Arctic CLIC sea ice working group meeting
NSIDC, Boulder, Colorado – 31st October 2011

Sea ice modelling with LIM

Recent advances

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on behalf of the LIM team
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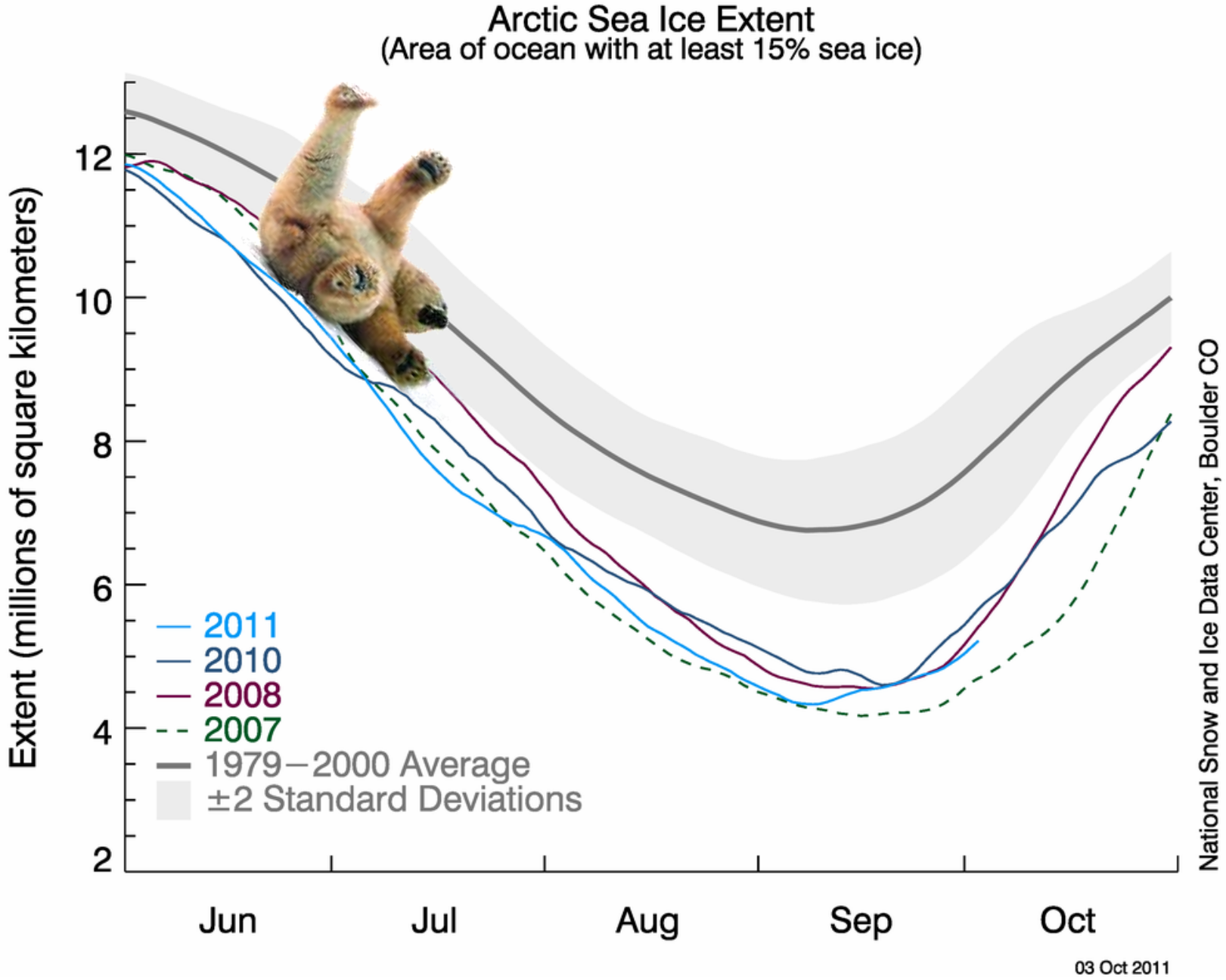
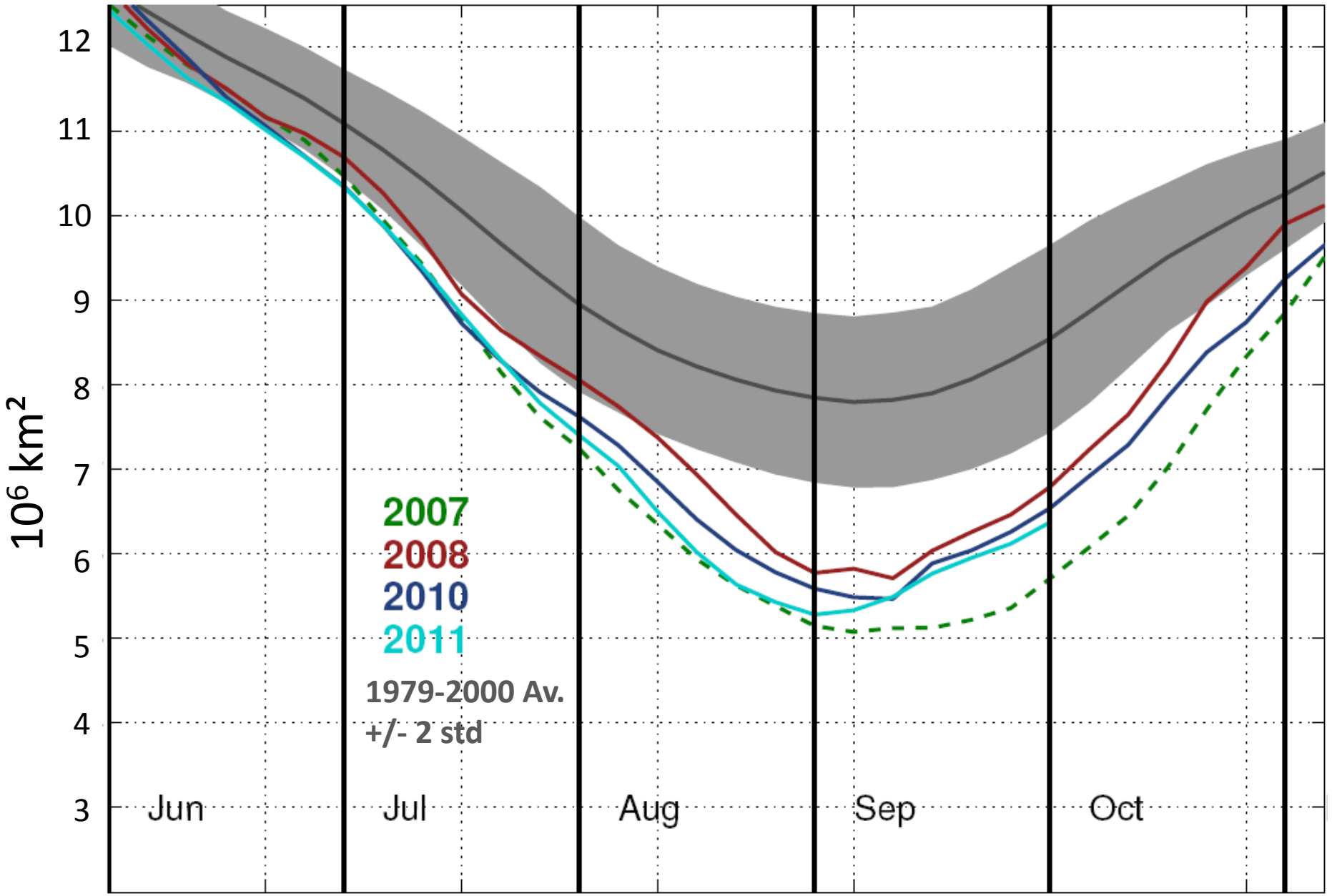
BREAKING NEWS

NSIDC website , Oct 20th 2011

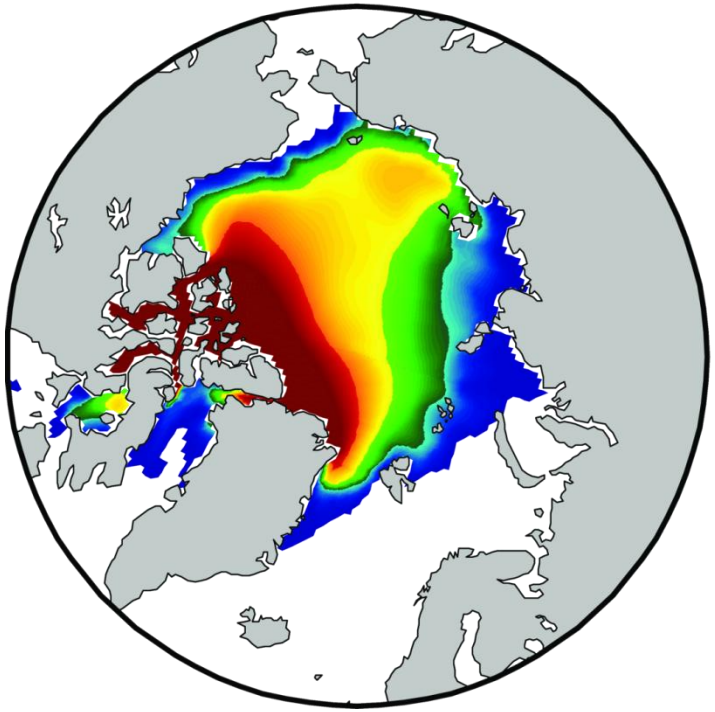


Simulated sea ice extent (NEMO-LIM + atmospheric reanalyses)

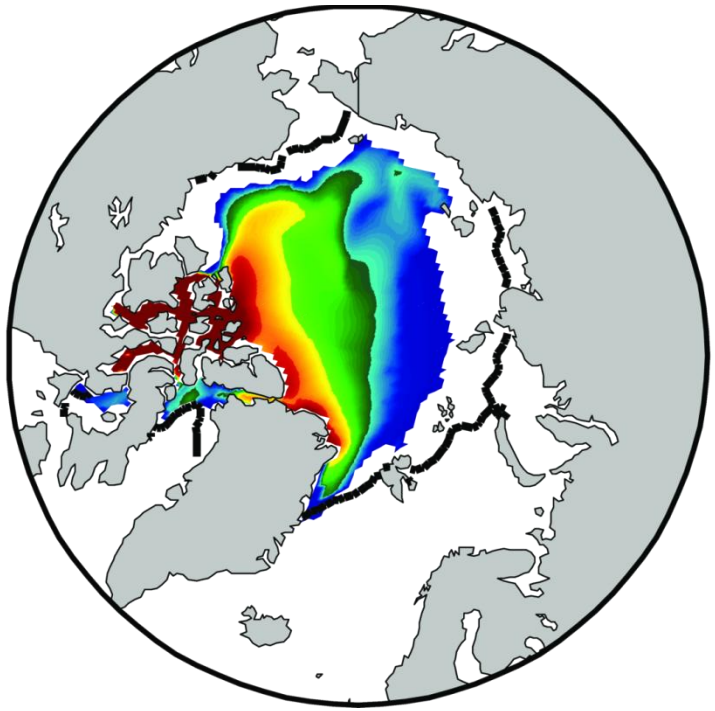


Arctic sea ice thickness (Louvain-la-Neuve sea Ice Model)

September climatology (1979-2000)



September 2011



Volume ≈ 26,000 km³

Volume ≈ 10,000 km³

Lowest minimum of the model

1. Assessment & understanding

- Statistical reanalyses
- Sensitivity experiments

Louvain-la-Neuve sea Ice Model
www.climate.be/lim

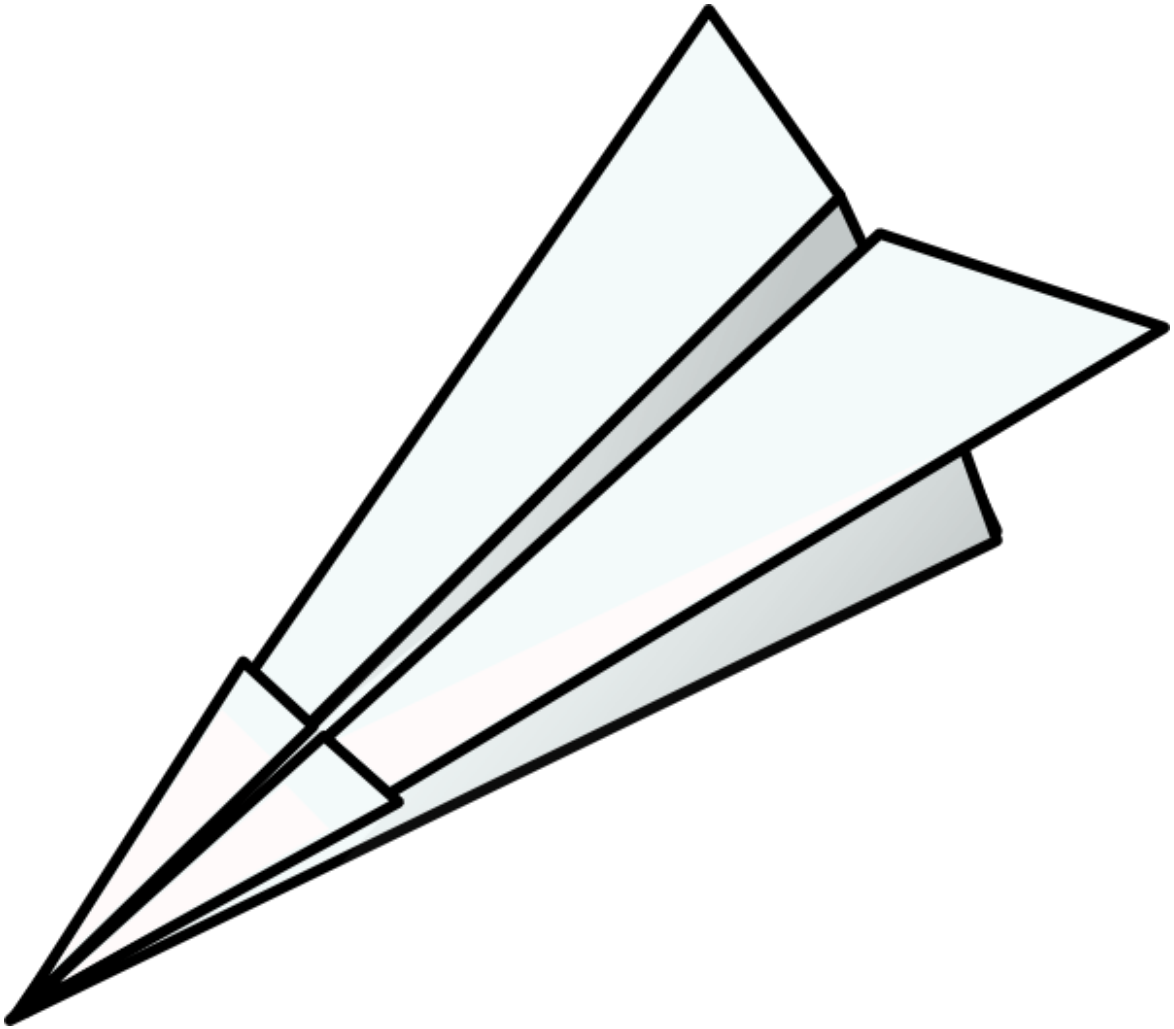
2. Developments

- Sea ice-ocean interactions
- Sea ice-atmosphere interactions
- Snow-on-ice scheme
- New parameterizations

3. Climate Forecasts

- Embedding in GCMs
- Seasonal-to-centennial predictions/projections

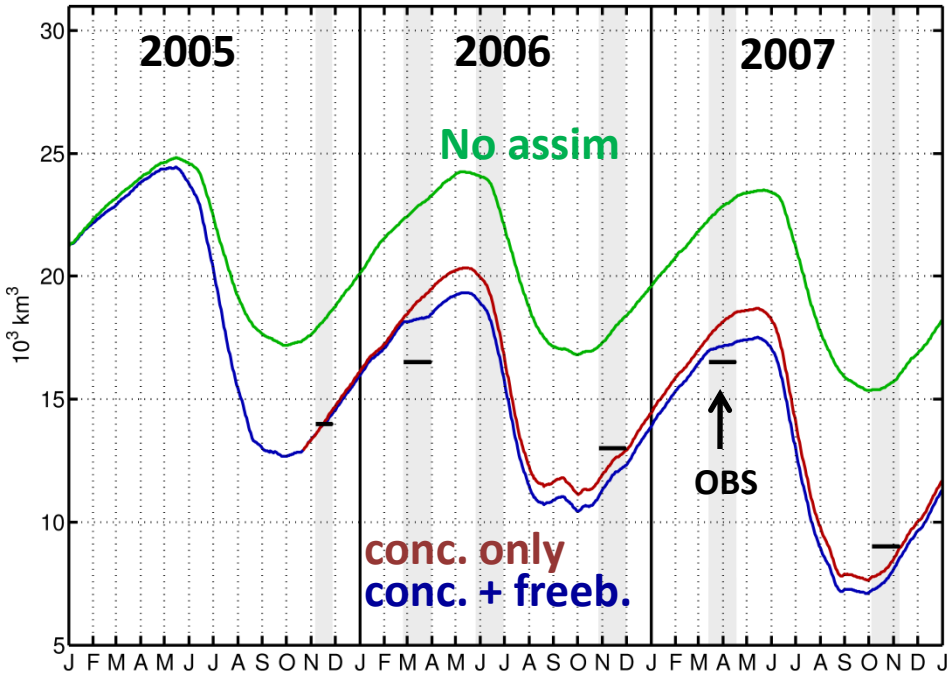
1. Assessment & understanding



1. Assessment & understanding

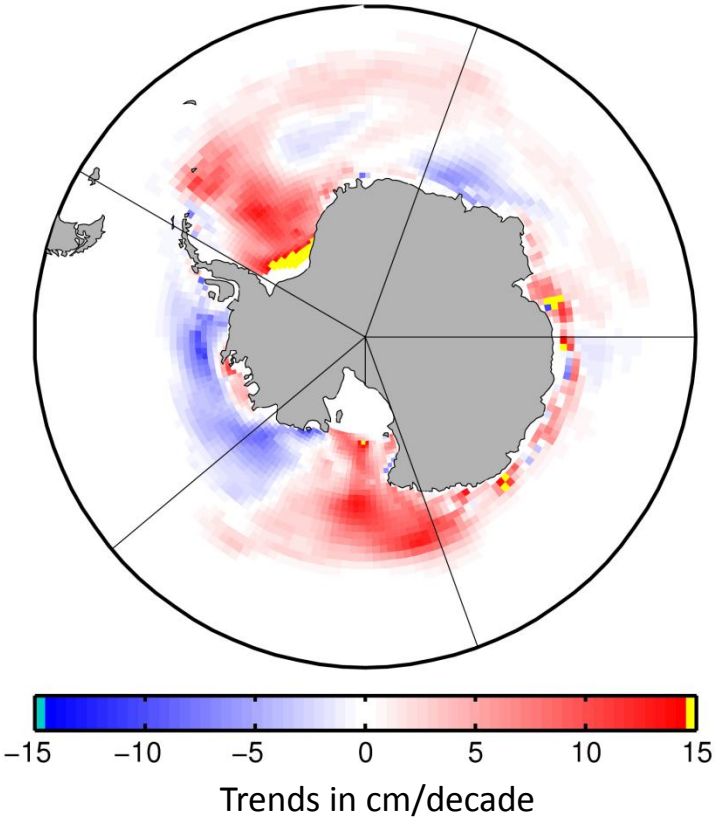
- Ensemble Kalman Filtering

Arctic sea ice volume as reconstructed by NEMO-LIM2



Mathiot et al., in prep.

Trends of Antarctic sea ice thickness (1983-2007, NEMO-LIM2 + assim. ice conc.)



Massonnet et al., in prep.

1. Assessment & understanding

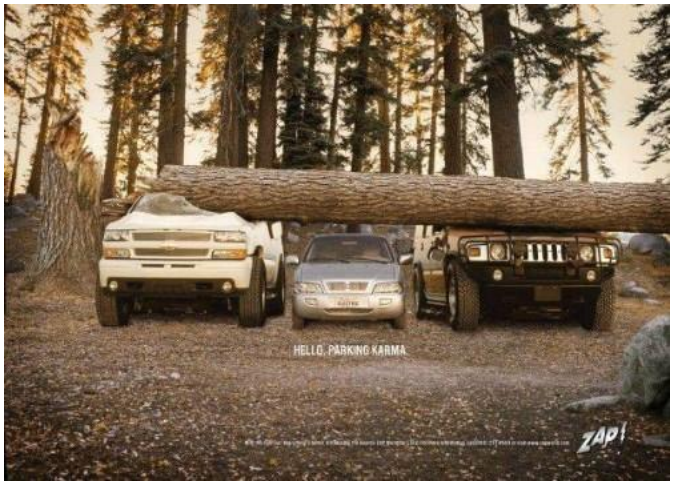
- Model evolution assessment
  - Performance metrics for sea ice models

(Massonnet et al., The Cryosphere, 2011)

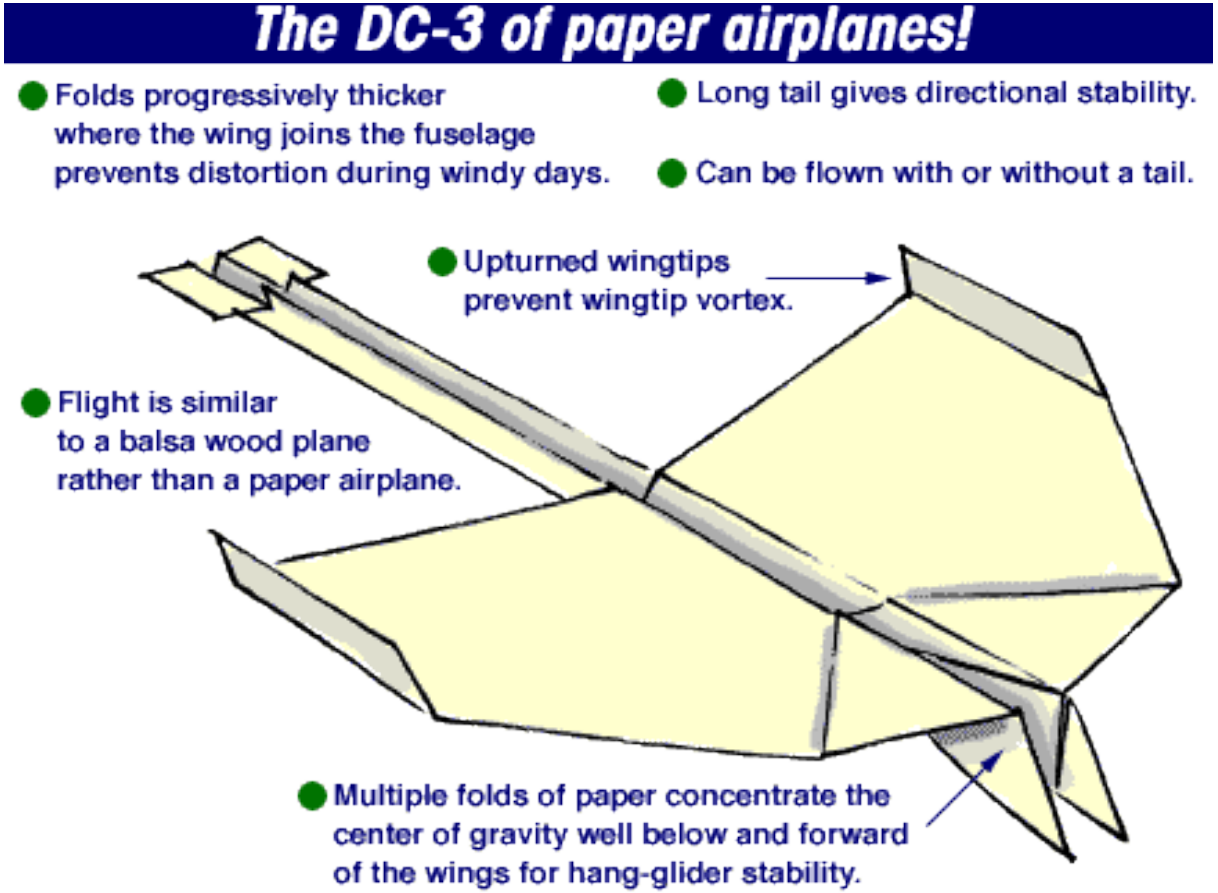
Arctic

	LIM2	LIM3	
concentration	0.97	0.79	μ
	1.03	0.77	σ
	1.03	0.78	trend
extent	1.33	0.43	μ
	1.22	0.61	σ
	0.23	0.46	trend
draft (thick.)	0.94	0.67	μ
	0.72	0.32	trend
drift	0.39	0.61	μ
	0.86	0.76	↗
Fram strait export	0.44	0.7	μ
	0.34	0.9	σ
	1.14	0.82	μ
	0.09	0.8	σ

« Lower is better »

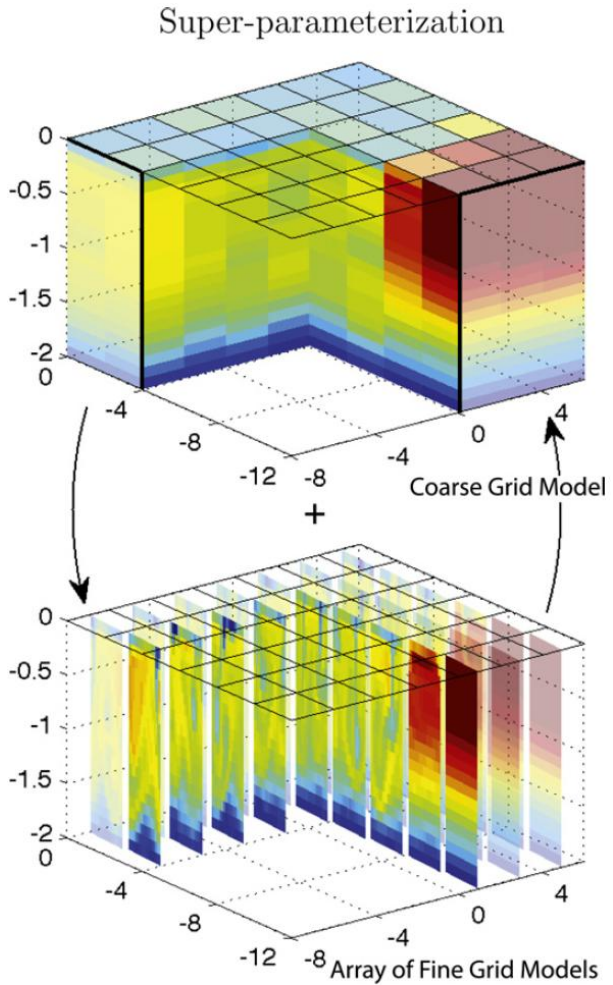


2. Developments



2. Developments

- « Super-parameterizations » for ice-ocean coupling (A. Barthélemy)

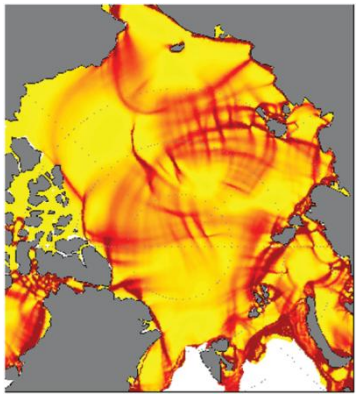


From *Campin et al., 2011*

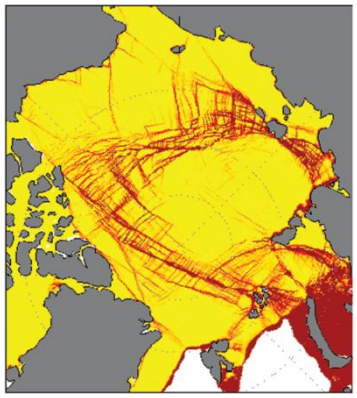
- New sea ice rheology (S. Bouillon)

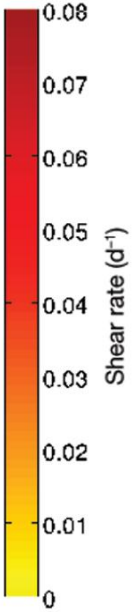
Observed shear rate (RGPS; Kwok, 1998)

Viscous-Plastic



Elasto-Brittle

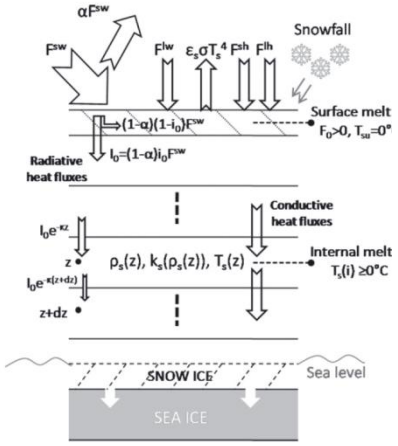




From *Girard et al., 2011*

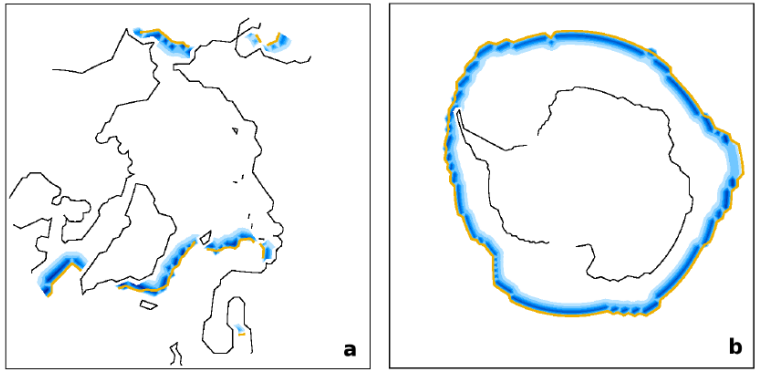
2. Developments

- New snow scheme (O. Lecomte)



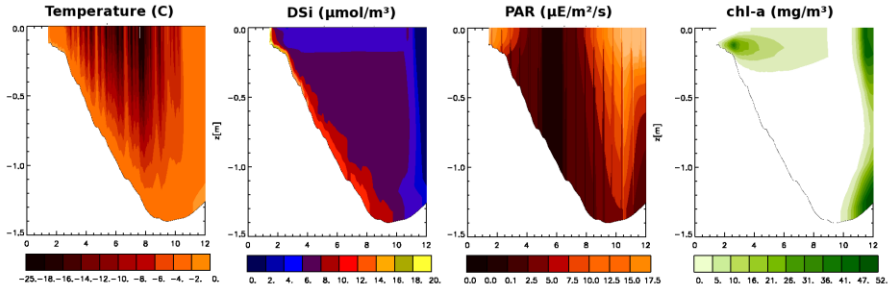
- Pancakes parameterization

(M. Vancoppenolle)



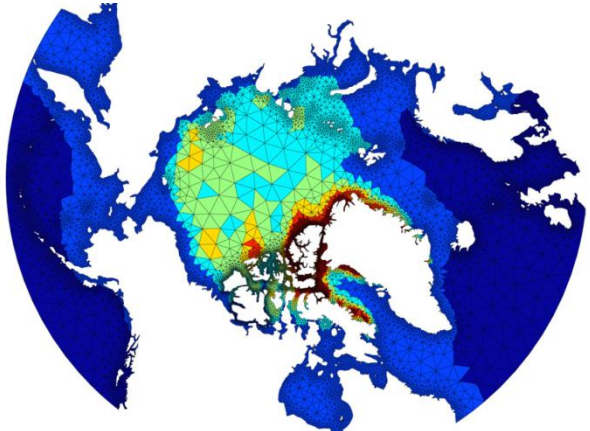
- Sea ice biogeochemistry

(M. Vancoppenolle)



- Finite-elements modelling

(O. Lietaer, A. Pestiaux)



3. Climate forecasts

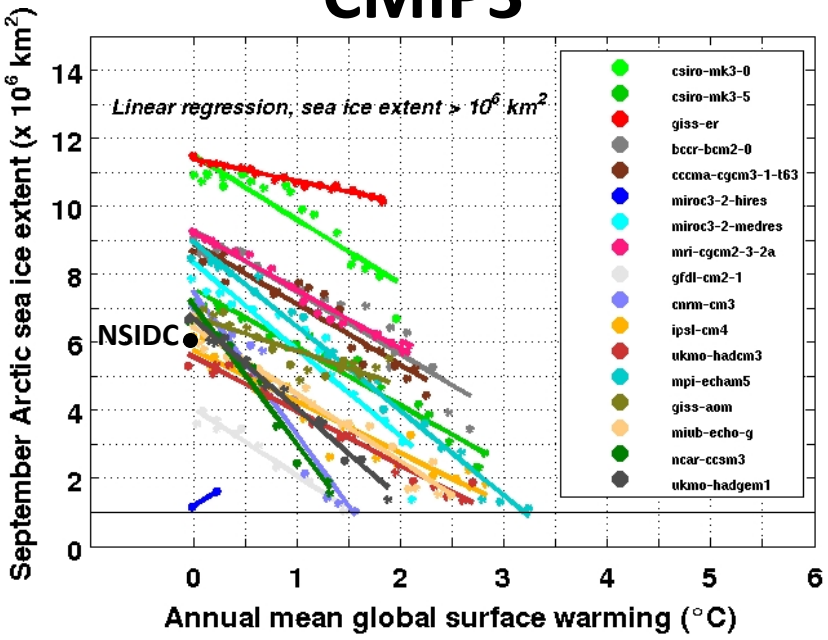
(in class experiment)

3. Climate forecasts

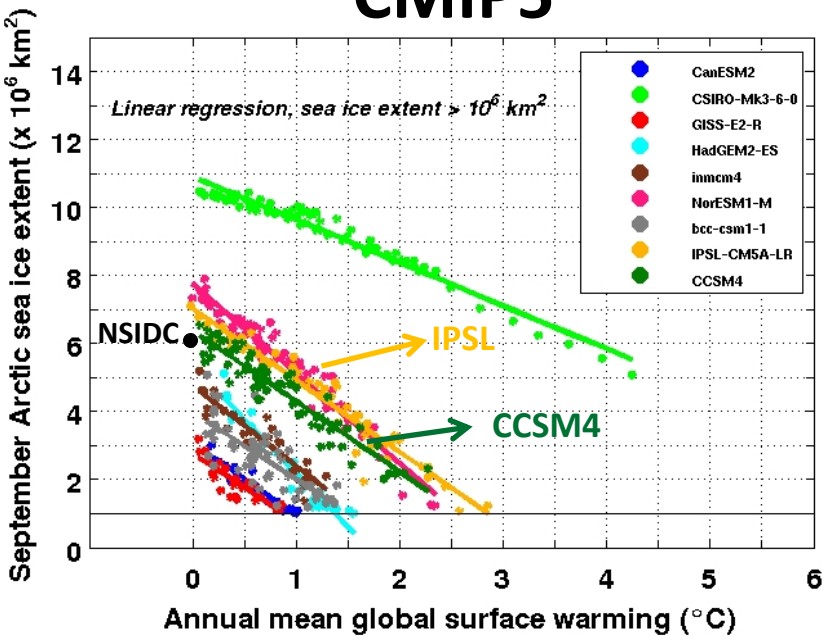
LIM is involved in large-scale General Circulation Models

Coupling of the latest version under way (G. Vergé-Dépré, K. Wyser -SMHI)

CMIP3

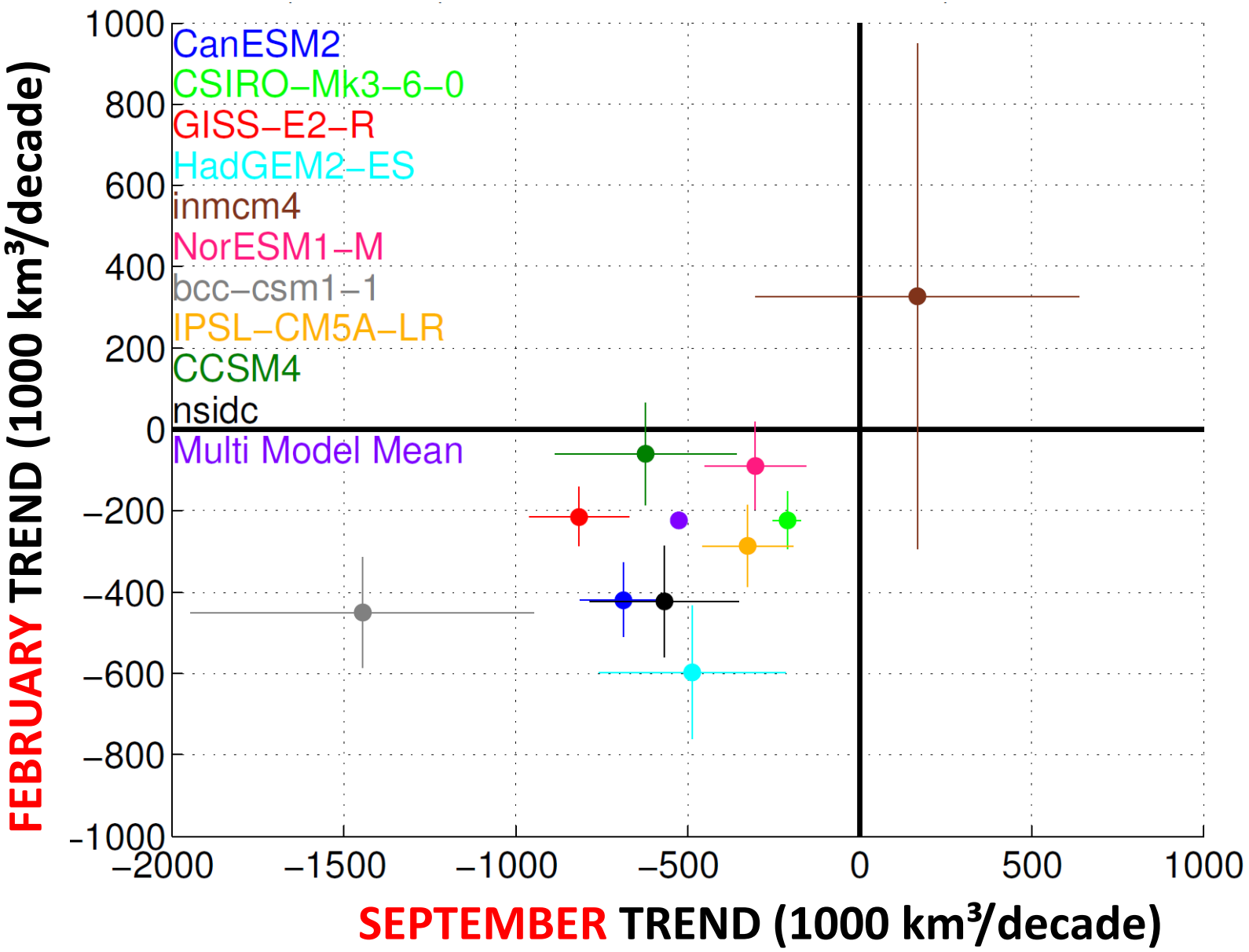


CMIP5



G. Philippon, pers. comm.

1979-2006 trends of Arctic sea ice extent +/- 2std



Christmas is only 2 months away

Observational needs

- **Errors** are as much important as the products
- Antarctic sea ice +snow thickness, continuing the ASPeCT data set (Worby et al., 2008)
- Sea ice flux estimates (other than Fram Strait)
- When possible: gridded data
- Data format

Conclusions

- is **not** a a paper plane
- Assessment, development and forecasts
- Focus on **both** hemispheres
- For more information:

www.climate.be/lim

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