

Using EC-Earth GCM for Decadal Predictions of Arctic Sea-Ice Evolution

PhD Proposal

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Who's who?

- Belgium & LLN
- Myself
 - From traffic dynamics...
 - ... to climate modelling (Sept. 2009)
 - My favourite dish



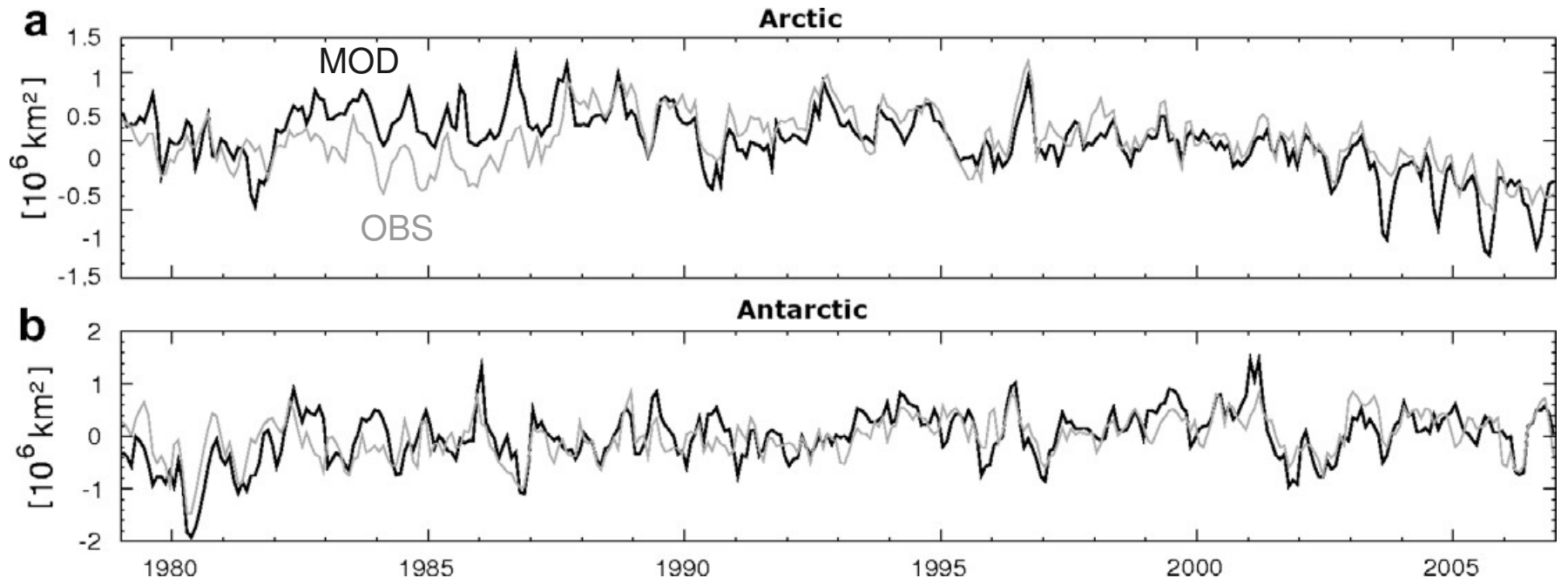
Who's who?

- **L**ouvain-la-Neuve sea **I**ce **M**odel (LIM)
 - Large scale dynamic-thermodynamic sea ice model [*Fichefet and Maqueda, 1997*]
 - Coupling with **O**céan **P**Arallélisé [*Goosse and Fichefet, 1999; Timmerman et al., 2005*]
 - Current developments
 - Rheology & sea ice physics
 - Assimilation (EnKF)
 - Finite element version
 - ...
- COMBINE project

A few words about sea ice

- At the heart of numerous feedbacks
- Free sea ice Arctic summer soon? *[Wang and Overland, 2009]*

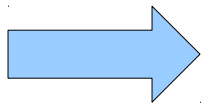
Sea ice area anomaly from 1979 to 2007



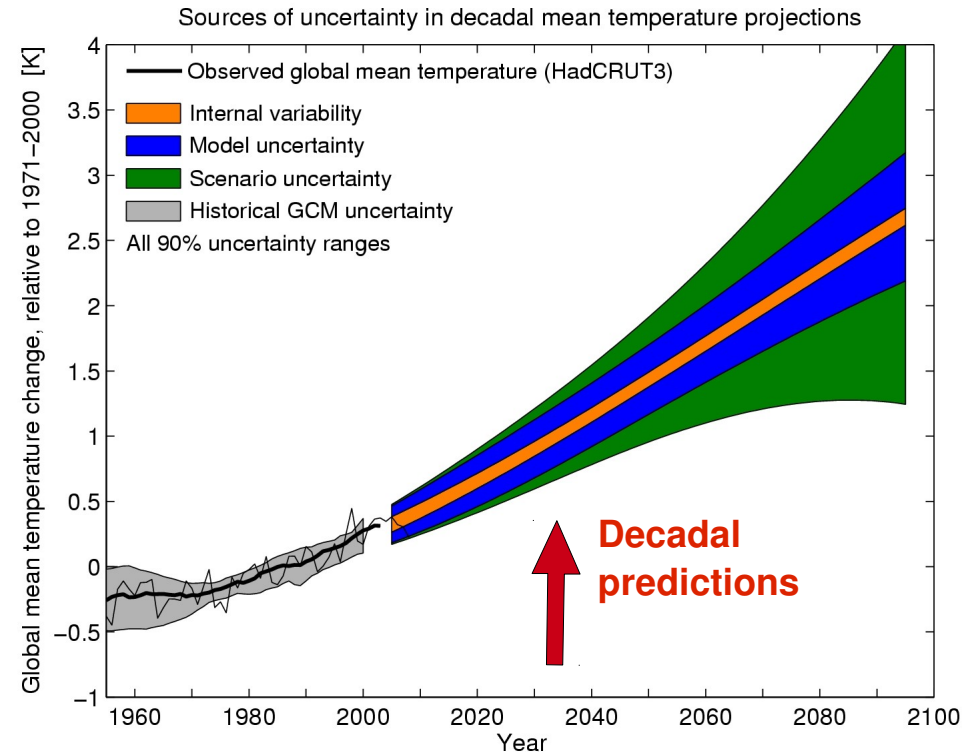
[Vancoppenolle et al., 2009]

Sea ice and decadal predictions

- Need for accurate forecasts in Arctic within 10-30 years



Need for accurate **initialization** of sea ice?



[Hawkins and Sutton, 2009, BAMS]

Thesis proposal

1. Getting to know my field of research
2. Developing tools for assessing model performances
3. Running EC-Earth and analyzing outputs
4. Performing sensitivity experiments

1. Getting to know my field of research

- Climate system
- Predictability
- Initialization for decadal predictions

KNMI Workshop 2-4/11/09

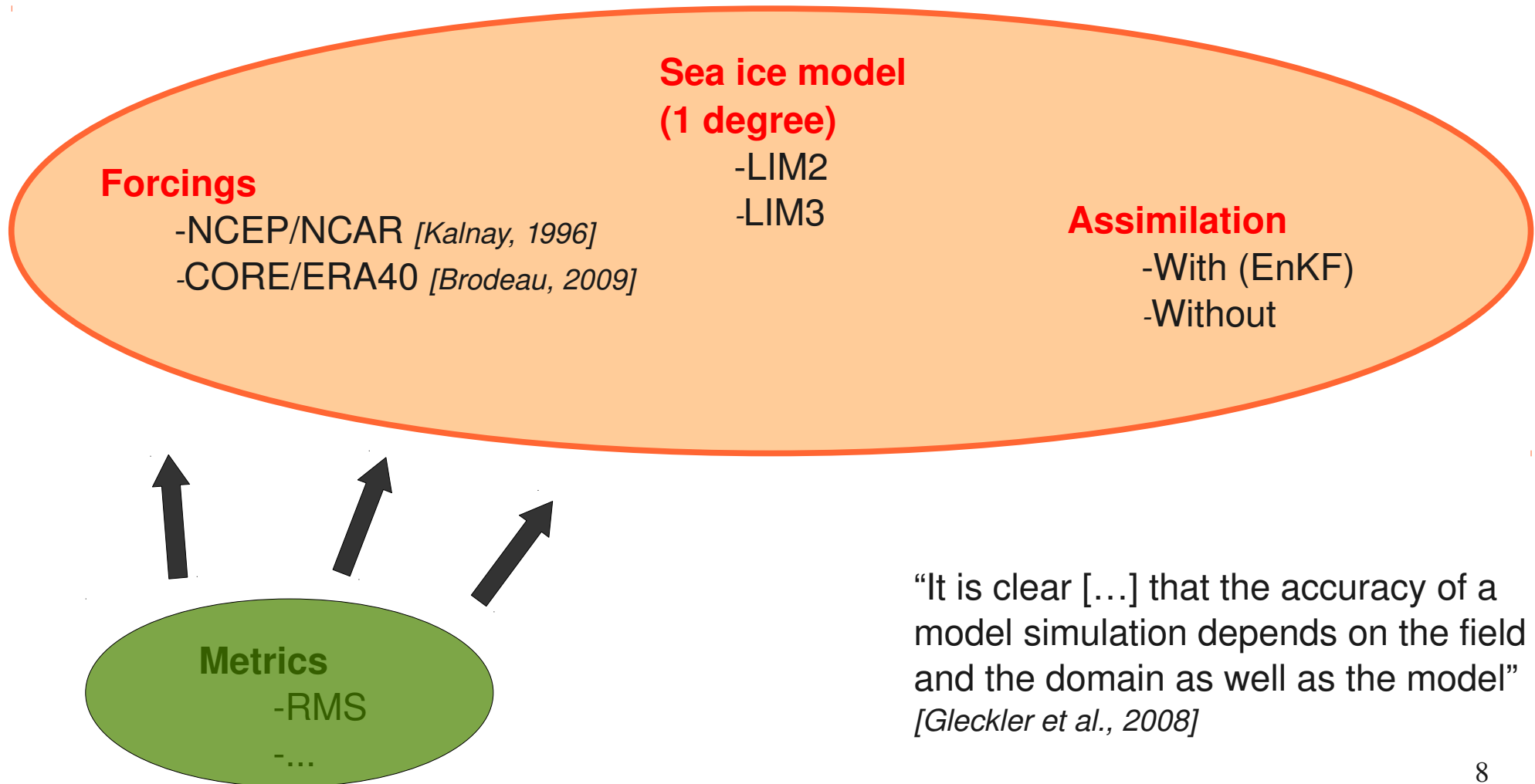
- EC-Earth GCM

ECMWF Meeting 10-11/12/09

- ...

2. Developing tools for assessing model performances

- Work “at home”



“It is clear [...] that the accuracy of a model simulation depends on the field and the domain as well as the model”
[Gleckler et al., 2008]

3. Running EC-Earth and analyzing outputs

- COMBINE's WP 4 & 5: expected results
 - WP 4: Cryosphere
 - WP 5: Initialization →

Tackle the paucity of observations and initialize sea ice + ocean together
- Performing the runs

4. Performing sensitivity experiments

- Impacts of initialization
- Impacts of external forcings /scenarios
- Impacts of the model



For a defined metric, where do the efforts have to be made in order to ensure the “best” decadal forecasts?

Conclusion

- Importance of **sea ice initialization** for decadal predictions?
- Defining a **metric** is essential to distinguish between different models
- Providing reliable **decadal** forecasts for Arctic sea ice is at the core of my future research

Thank you

Bon appétit!