Interactions between Arctic sea ice drift, concentration and thickness modelled by NEMO-LIM3.6

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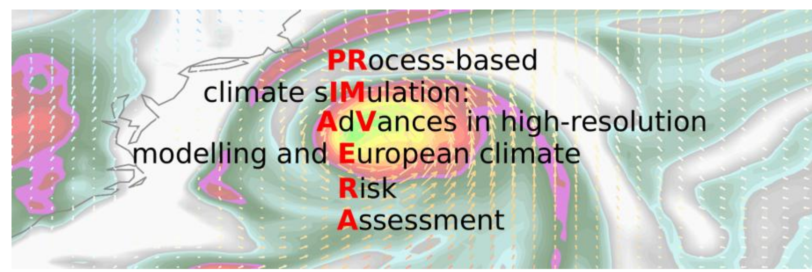
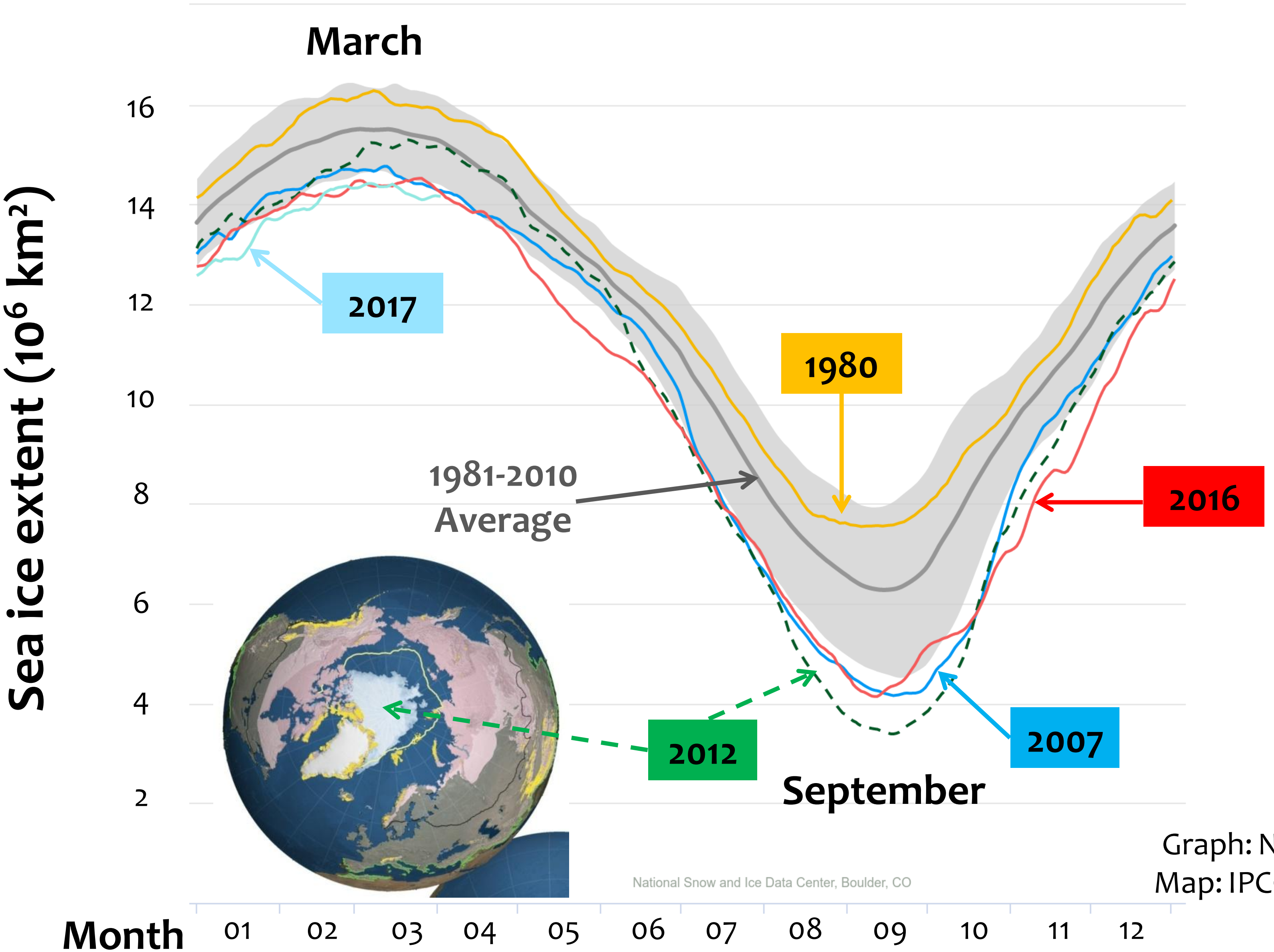


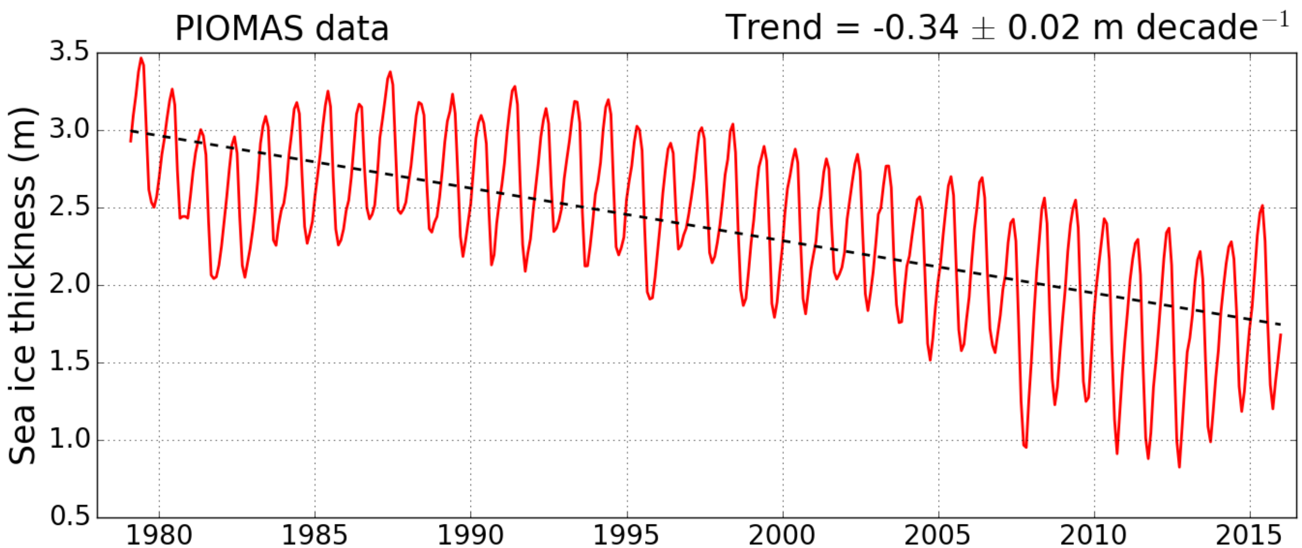
EGU, Vienna, 28 April 2017

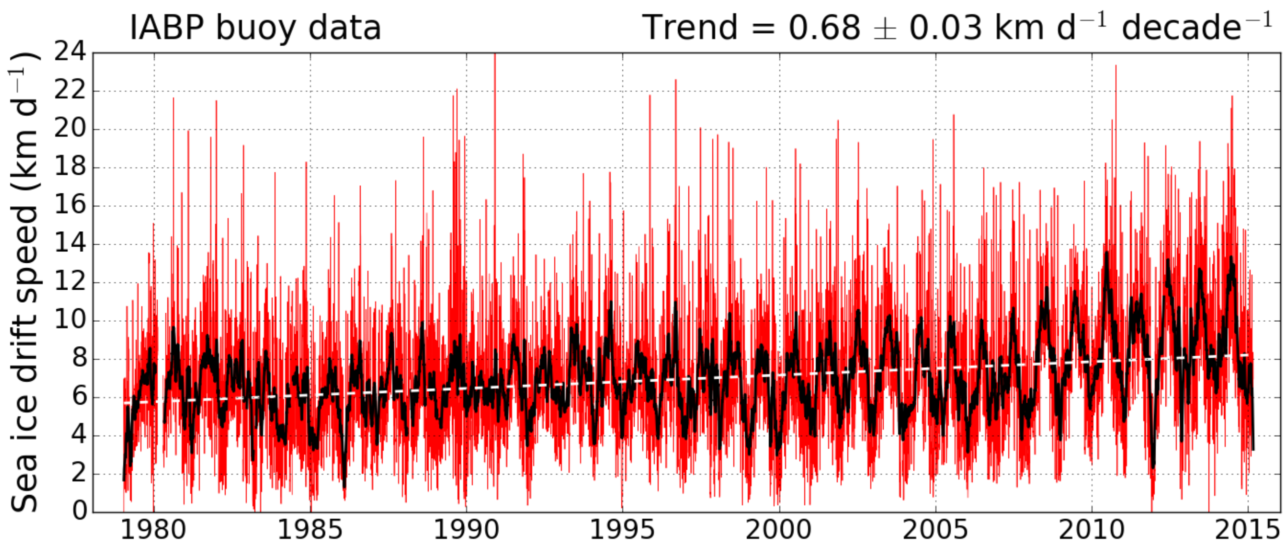
Rapid Arctic sea ice loss



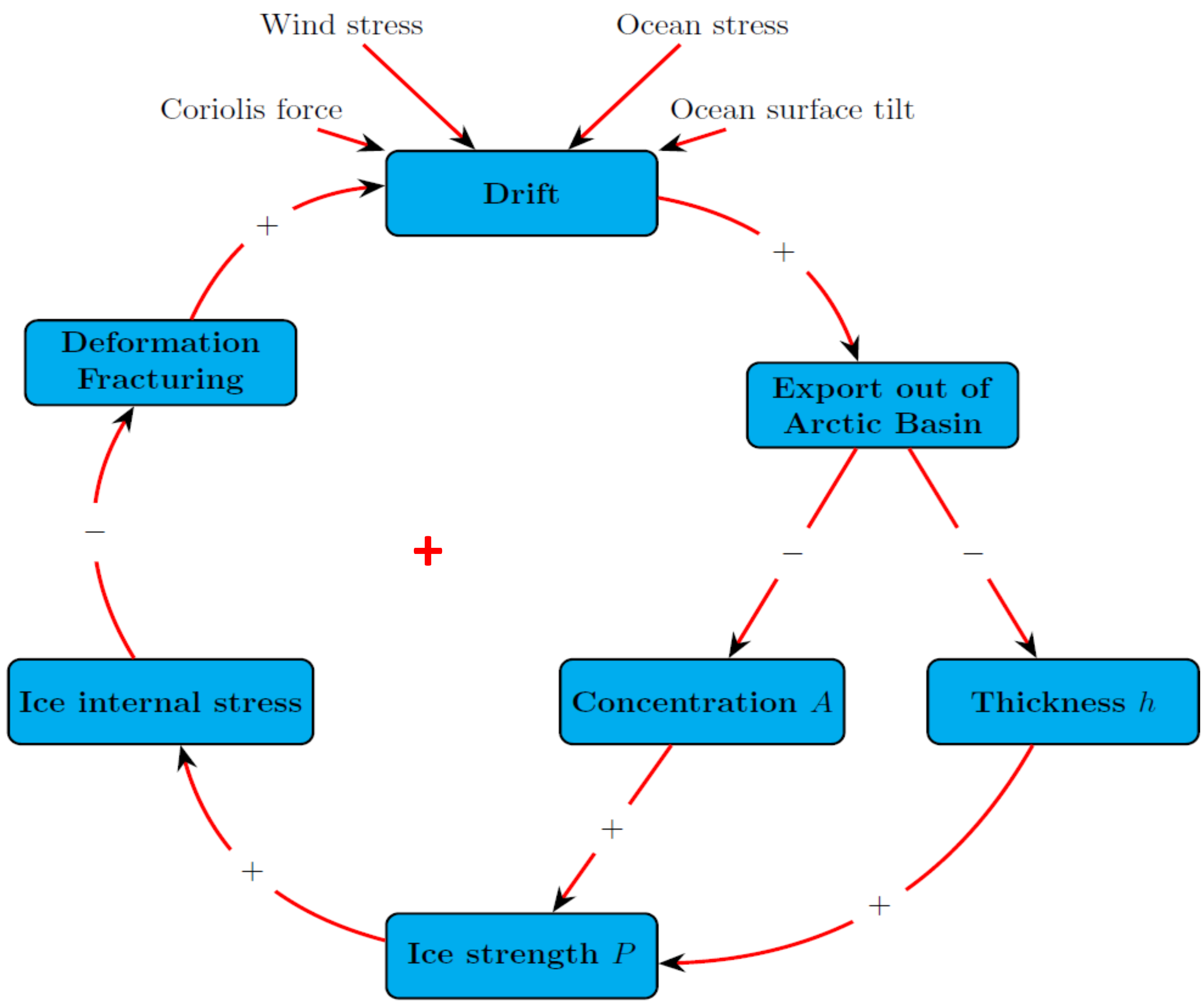
Graph: NSIDC
Map: IPCC AR5

Sea ice Thickness and Drift in past decades





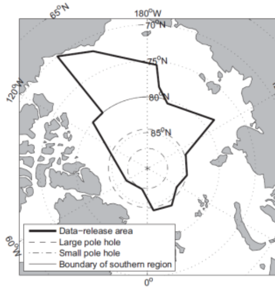
Sea ice Drift-Strength feedback



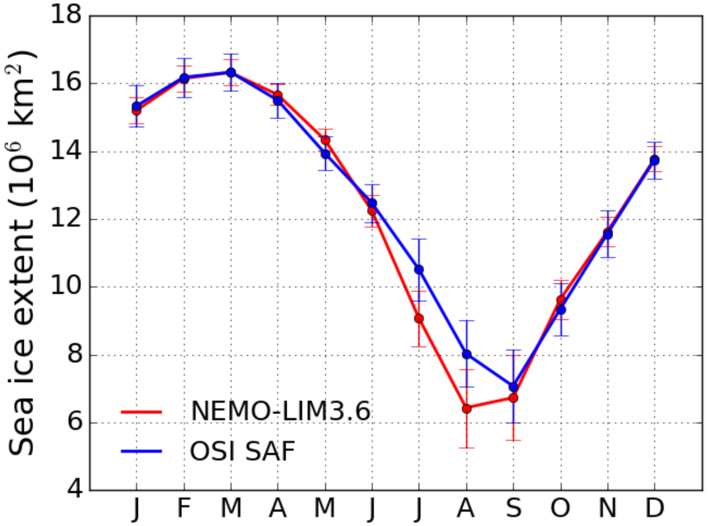
$$P = P^* \ h^\lambda \ \exp[-C(1-A)]$$

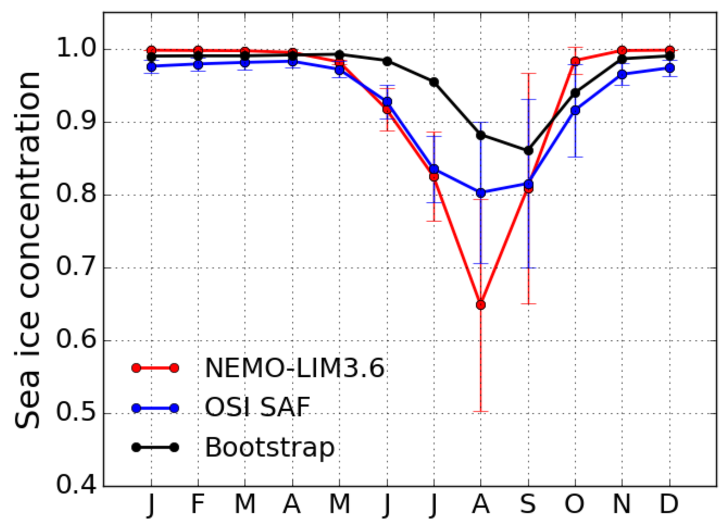
Model: NEMO-LIM3.6

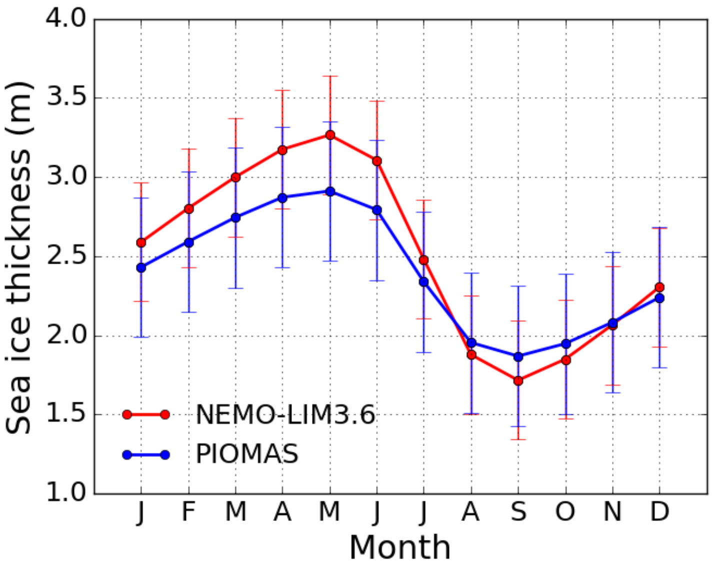
1979-2013

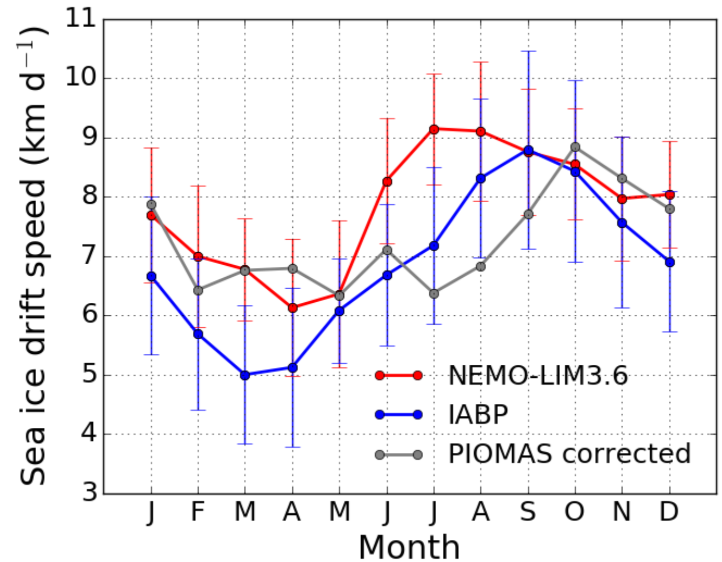


SCICEX box
(Olason and Notz, 2014)

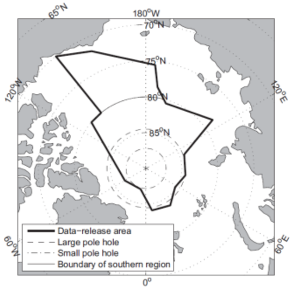






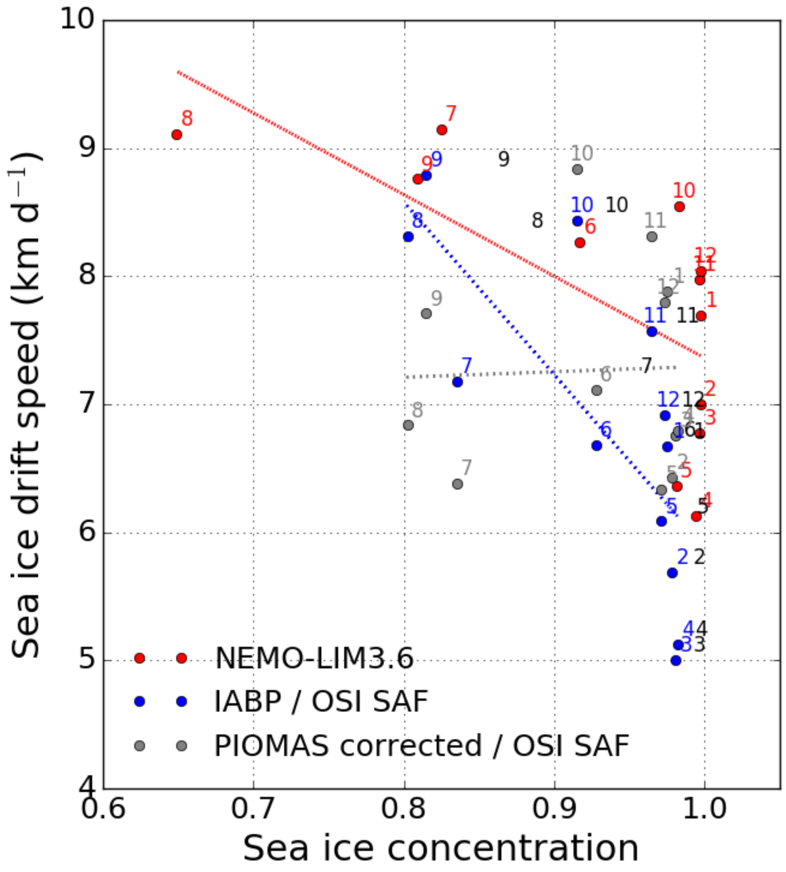


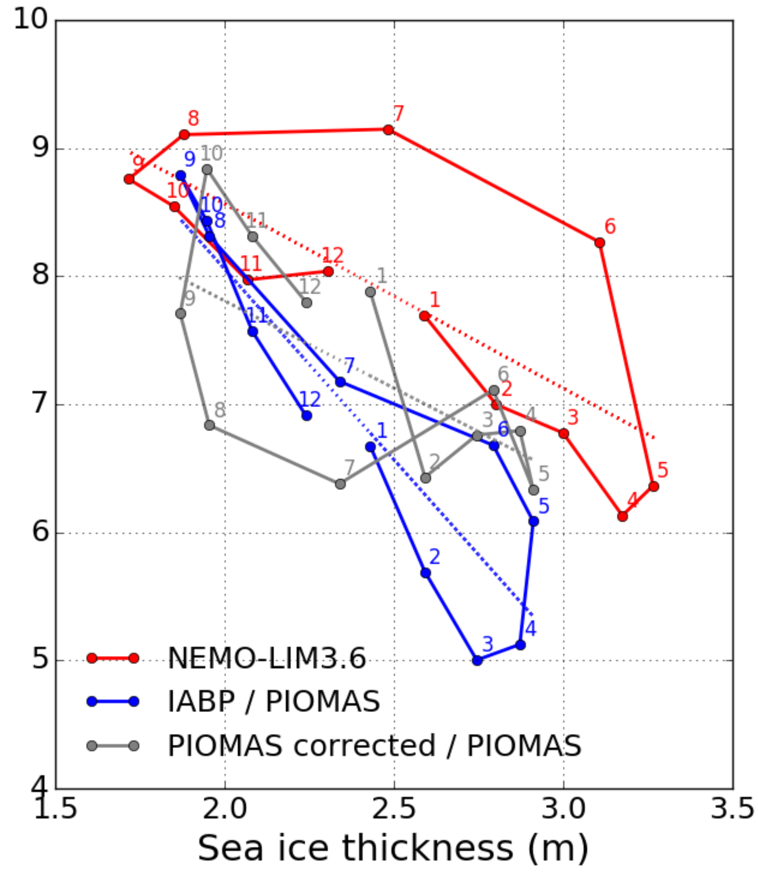
Drift vs. Concentration and Thickness: Monthly Means



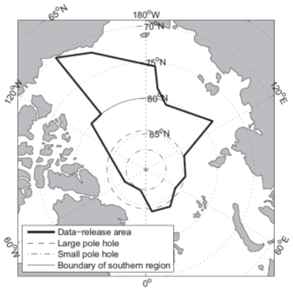
SCICEX box

1979-2013



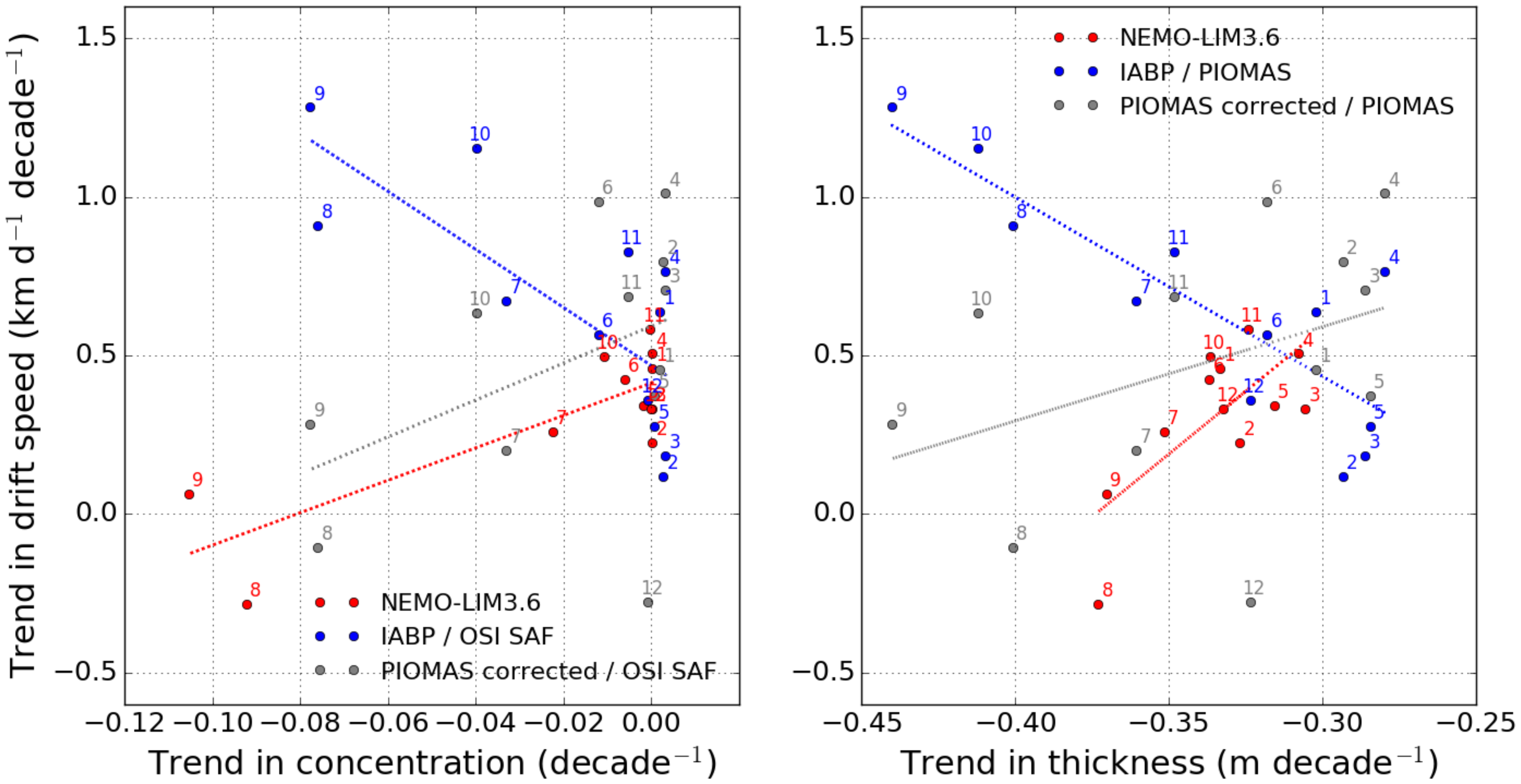


Drift vs. Concentration and Thickness: Monthly Trends



SCICEX box

1979-2013



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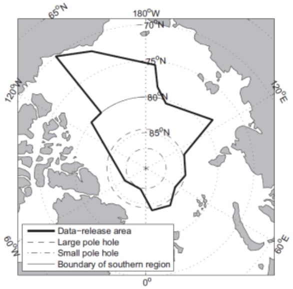
Testing drift-strength feedback



SCICEX box

Strength

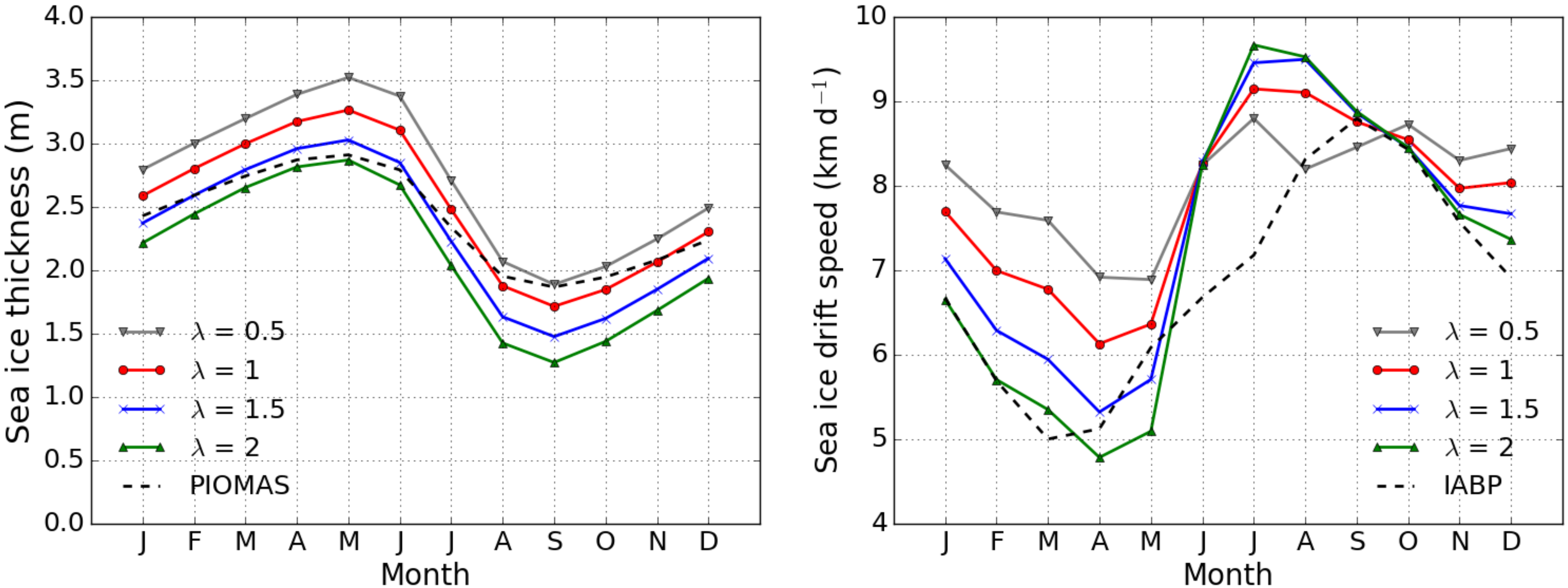
λ = [0.5 - 2]

Hibler (1979): $P = P^* h^\lambda \exp[-C(1-A)]$

Thickness

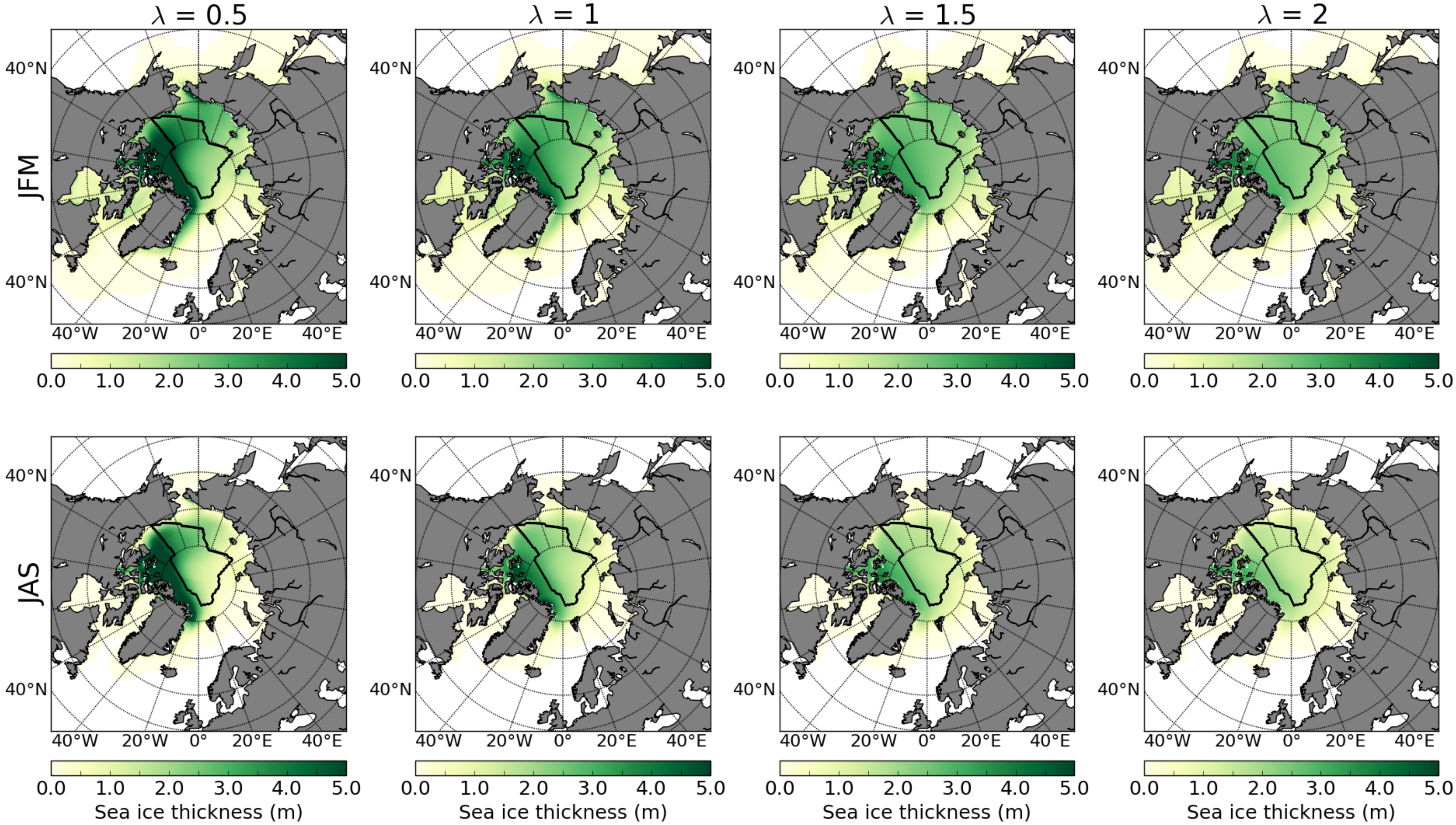
Concentration

1979-2013

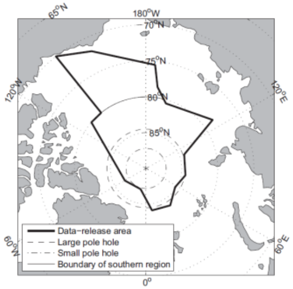


Testing drift-strength feedback

1979-2013

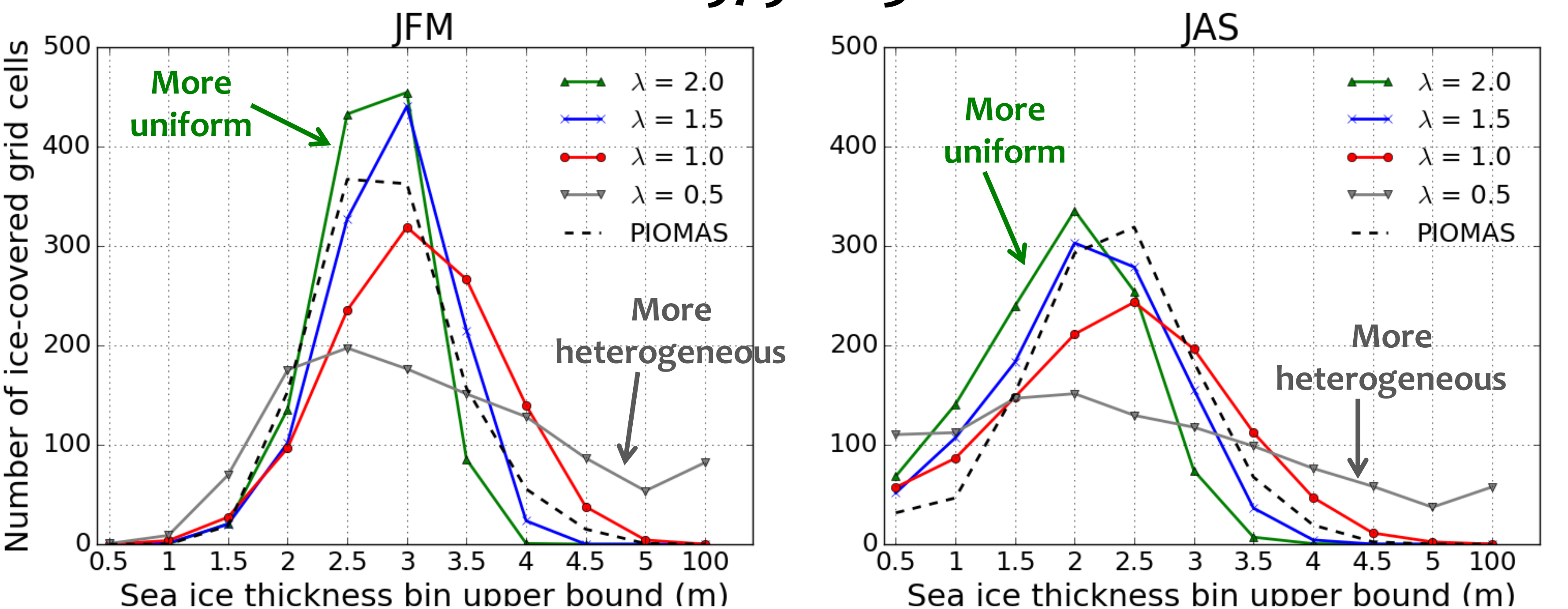


Why Thickness h ↓ with Strength P ↑ ?



SCICEX box

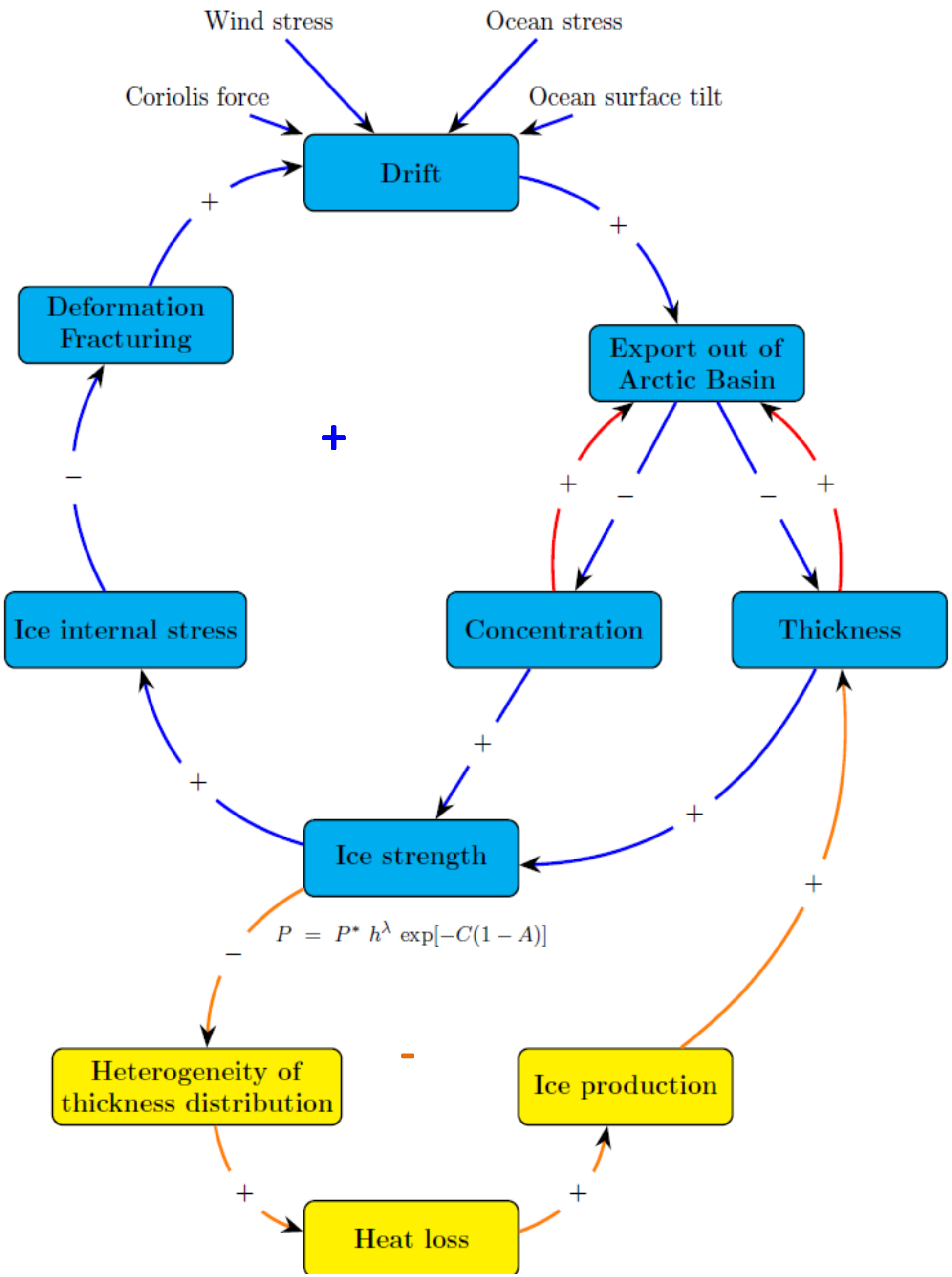
1979-2013



Revisiting the Drift-Strength feedback

Dynamic feedback

Thermodynamic feedback



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Conclusions

1. NEMO-LIM3.6 evaluation is good
2. Relationships between sea ice drift and concentration/thickness are reasonably well represented
3. Higher initial ice strength leads to lower thickness due to thermodynamic feedback
4. Interactions between drift and strength are more complex than previously thought

NSIDC / Alice O’Connor

Posters
X5.510 Barthélemy *et al.*, ITD
X5.511 Raulier *et al.*, Elasto-brittle rheology

Docquier *et al.* (2017), The Cryosphere Discussions