

Some logistics:

meeting web site

<http://ecco2.jpl.nasa.gov/meetings/2009/ECCO2/>
will eventually include presentations

coffee will be served outside meeting room

group picture at 12:30 pm

lunch at Chandler cafeteria

dinner at 7 pm

Buca Di Beppo

80 West Green Street

ECCO2 Meetings

<http://ecco2.jpl.nasa.gov/meetings/2009/ECCO2/> Google

NASA Jet Propulsion Laboratory California Institute of Technology

ECCO2 is a NASA Modeling, Analysis, and Prediction (MAP) project

Search ECCO2

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ECCO2
ESTIMATING THE CIRCULATION AND CLIMATE OF THE OCEAN, PHASE II:
HIGH RESOLUTION GLOBAL-OCEAN AND SEA-ICE DATA SYNTHESIS

PRODUCTS & DATA SERVERS MANUSCRIPTS & PUBLICATIONS MEETINGS & PRESENTATIONS PROJECT HIGHLIGHTS RESULTS & APPLICATIONS PEOPLE RELATED LINKS

ECCO2 Meeting, California Institute of Technology, Pasadena, 8-10 November 2009.

Agenda

Logistics

Caltech map

Dinner directions

USA.gov Government Made Easy - Privacy/Copyright - Freedom of Information Act

NASA Site Manager: Dimitris Menemenlis

ECCO2 meeting charge:

**Consensus science targets for last year of
ECCO2 project and beyond.**

**Technical road map in support of the science
applications.**

Status of CS510 solutions

Global Green's function optimization

Hong Zhang

Arctic ocean and sea ice optimization

An Nguyen

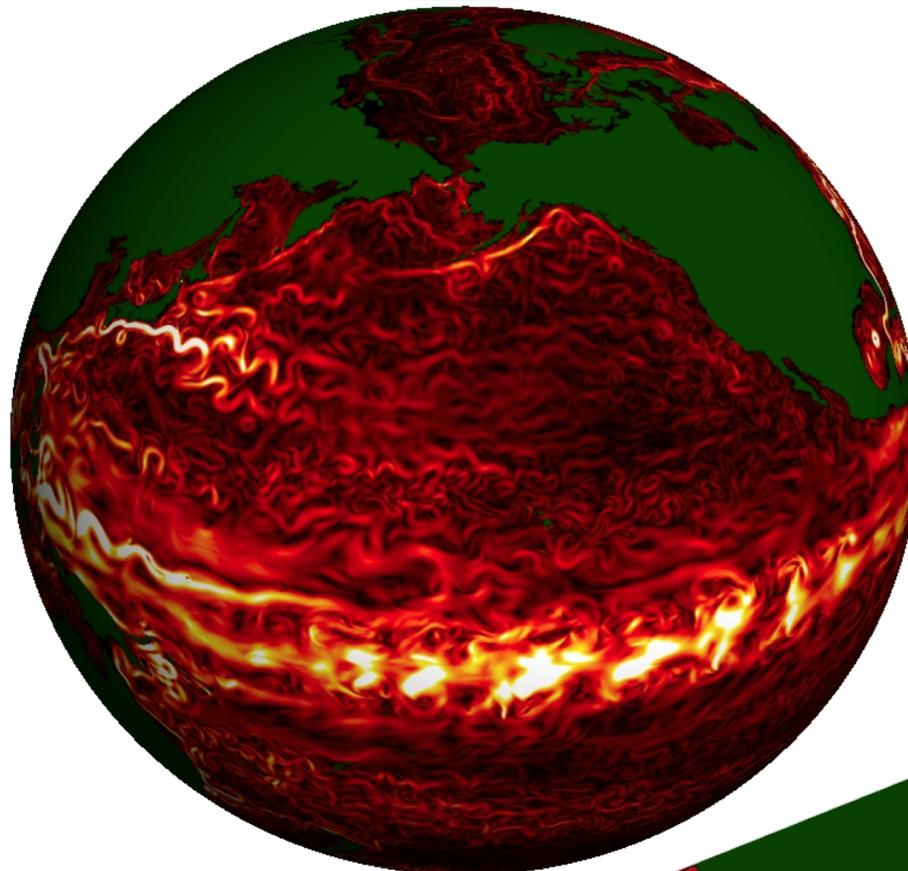
Antarctic ocean, sea-ice, and ice shelf optimization

Michael Schodlok

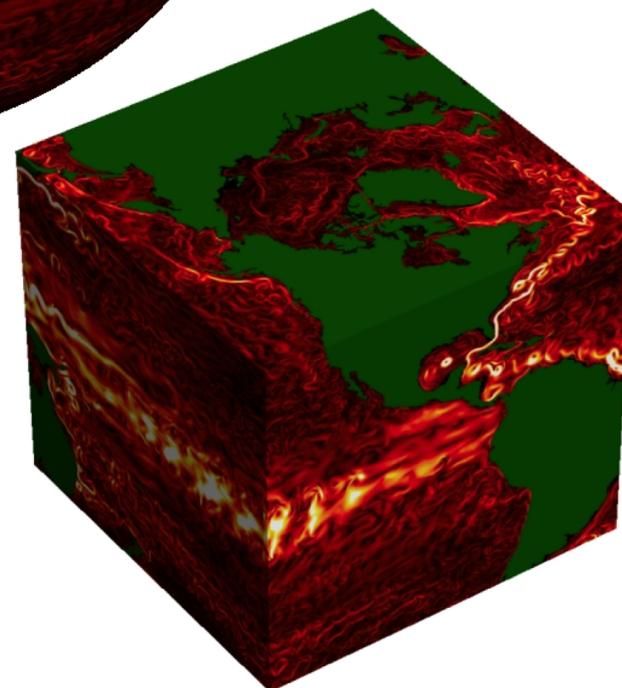
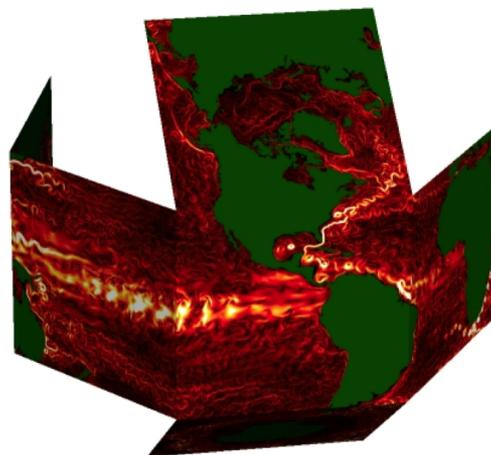
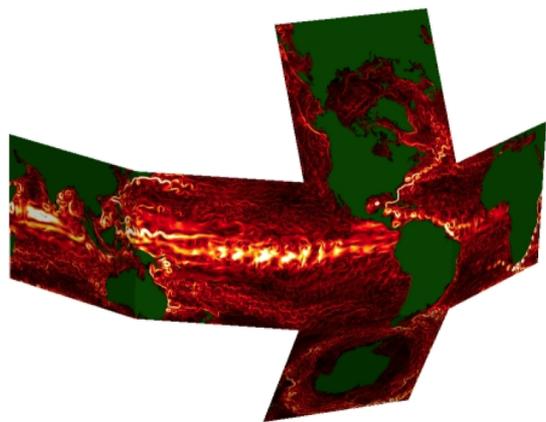
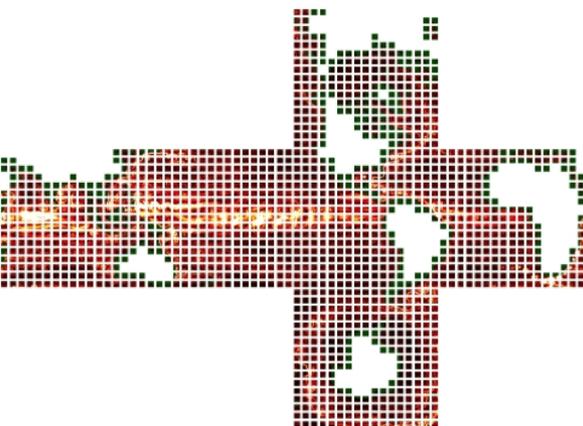
Wish list for forward CS510 solution

Adjoint-method optimization

H. Zhang, P. Heimbach, G. Forget & C. Hill



Speed at 15m



Global Green's function optimization (Hong Zhang)

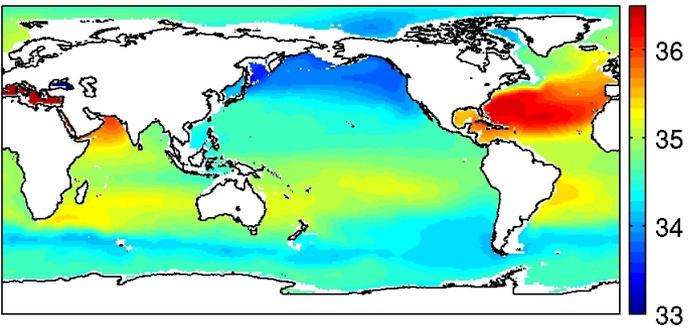
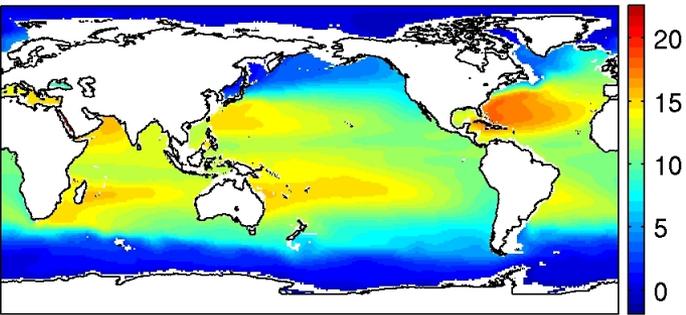
temperature

salinity

WOA05 pot. temp. in top 750 m ($^{\circ}\text{C}$)

WOA05 salinity in top 750 m (PSU)

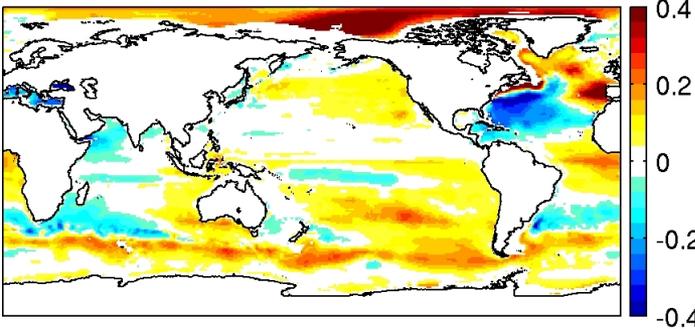
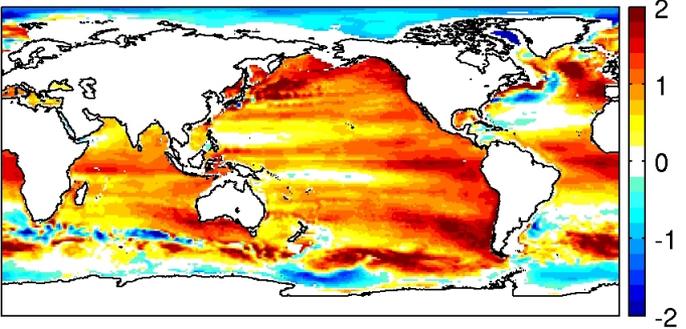
WOA05



baseline

ΔT of baseline wrt WOA05

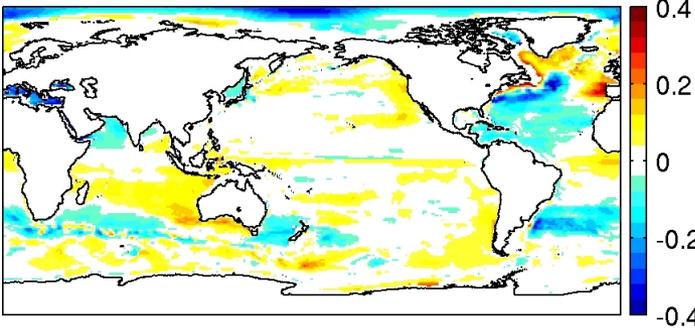
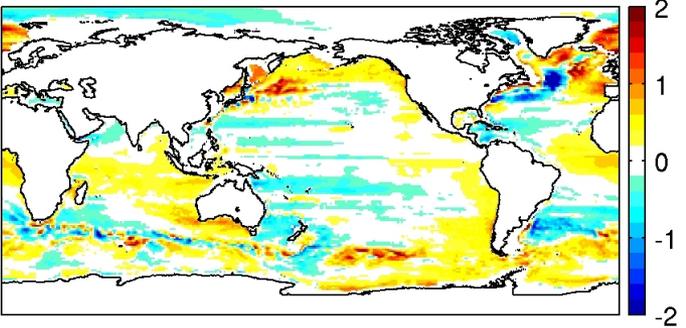
ΔS of baseline wrt WOA05



optimized

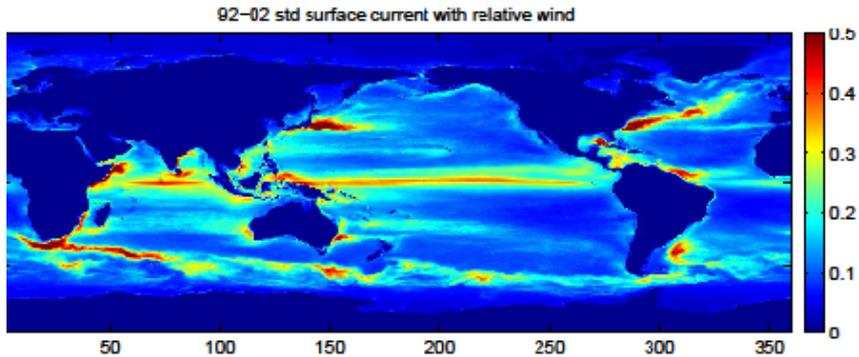
ΔT of optimized wrt WOA05

ΔS of optimized wrt WOA05

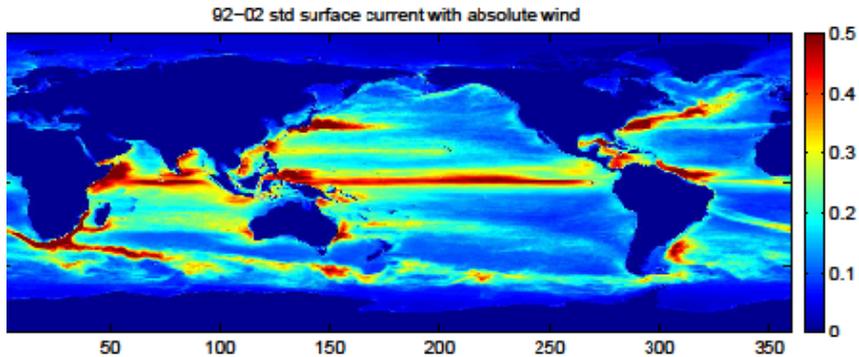


New since last year's meeting: CS510 integrations with relative-wind forcing

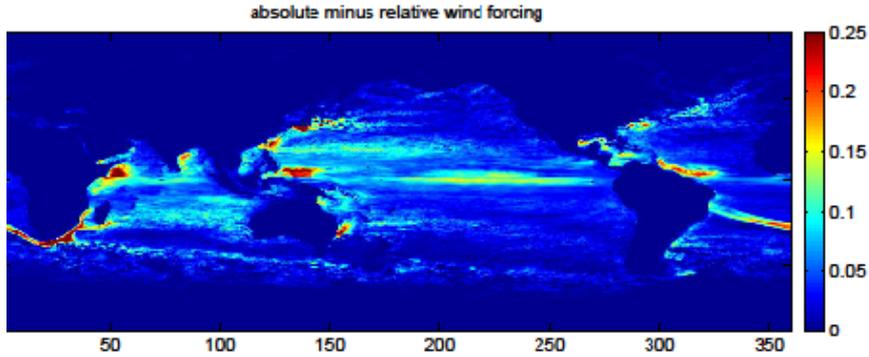
std of surface current speed with relative wind



std of surface current speed with absolute wind



absolute std minus relative std



30% reduction in the model kinetic energy

sink of ~ 0.2 TW of eddy kinetic energy

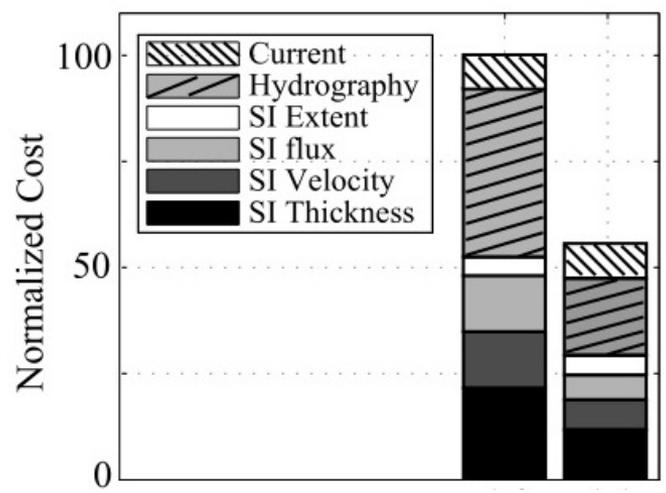
more realistic physics ... but eddies are substantially damped relative to altimetry

resolution or surface wind stress parameterization problem?

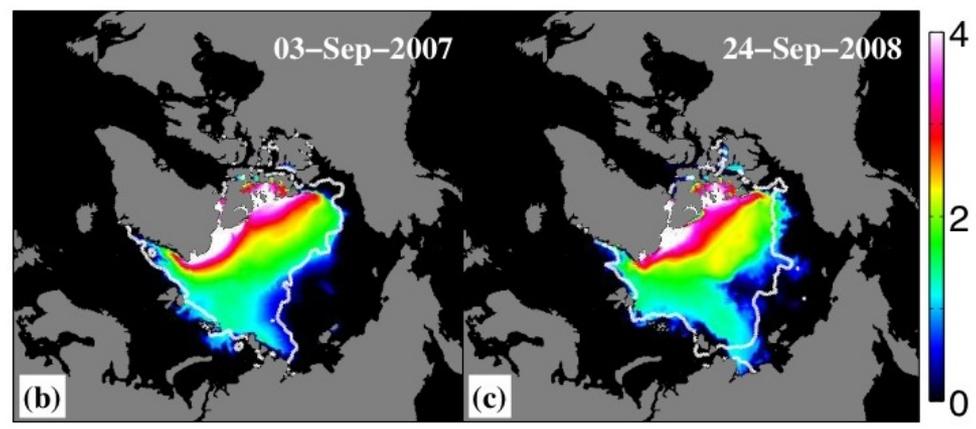
... more on this by David Moroni tomorrow

Arctic ocean and sea ice optimization (An Nguyen)

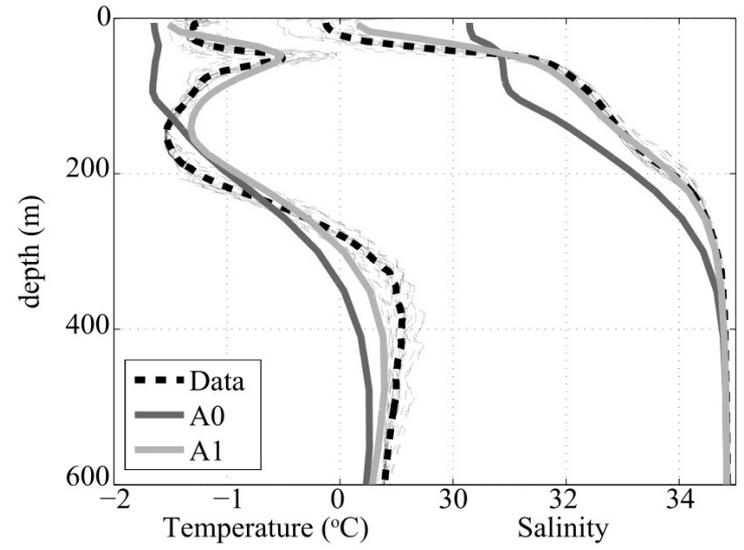
Arctic cost function reduction



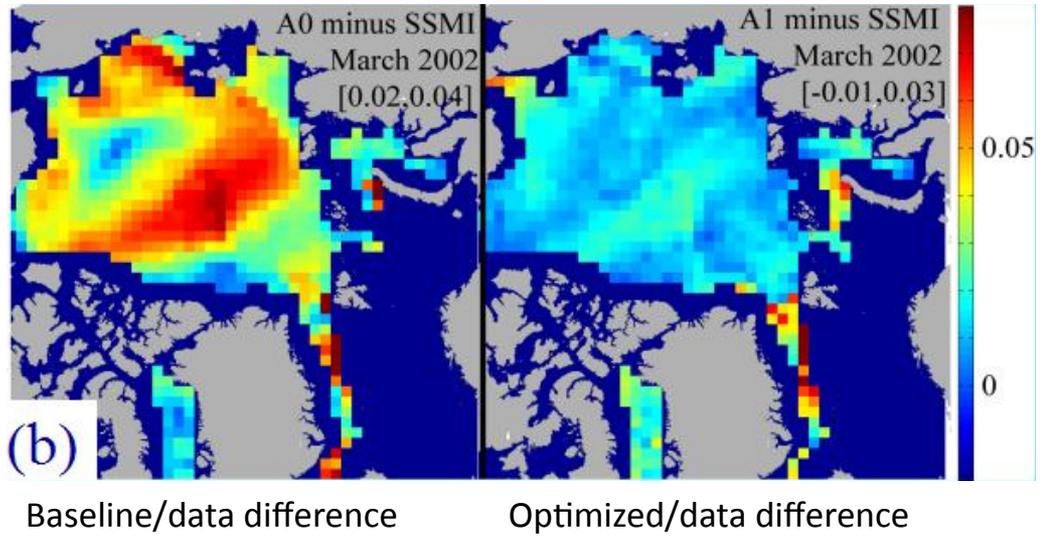
2007-2008 summer sea ice minima



Canada Basin Hydrography



Sea ice velocity comparison with SSM/I



New since last year's meeting: Arctic optimization based on JRA25

A change from ERA40 to JRA25 has a significant positive effect on the Arctic Ocean model solution.

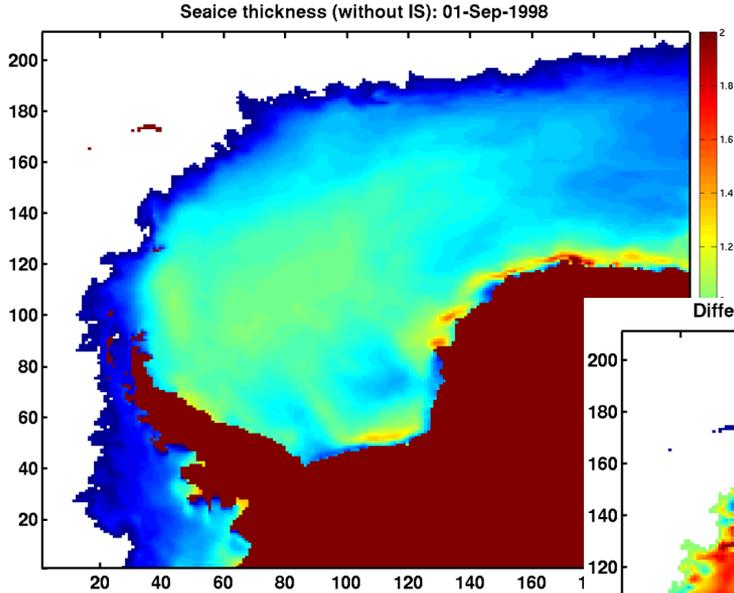
Specifically, ERA40 overestimates downward shortwave radiation at the surface in high latitude regions.

As a consequence, optimized albedos in experiments with ERA40 atmospheric boundary conditions are artificially increased to compensate for the excess downward shortwave radiation.

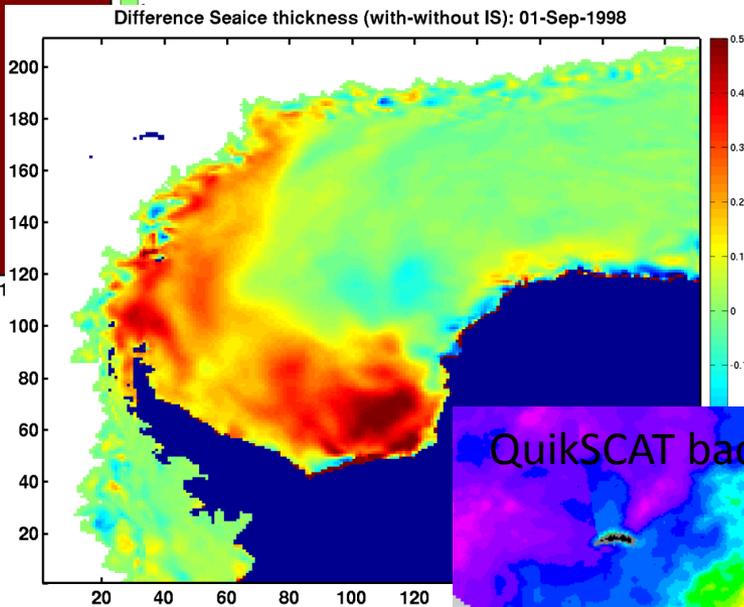
JRA25 has more realistic low-level clouds compared to ERA40 and therefore more realistic incoming radiation.

This results in more realistic optimized albedo values, which in turn lead to significantly improved sea ice thickness.

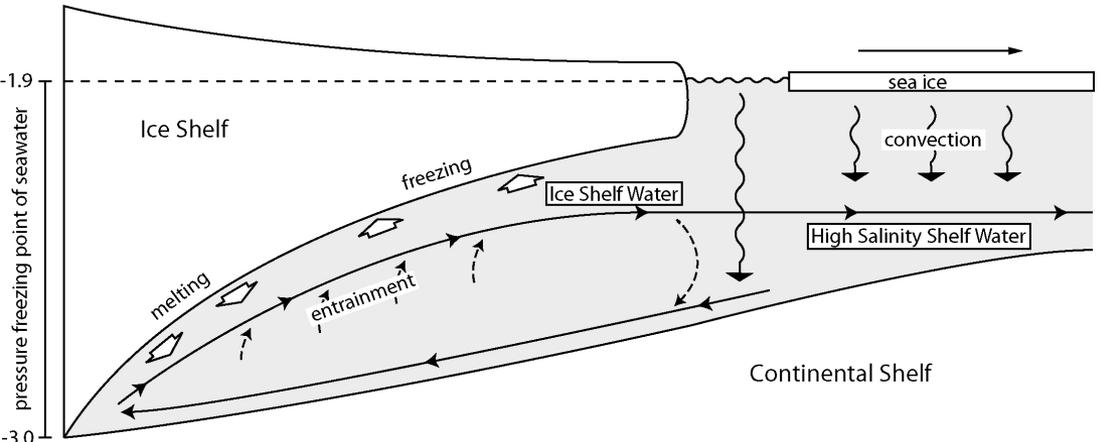
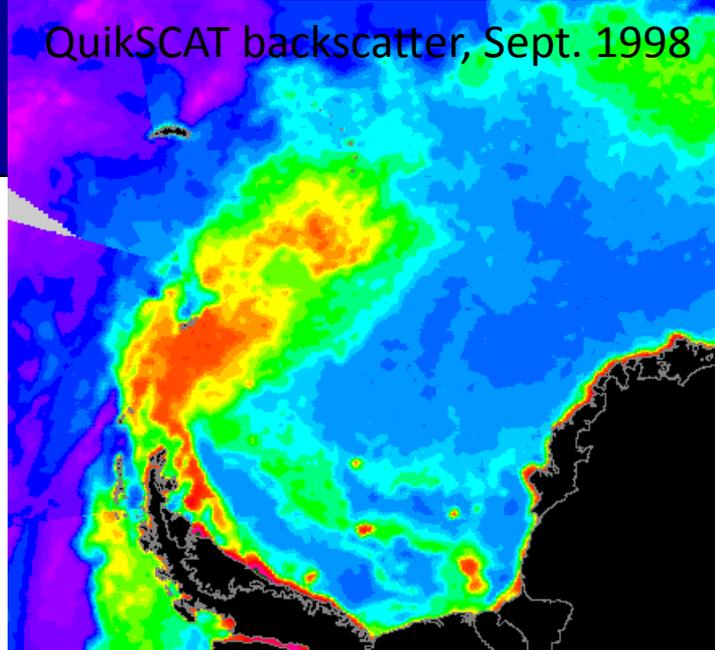
Antarctic ocean, sea-ice, and ice shelf optimization (Michael Schodlok)



Sea ice thickness without ice shelf



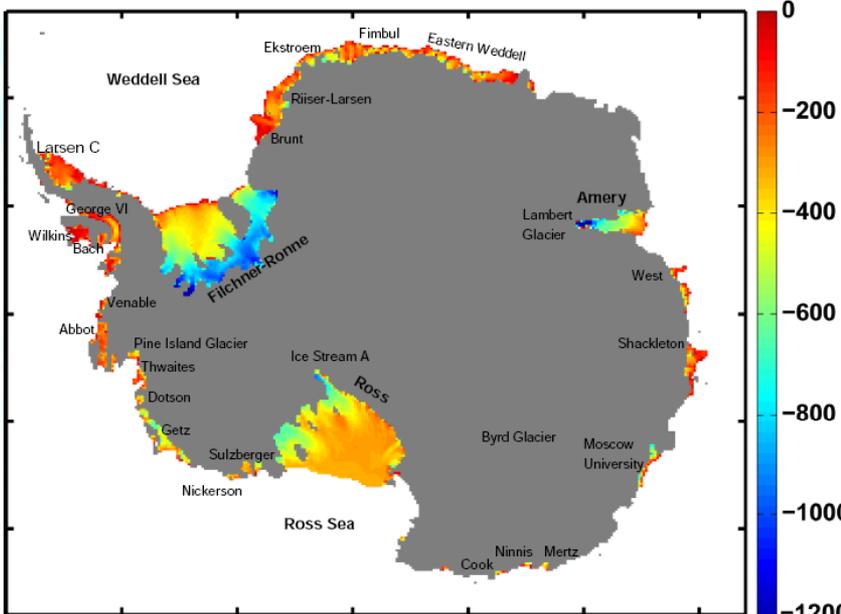
Additional sea ice thickness due to ice



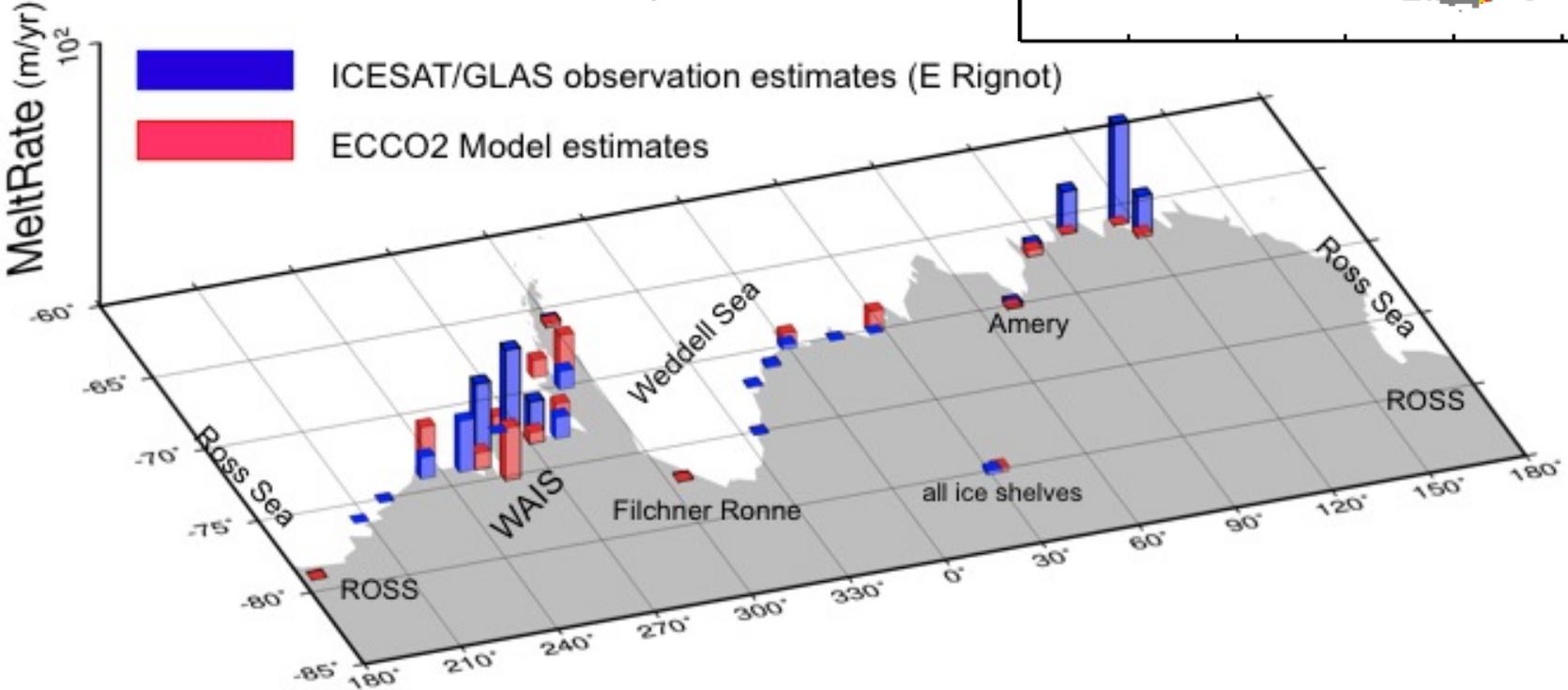
New since last year's meeting: Modeling of all ice shelves around Antarctica

- aim to:
- incorporate in global simulations,
 - use for paleo studies, and
 - couple with a land ice model.

Antarctic ice shelf thickness (m)



Melt rate dh/dt 2004 (m/yr)



Wish list for CS510 forward integrations

- incorporate optimized Arctic and Southern Ocean optimized solutions
- more (budget terms) and higher frequency diagnostics in support of science applications
- improved Indonesian throughflow bathymetry (Tong Lee)
- experiment with JRA25 and ERA-interim
- improved surface wind stress parameterization based on sea state and surface currents
- more vertical levels (Michael Schodlok)
- bottom boundary layer or extension of downslope package for shaved cells
- adjustment and adoption of Baylor's submesoscale parameterizations
- adjustment and adoption of Winton thermodynamics
- tides
- ...

CS510 adjoint-method optimization

(H. Zhang, P. Heimbach, G. Forget & C. Hill)

The technical centerpiece of the ECCO2 project is an adjoint-method optimization of the global, eddying CS510 MITgcm configuration.

Most of the CS510 development effort since the last ECCO2 meeting has gone towards development of a global, eddying, adjoint-method solution, as will be discussed by Hong Zhang, next.