Regional coupled model in Adélie Land, impacts of small scale processes

(Belgian contribution to YOPP)

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[François Massonnet]
A total of 53 endorsed projects and initiatives (10 May 2017)
Due to their relatively coarse resolution, global climate models lack many small scale processes.

Those processes aren’t well understood in remote areas such as Antarctic coastal region.

Few models studies in Southern Ocean and almost no high resolution coupled ocean sea ice atmosphere models!
Use of a **high resolution** ocean-atmosphere-sea ice **coupled** model in a regional configuration.

Investigate the effect of **coupling** on hourly to seasonal time scales.

Assess the impact of **small scale processes** (i.e. sea ice rheology, blowing snow, eddies ...) on each component state.

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<th>Project</th>
<th>Adelie</th>
<th>Model</th>
<th>Resolution &amp; Tides</th>
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* Downscaled by a medium-resolution version of MAR.
Adélie Land and d’Urville sea: proximity of in-situ observations (DDU french base).

Southern ocean processes: katabatic winds, ice shelves - ocean intercations.
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Current version: **NEMO 3.6 - LIM3** at 1/4° resolution (~10km) forced by DFS5.2 reanalysis.

Bathymetry: **RTOP02**

Boundary conditions coming from NEMO 1° global run.

Simulations from 2005 to 2012.

Upcoming version: **NEMO 3.6 – LIM3** at 1/24° res. (<2km) forced by DFS or coupled to MAR model.

Boundary conditions: 1/12° (~4km) analysis from MERCATOR Ocean.

Will include **tides** and under **ice-shelves cavities**.
Effect of switching from global $1^\circ$ res to regional $1/4^\circ$ res.

Daily sea ice area [130°E – 150°E] in 2012

Sea ice area (100,000 km$^2$)

- **$1^\circ$ global**
- **¼° regional** (! Monthly forcing at boundaries!)
- **obs**
Effect of switching from global $1^\circ$ res to regional $1/4^\circ$ res.

Daily sea ice area [130°E – 150°E] in 2012

- $1^\circ$ global
- $1/4^\circ$ regional + tides
- $1/4^\circ$ regional (Monthly forcing at boundaries!)
- obs
Switch to 1/24° resolution.

Include under ice shelves cavities and ocean – ice shelves interactions.

Sensitivity experiments with tides, boundary condition, sea ice rheology.

Coupling with MAR atmospheric model.

More on the project:

http://apps3.awi.de/YPP/pdf/stream/25
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