Utilizing a FAMOS hierarchy of sea ice models to identify their physical limitations

What is the main goal of a coordinated FAMOS sea ice modeling effort:

- ❑ To improve synoptic to seasonal hindcasts and forecasts?
- ❑ To better understand limitations on longer term coupled simulations and projections?
- ☑ To gain a better understanding of physics?
- ❑ All of the above

Constraints within a FAMOS sea ice model hierarchy
Stand-alone regional ice-ocean model

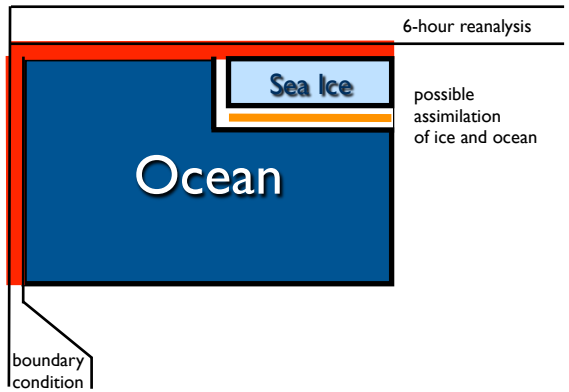
Most constrained ice-ocean system

assimilated regional ice-ocean

stand-alone regional ice-ocean

Least constrained ice-ocean system

constrained at the coupling channel



-Oceanic constraint

-Coupling channels between component models

-Component models

Constraints within a FAMOS sea ice model hierarchy
Stand-alone global ice-ocean model

Most constrained ice-ocean system

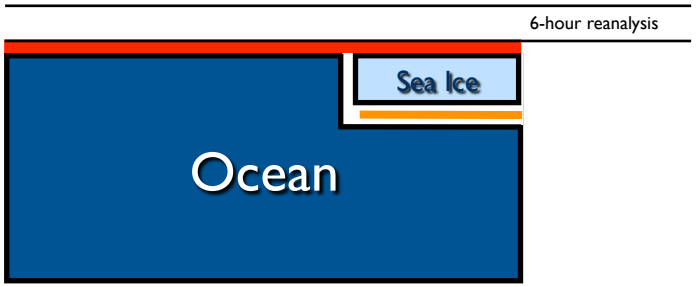
assimilated regional ice-ocean

stand-alone regional ice-ocean

global ice-ocean

Least constrained ice-ocean system

constrained at the coupling channel



-Oceanic constraint

-Coupling channels between component models

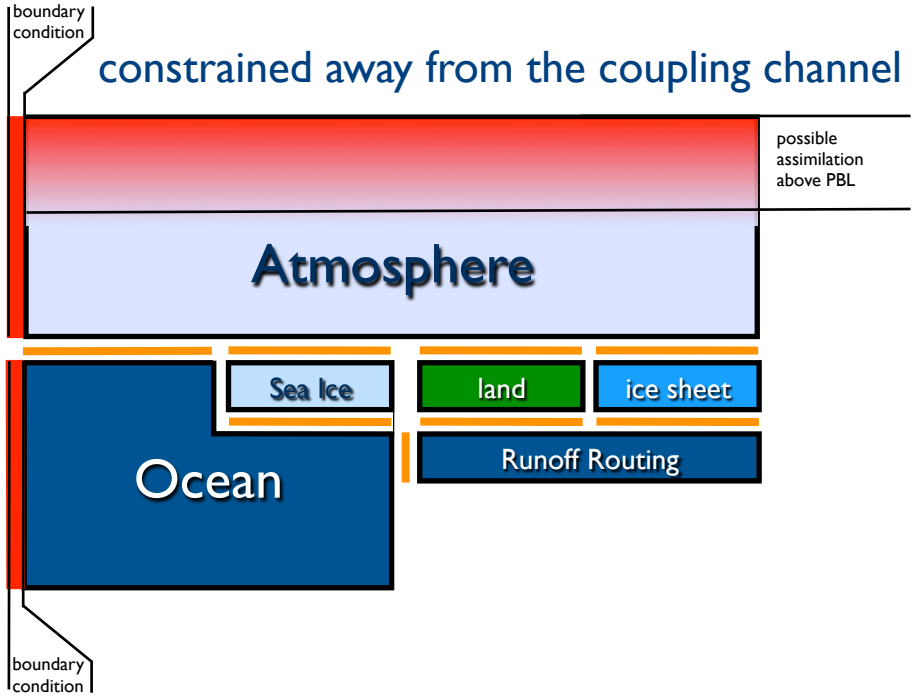
-Component models

Constraints within a FAMOS sea ice model hierarchy
Coupled regional model

Most constrained ice-ocean system

- assimilated regional ice-ocean
- stand-alone regional ice-ocean
- global ice-ocean
- coupled regional model

Least constrained ice-ocean system



-Atmospheric and Oceanic constraints

-Coupling channels between component models

-Component models

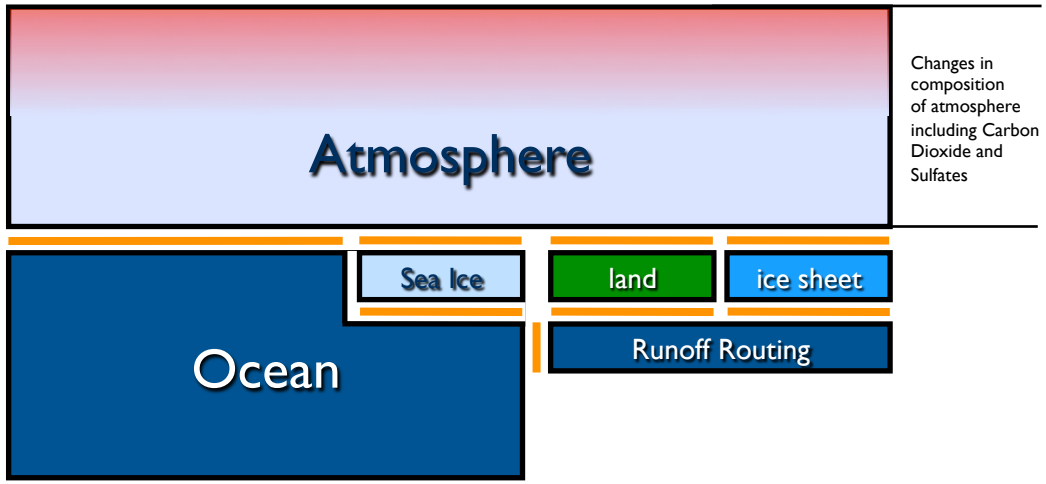
Constraints within a FAMOS sea ice model hierarchy
Coupled global model

Most constrained ice-ocean system

- assimilated regional ice-ocean
- stand-alone regional ice-ocean
- global ice-ocean
- coupled regional model
- coupled global model

Least constrained ice-ocean system

constrained away from the coupling channel

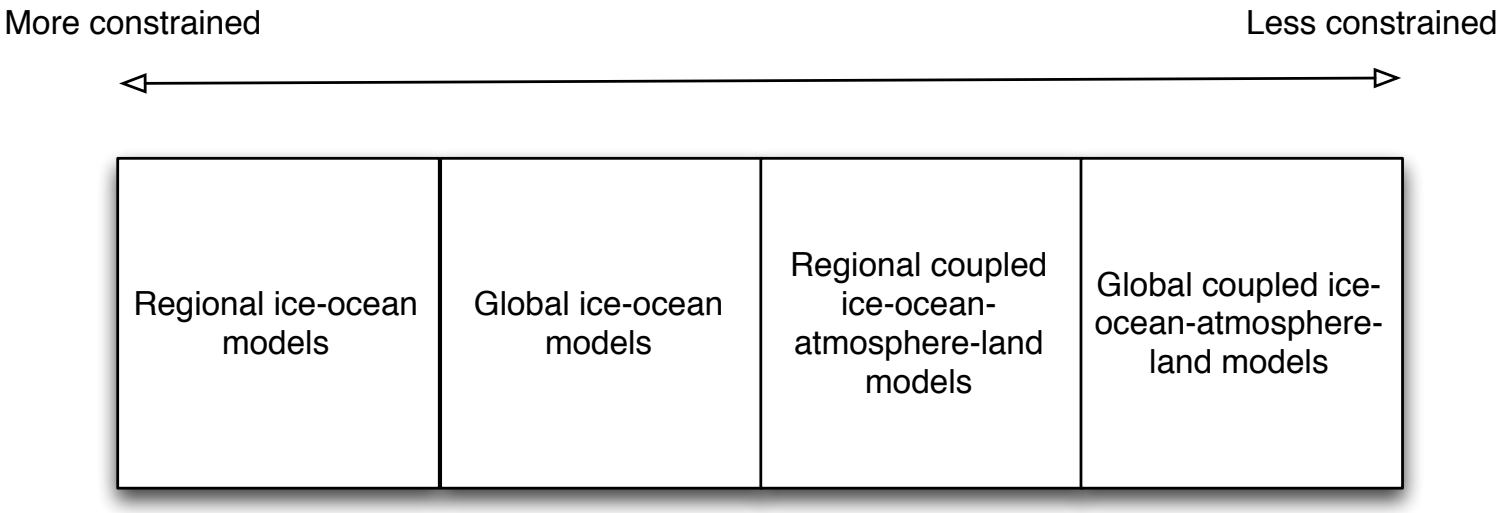


-Atmospheric constraint

-Coupling channels between component models

-Component models

Utilizing a FAMOS hierarchy of sea ice models



evaluate individual extreme events

evaluate statistics of internal variability

full feedbacks of atmosphere-ice-ocean interaction

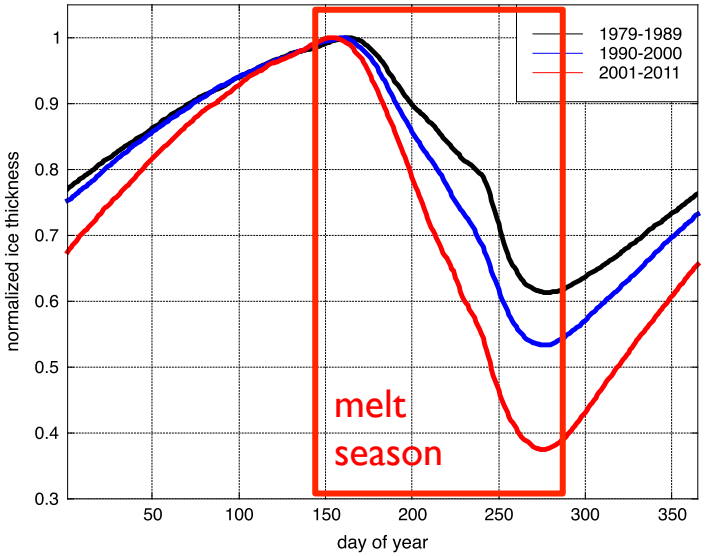
Some suggested physically-based metrics for which observations exist

In concert with a sparse set of metric on the basic performance of sea ice simulations, can we identify physically-based metrics meaningful across multiple model configurations, such as:

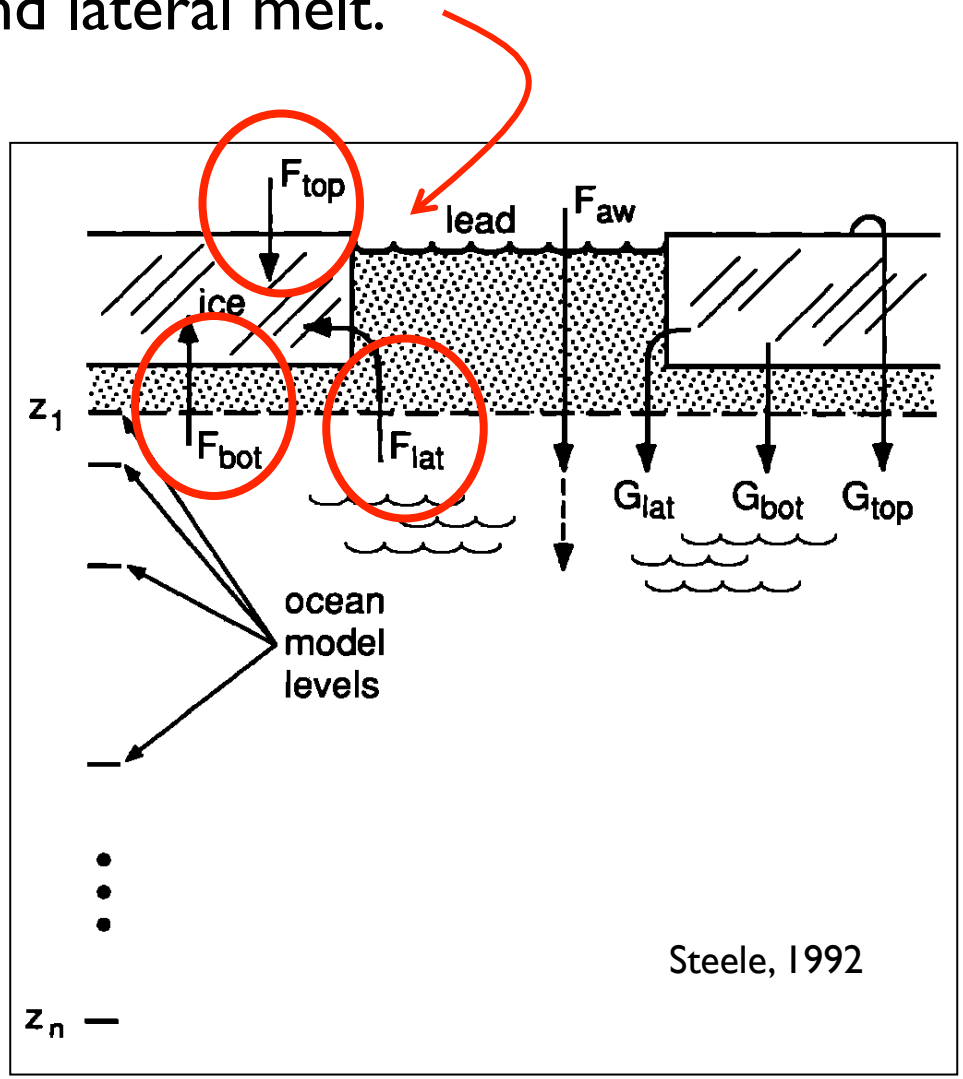
- Melt timing and melt rate

The trajectory of sea ice thickness during the melt season

is defined by surface, bottom, and lateral melt.



How does the partitioning between these affect the summer minimum?



Some suggested physically-based metrics for which observations exist

In concert with a sparse set of metric on the basic performance of sea ice simulations, can we identify physically-based metrics meaningful across multiple model configurations, such as:

- Melt timing and melt rate
- Sea ice mechanics scaling
- …

And should these consider atmospheric processes, e.g. radiation scheme?
What would the combined results from a FAMOS model hierarchy reveal using such metrics?