CORE experiments

Rüdiger Gerdes

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Common Ocean Reference Experiments

The CLIVAR Working Group on Ocean Model Development (WGOMD) has decided to establish experimental protocols for a series of "Co-ordinated Oceanice Reference Experiments" (CORE) that can become the basis for PI driven collaborations between groups and potentially serve as a basis of a broader ocean model intercomparison activity of the AMIP/CMIP class at some future date.

Common Ocean Reference Experiments

Part of this initiative was the generation of global forcing data sets for ocean-sea ice model integrations. CORE will use the recently developed merged NCEP reanalysis / remote sensing data set of Large and Yeager (2004) as forcing. The dataset is well documented, comprehensive, globally balanced, and includes both a "normal year" and interannually varying forcing.

Documentation can be found at
http://data1.gfdl.noaa.gov/nomads/forms/mom4/CORE.html

Common Ocean Reference Experiments

The experiments specified in the CORE framework include:

- a normal year forcing control
- an interannually varying forcing
- and a special climate perturbation experiment addressing the response to a perturbation in freshwater fluxes over the sub arctic Atlantic

Data sets

http://data1.gfdl.noaa.gov/nomads/forms/mom4/CORE.html

This web page contains the following datasets:

- Uncorrected Normal Year Forcing (unCNYF) fields
- Uncorrected Interannual Forcing (unCIAF) fields
- Corrected Normal Year Forcing (CNYF) fields
- Corrected Interannual Forcing (CIAF)

Uncorrected -> corrected via advance.f90 or ferret (script make_data.csh)

Normal year

Similar to the OMIP data set (Röske, 2005; low pass plus variability of a selected year, here 1995)

Criteria:

- Seasonal cycle
- Realistic propagation of “weather“ (turbulent flux associated with storms)
- Climatological average fluxes the same as with interannually varying forcing
- Smooth transition from end to start of the year
- Not overly weighted to any individual year

Large & Yeager (2004) data set

- Based on NCEP/NCAR reanalysis 1948-2002:

- U,V(10m), Θ(2m), q(2m), SLP at 6h interval on T62 grid

- Θ(2m), q(2m) are shifted from the reanalysis height of 2m to match the wind height of 10m

- Short-wave insolation Q_I and downwelling long-wave radiation Q_A from ISCCP 1983-2002, daily means, mapped to NCEP grid, extended back in time using climatological annual cycle of daily means
- Precipitation blend of Xie & Arkin, GPCP (tropics), and ‘Serreze‘ (Arctic); mapped to T62 and extended back
- Run-off: Annual mean climatology (Baumgartner & Reichel, distribution according to Perry et al.)

Large & Yeager (2004) data set

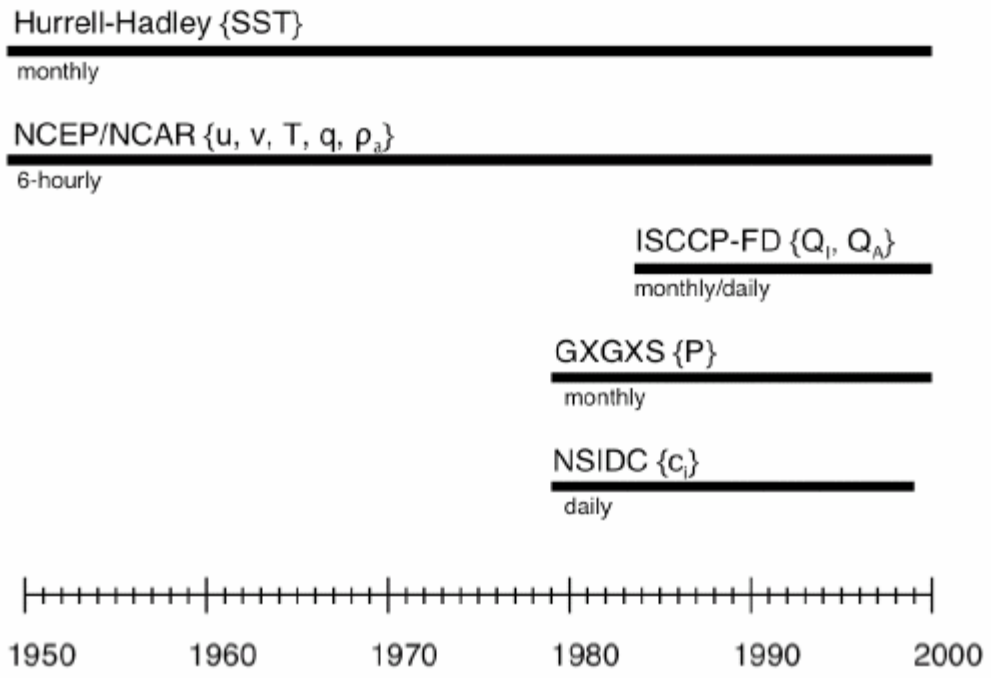

Figure 2: Timeline showing the availability forcing data sets and their frequency. Various precipitation data sets are available from 1979 to 2000.

Large & Yeager (2004) data set

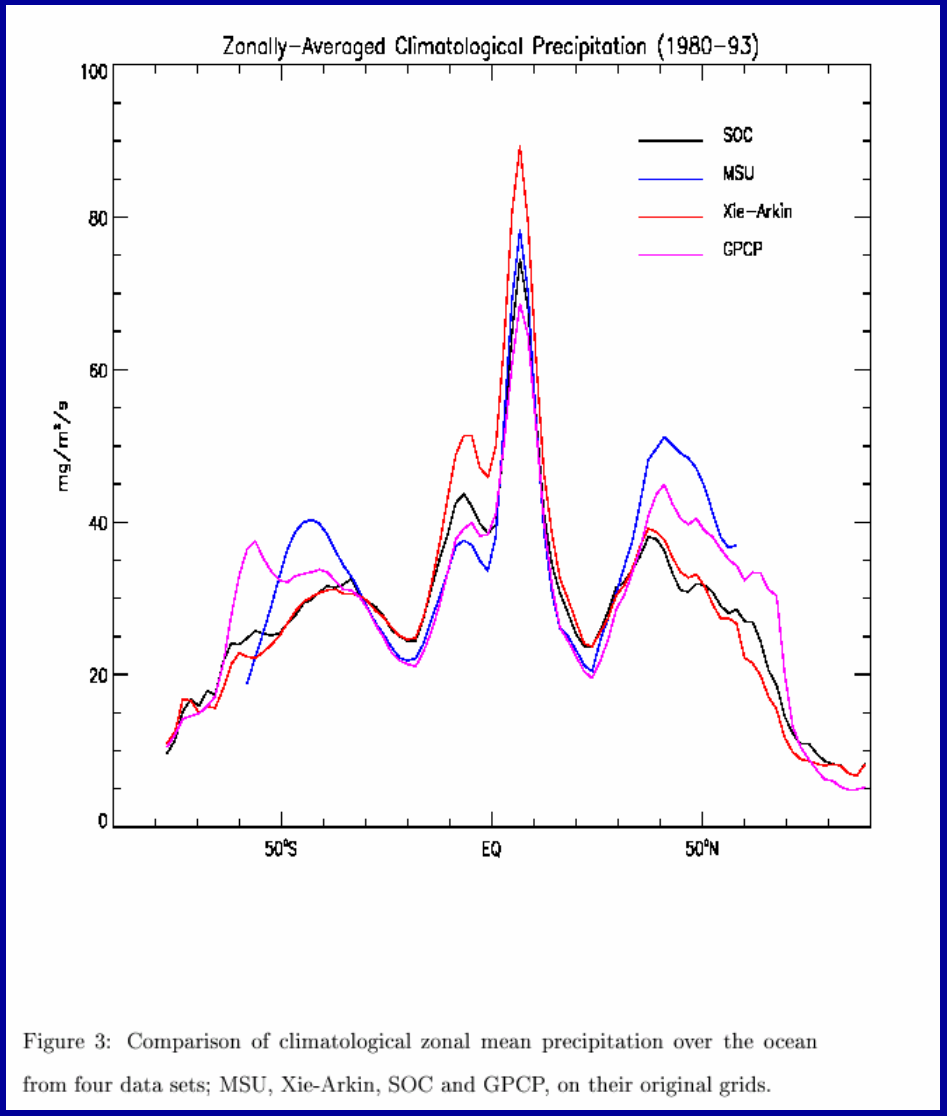

Figure 3: Comparison of climatological zonal mean precipitation over the ocean from four data sets; MSU, Xie-Arkin, SOC and GPCP, on their original grids.

Large & Yeager (2004) data set

BASIN	RUNOFF (1000 kg/s)	NUMBER OF RIVERS	RIVER RUNOFF	COASTAL RUNOFF
Eurasia - Arctic	138574	17	65216	53%
N. America - Arctic	52441	4	9014	83%
N. America- Atlantic	81114	51	37686	53%
Europe - Atlantic	50593	21	4115	5%
S. America- Atlantic	280381	20	266948	5%
Africa - Atlantic	91538	17	54249	41%
Africa - Indian	15146	9	5202	64%
Asia - Indian	87443	13	72781	16%
Asia - Pacific	153972	26	95286	38%
N. America - Pacific	35587	19	24730	31%
S. America - Pacific	59591	16	5860	90%
Australia - Southern	75000	28	1721	98%
Antarctica - Southern	73000	0	0	100%
Mediterranean	12840	4	5689	56%
Caspian Sea	14301	0	0	100%
Black Sea	9425	3	7996	16%
Persian Gulf/Red Sea	2486	1	1445	42%
Baltic Sea	4669	9	2524	54%
Hudson Bay	20883	17	10027	52%

Table 1: Climatological runoff from 19 continental drainage basins, including the guaged flow from a number of major rivers, and the percentage of the total attributed to coastal, or other rivers. The total runoff is $1.26x10^9 kg/s = 1.26Sv$.

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Corrections

- Correction of low bias in NCEP winds using QuikScat scatterometer winds
- Lowering NCEP relative humidity
- Correction of cold bias south of 60^{o}S
- Correction of annual cycle north of 60^{o}N according POLES
- Reduction of ISCCP shortwave radiation between 50^{o}S and 30^{o}N and north of 70^{o}N (to improve CCSM sea ice thickness!)
- Adjustment of precipitation for global water budget

Corrections: Wind speed

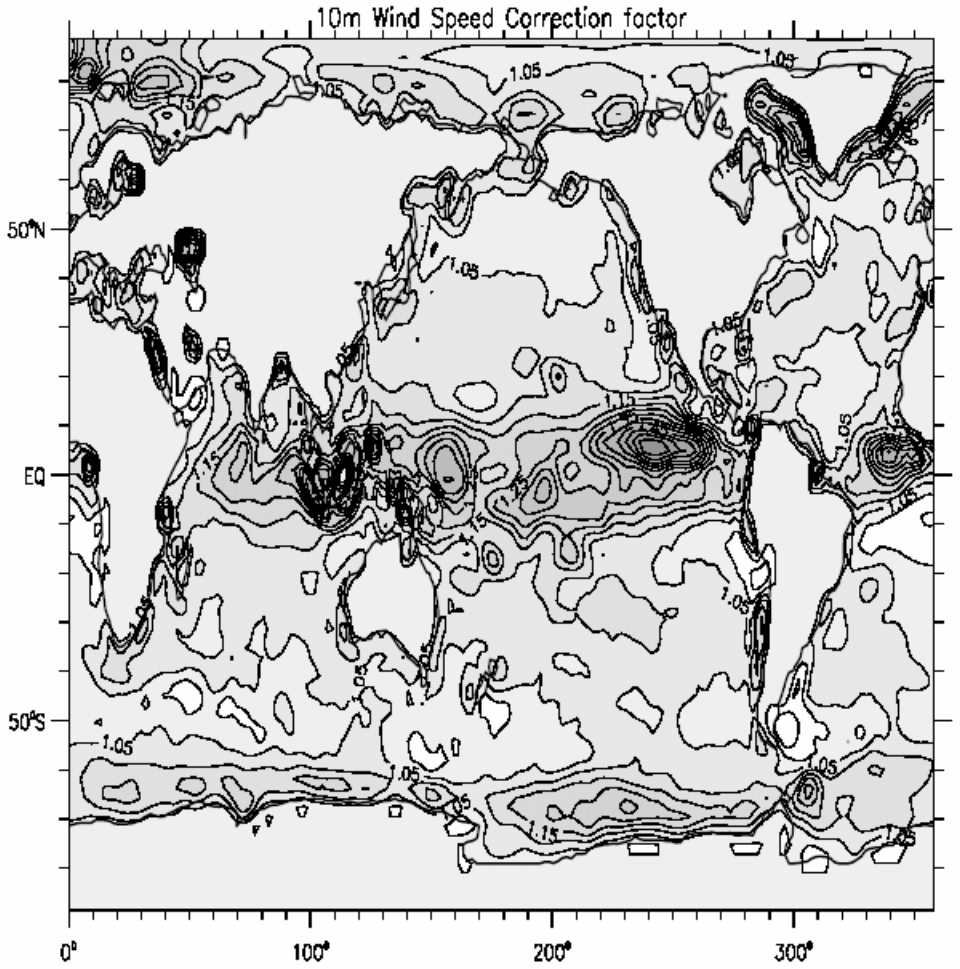

Figure 6: Ratio of two-year (2000-2001) mean QSCAT and NCEPR wind speeds. Contour interval is 0.05. The ratio has been smoothed once with a 3x3 box filter. Values above 1 are shaded.

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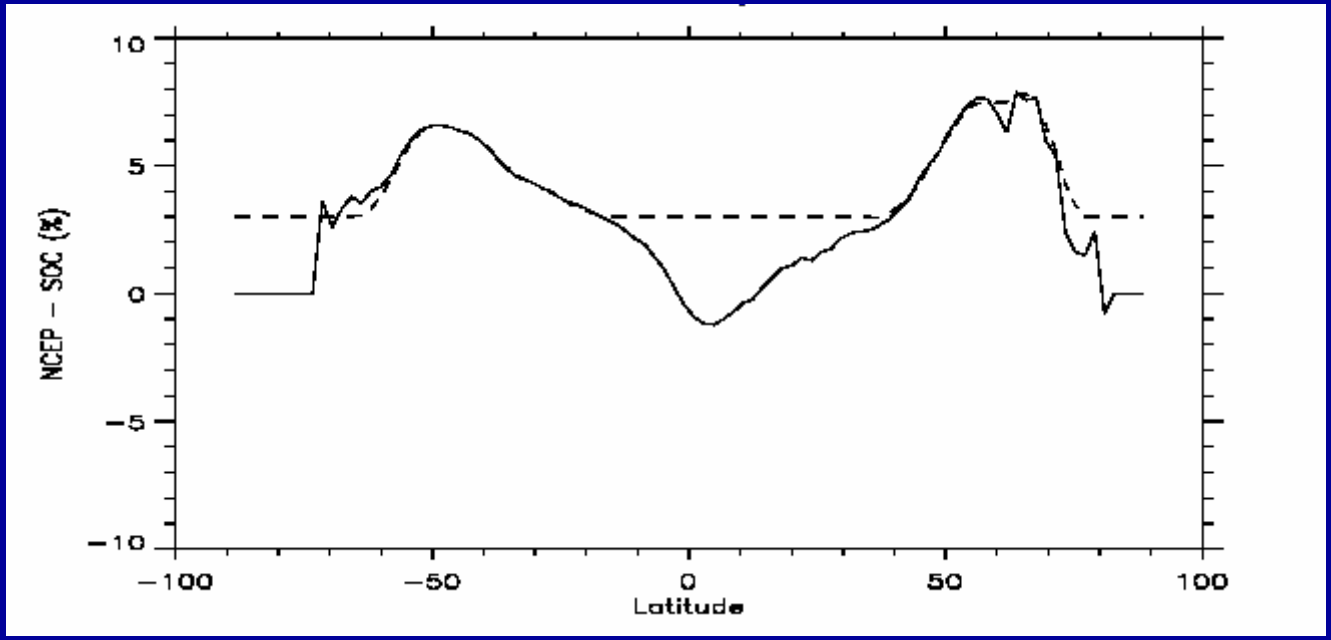
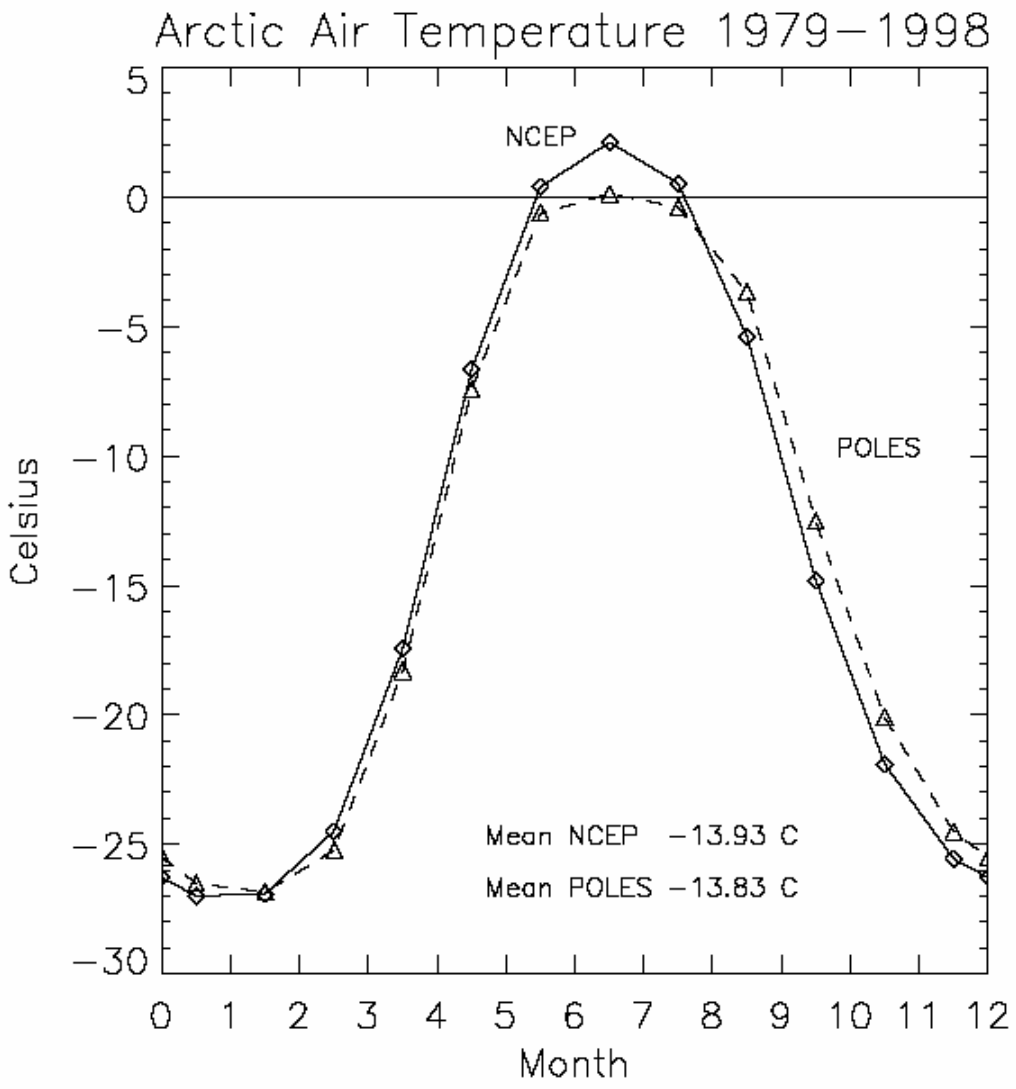
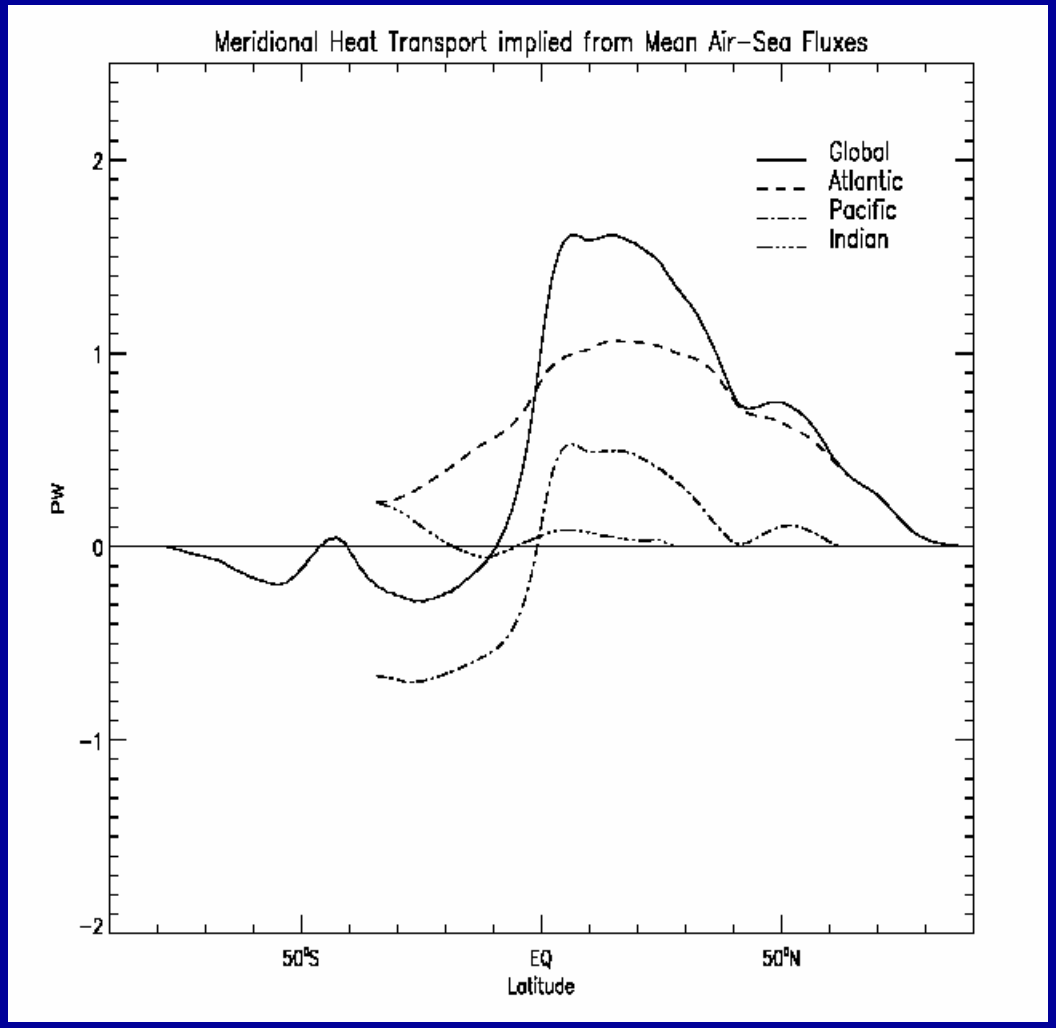
Corrections: Relative humidity



Corrections: Arctic SAT



Implied transports: Heat



Implied transports: Fresh water