Discussion on High latitudes freshwater flux for JRA55-based forcing.

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September 2016

CLIVAR OSC, Qingdao, China

Discussion on Antarctic freshwater flux for JRA55-based forcing.

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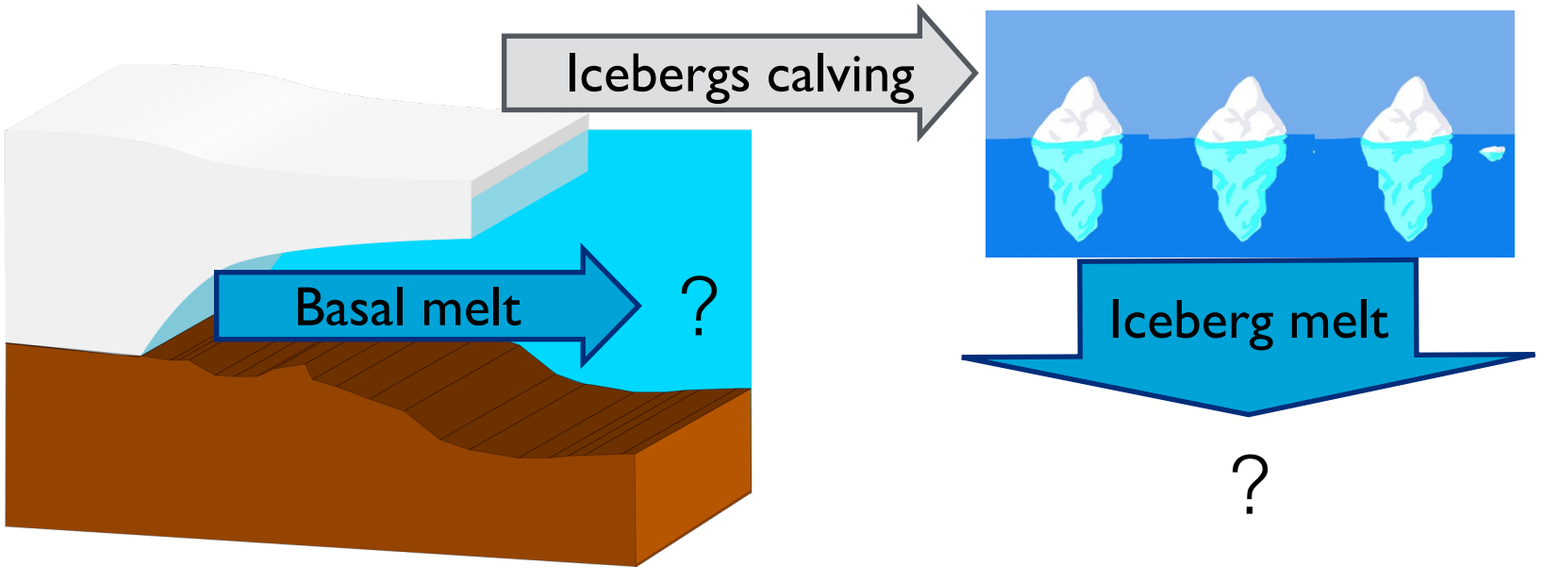
Background (1/3)

Some vocabulary *(NB : no river run-off in Antarctica)*

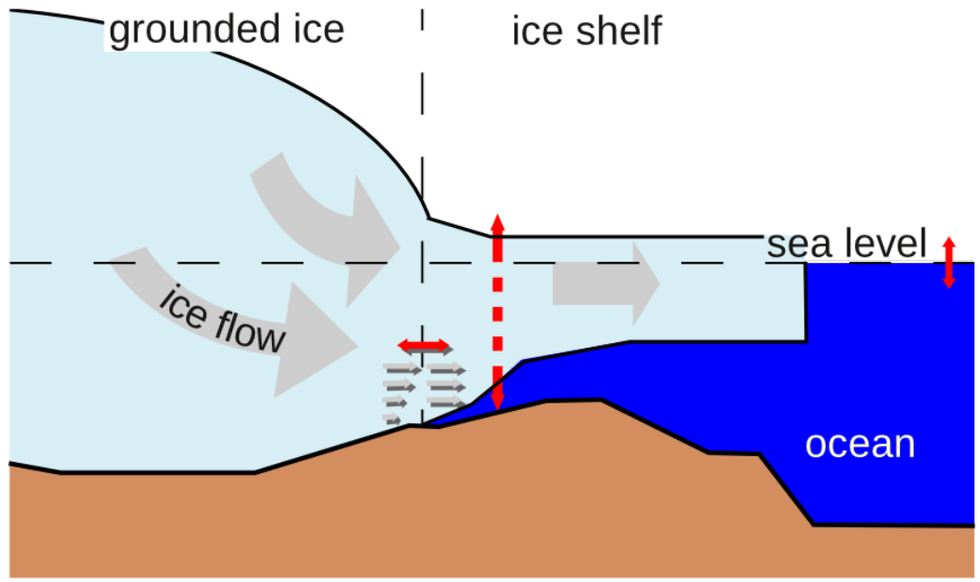
- Basal melt, iceberg calving, iceberg melt



Information needed for ocean / sea-ice models

- Grounding line flux

the volume of ice-shelves exhibits strong trends (dH/dt)



Background (2/3)

- Two recent studies provide estimates of the distribution of **calving rates** and **melt rates**

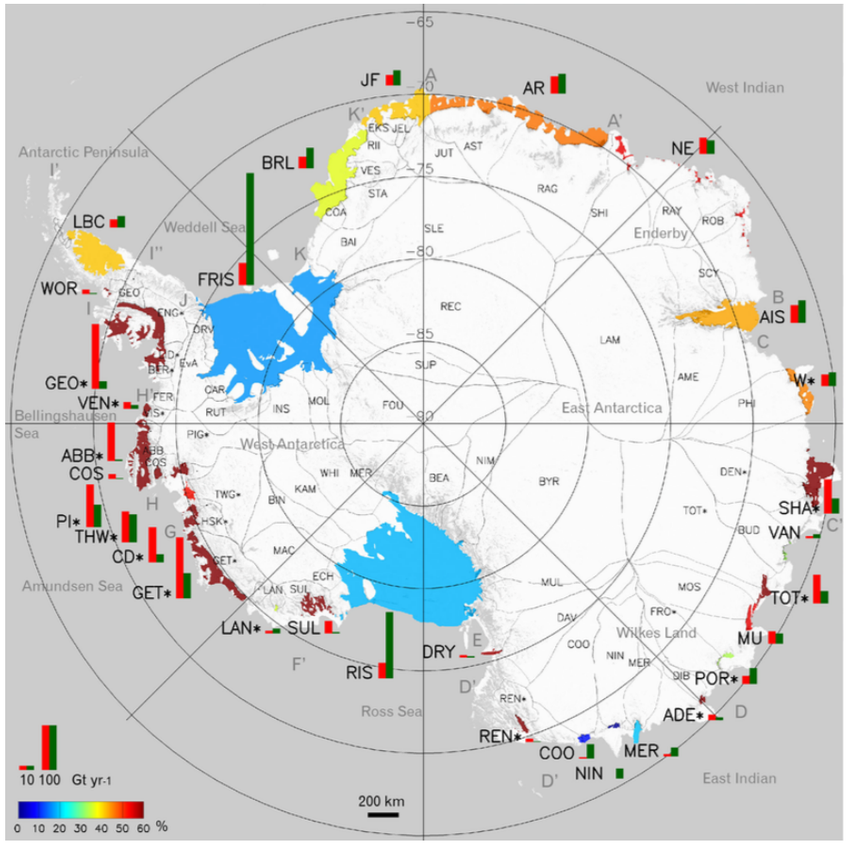
(Depoorter et al. 2013 ; Rignot et al. 2013)

- Combines : altimetry (dh/dt), modelling, field observations, ice flow reconstructions

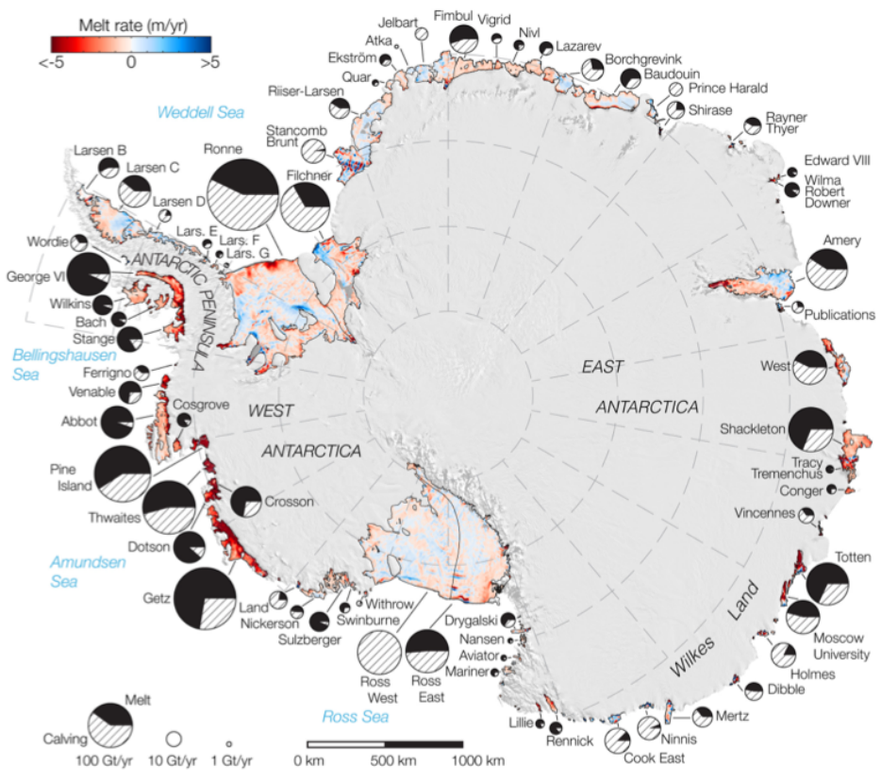
$$GLF + SMB - CF - BMB = dH/dt$$

CF = 1300Gt/yr BMB = 1400Gt/yr

- Previous studies : grounding line flux (GLF), rate of thinning of ice-shelves (dH/dt)



Depoorter et al. 2013



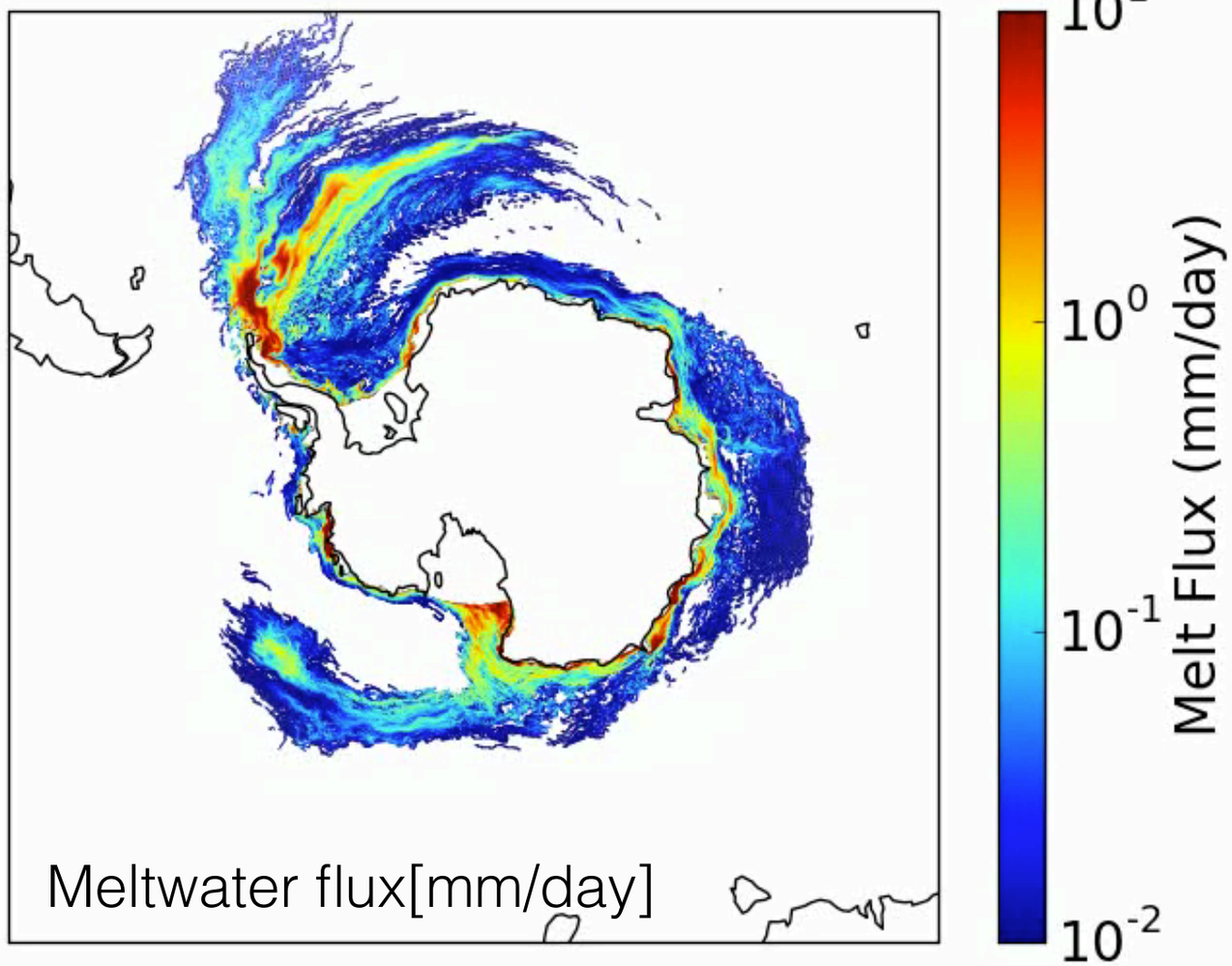
Rignot et al. 2013

Problem solved provided your ocean model uses an interactive icebergs models

(« climatological » values, only representative of the recent decade)

Iceberg meltwater flux over the Southern Ocean (Merino et al. 2016)

Merino et al. (2016). Antarctic icebergs melt over the Southern Ocean : climatology and impact on sea-ice. Ocean Modelling, 104, 99-110.



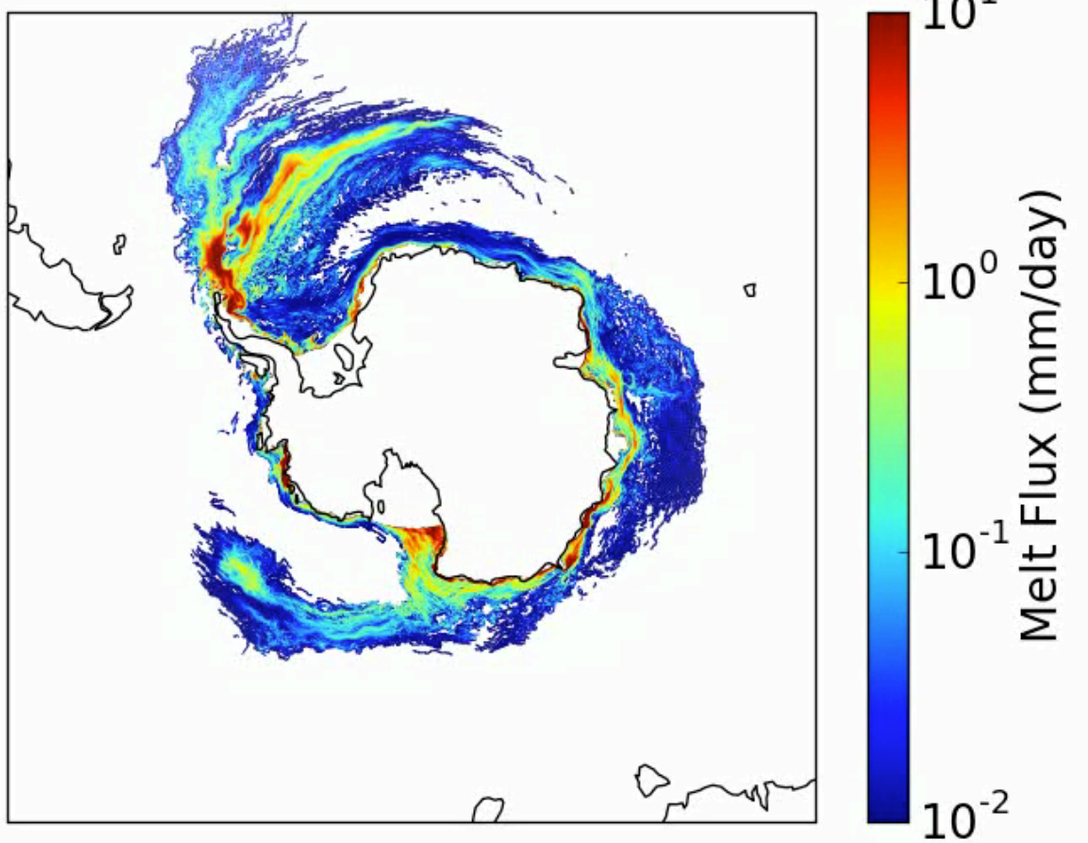
- Iceberg melt shows a large **seasonality** (cf SST)
- especially in the **Ross sea** and in the **Admunsen sea**.
- Melt is concentrated in **three branches** of subpolar gyres
- A large fraction of the total melt occurs in the **South Atlantic**

Information needed for JRA55 based forcing (1/2)

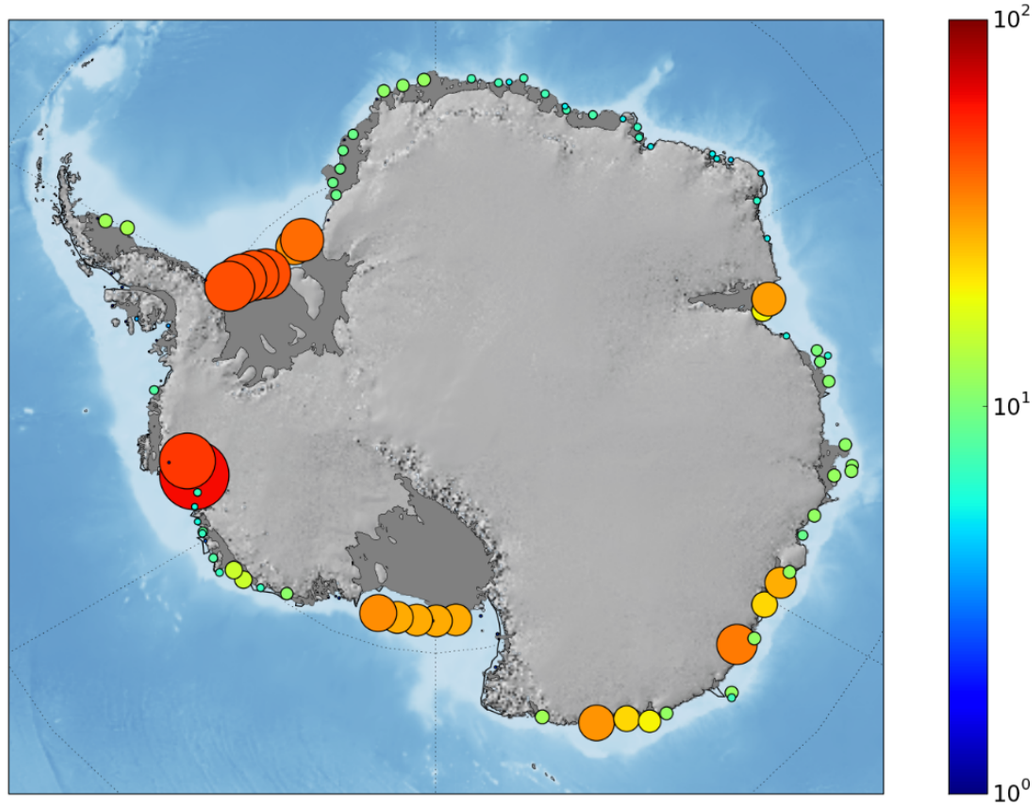
[x] Climatology of Antarctic iceberg melt

+ update : inter-annual forcing + extension to the coast.

[x] Source points for Antarctic icebergs (from Deeporter)



Iceberg meltwater flux
nc file



Distribution of iceberg point sources.
xls file

Nacho Merino's website : http://neichin.github.io/personalweb/material/meltwater/

Information needed for JRA55 based forcing (2/2)

[~] Files for Antarctic basal melt (caution : grid dependent)

importance of spreading the flux over depth

(key for sea-ice and circulation over shelves)

what kind of information should be provided ?
ice-shelves location + flux + depth ?

[?] Greenland freshwater forcing ? (see J. Bamber)