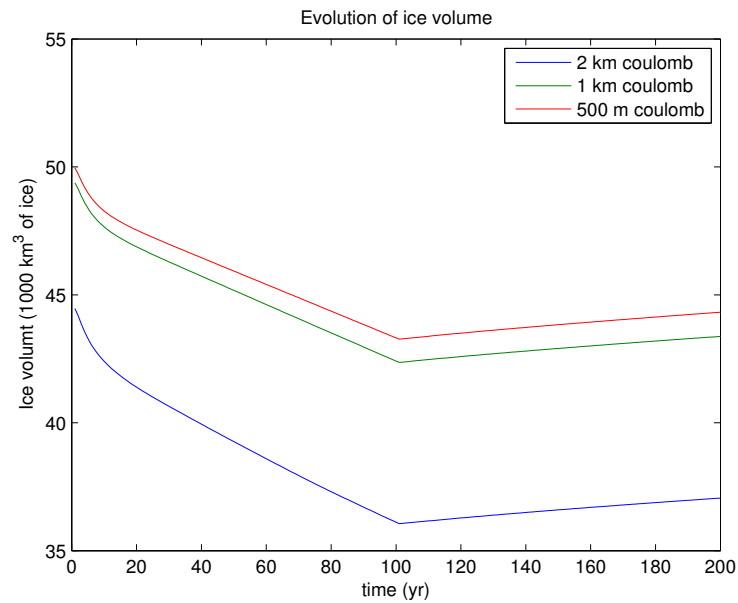
Grounded area

Evolution of grounded area with for experiment Ice1r (first 100 years) and experiment Ice1ra (last 100 years) for the three mesh resolution.

Evolution of grounded area
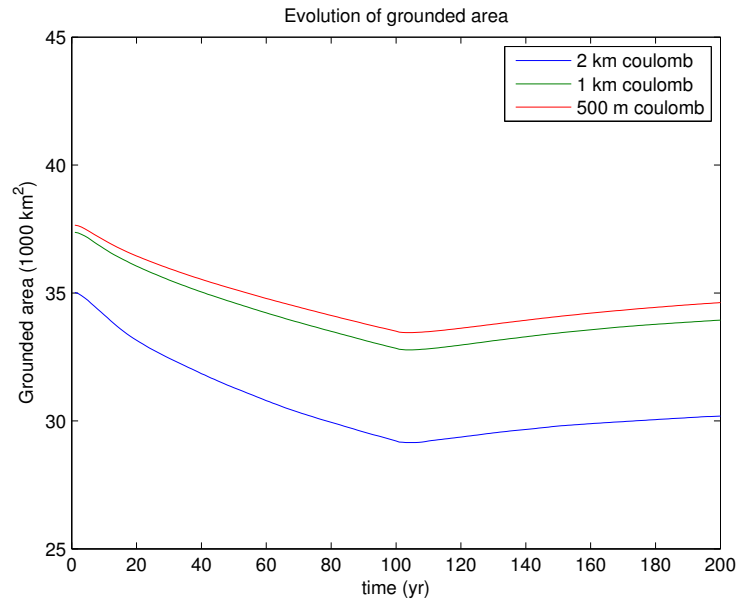
References

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