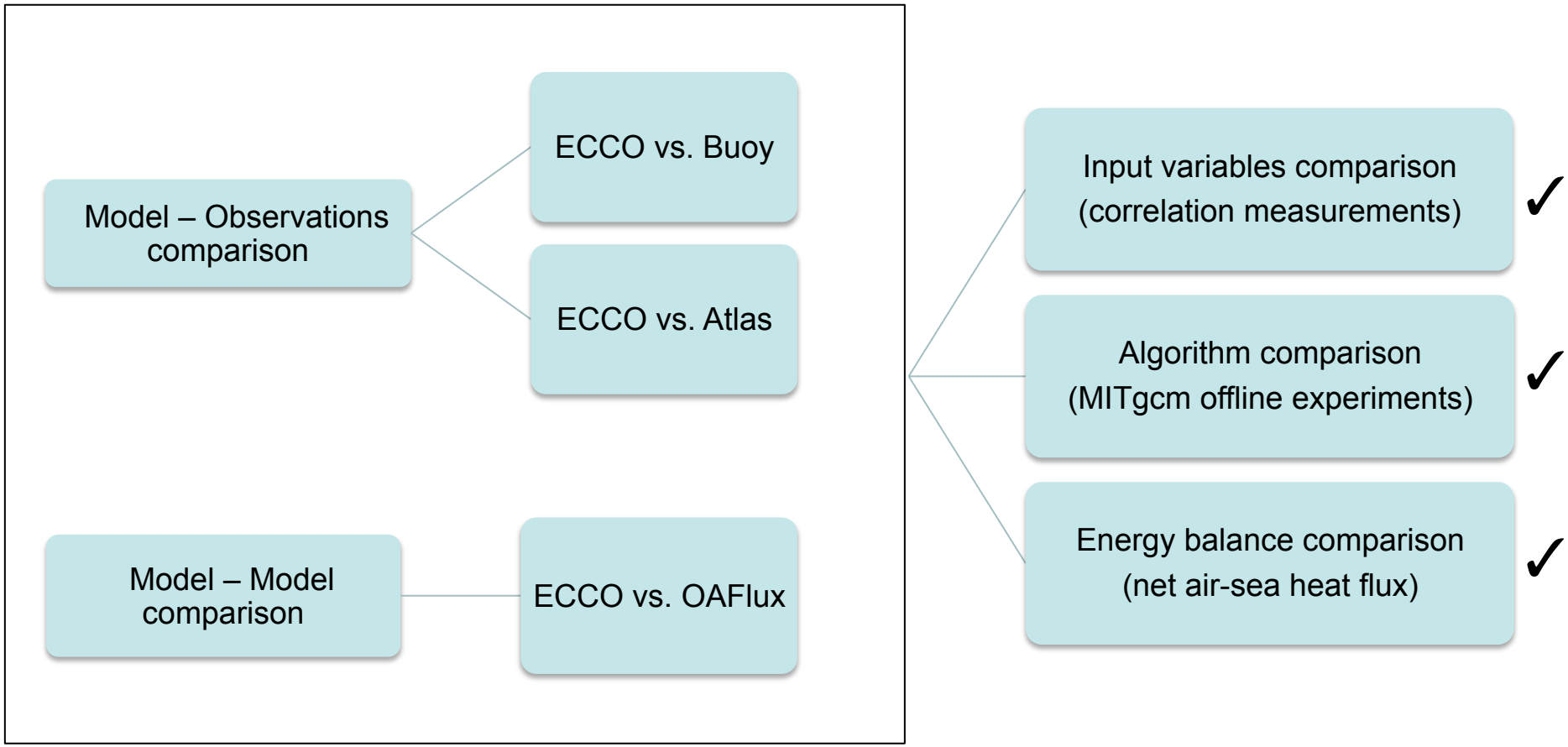
Intercomparison of ECCO and other products surface flux estimates

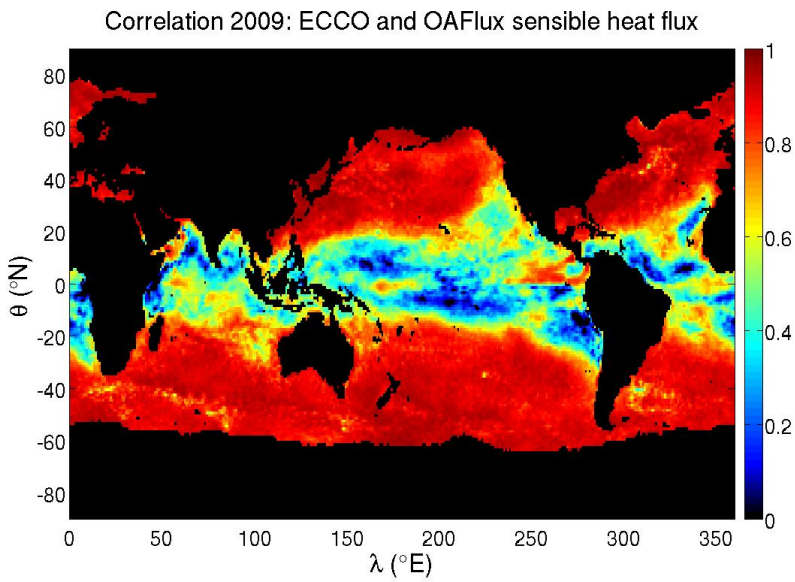
Veronica Nieves

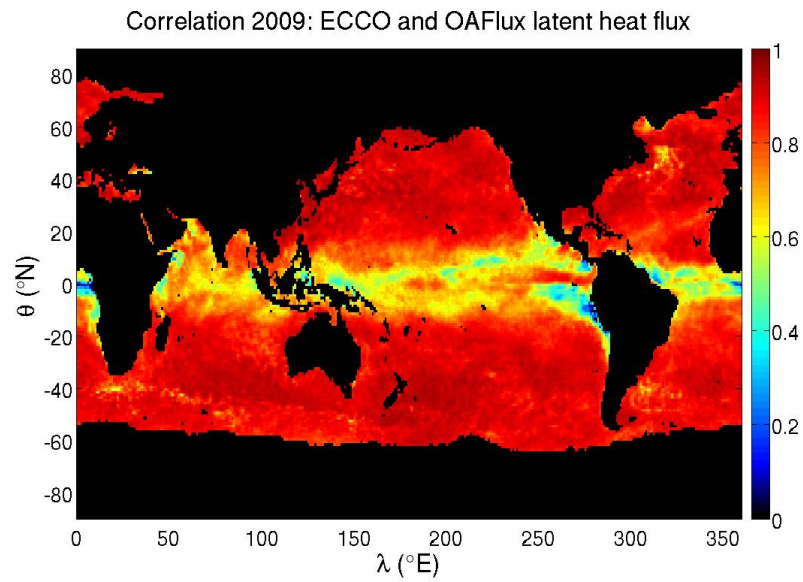
ECCO group meeting, JPL

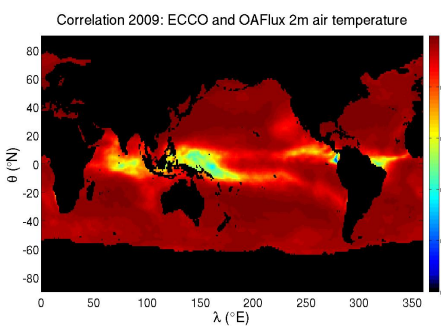
May 23rd, 2012

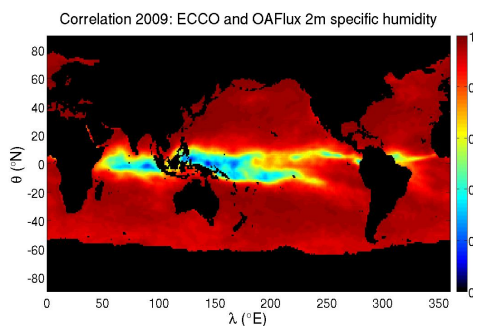

Model – Observations comparison
ECCO vs. Buoy
ECCO vs. Atlas
Model – Model comparison
ECCO vs. OAFlux
Input variables comparison (correlation measurements)
✓
Algorithm comparison (MITgcm offline experiments)
✓
Energy balance comparison (net air-sea heat flux)
✓

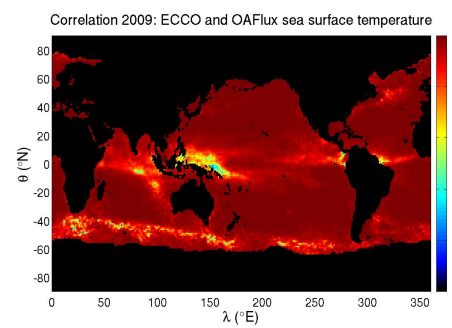
Input variables comparison
(correlation measurements)

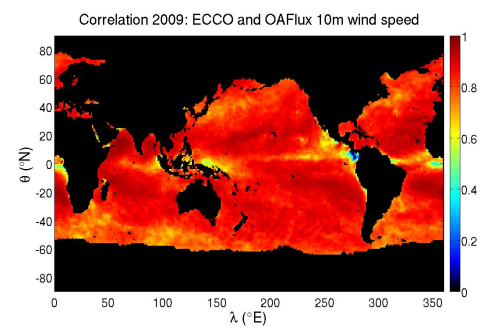






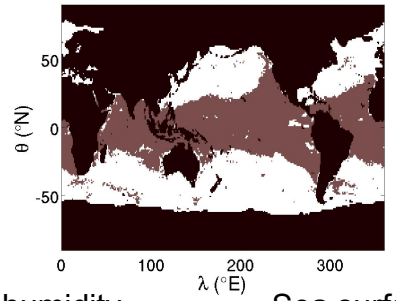




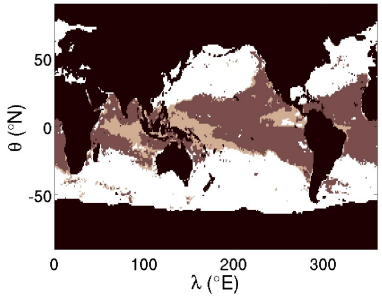


Input variables comparison
(correlation measurements)

Sensible heat flux

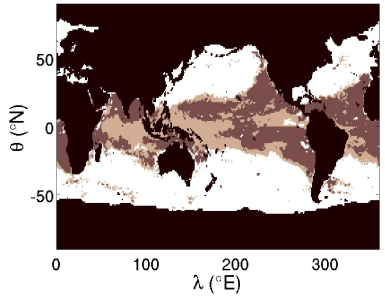


2m air temperature



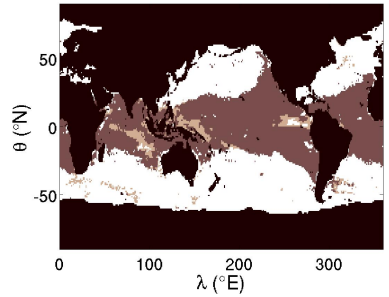
22.26%

2m specific humidity



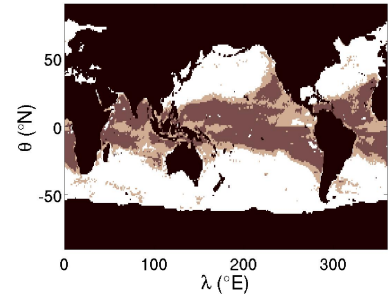
40.54%

Sea surface temperature



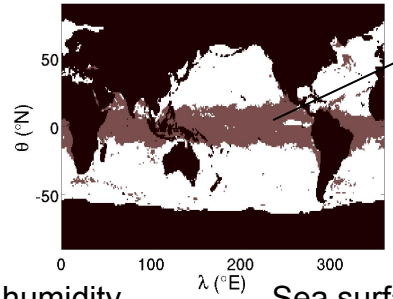
10.51%

10m wind speed



40.31%

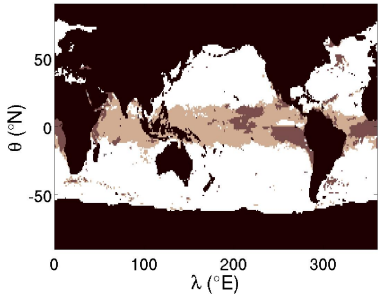
Latent heat flux



$\rho = 0.3$

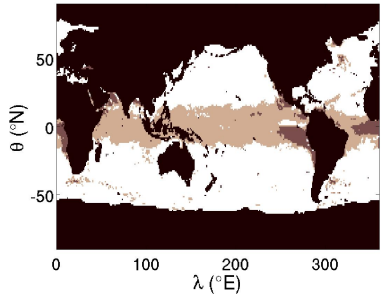
ρ € [0.204,0.39]
with 95% of confidence

2m air temperature



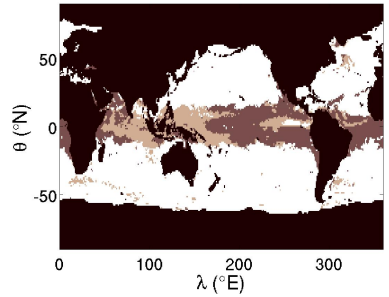
70.31%

2m specific humidity



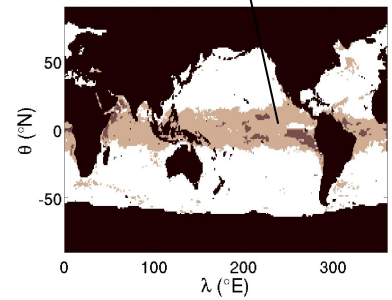
83.89%

Sea surface temperature



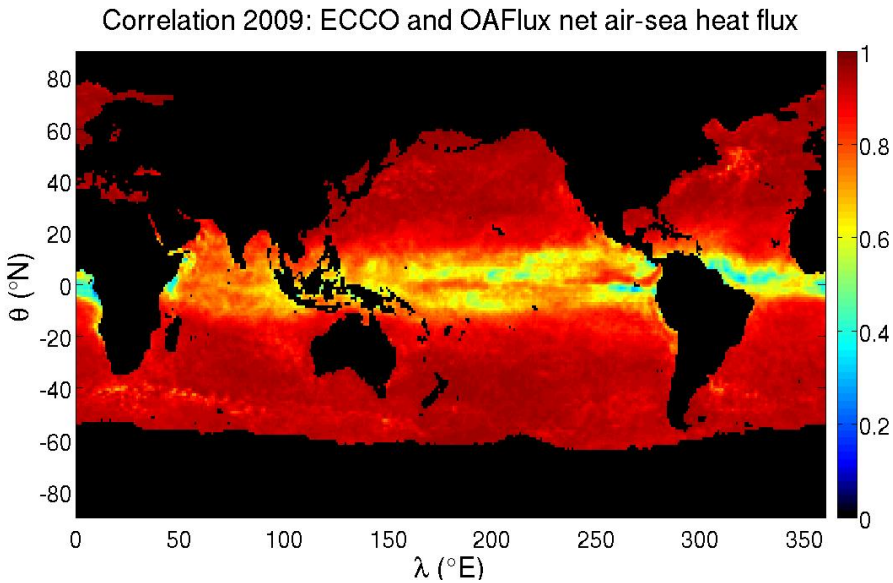
38.80%

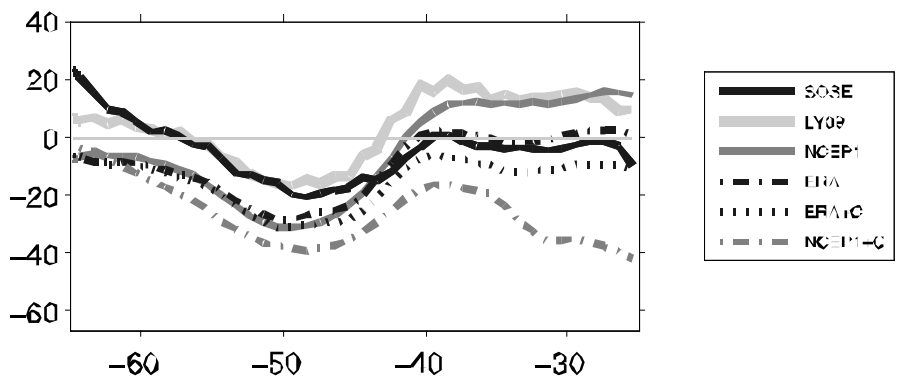
10m wind speed

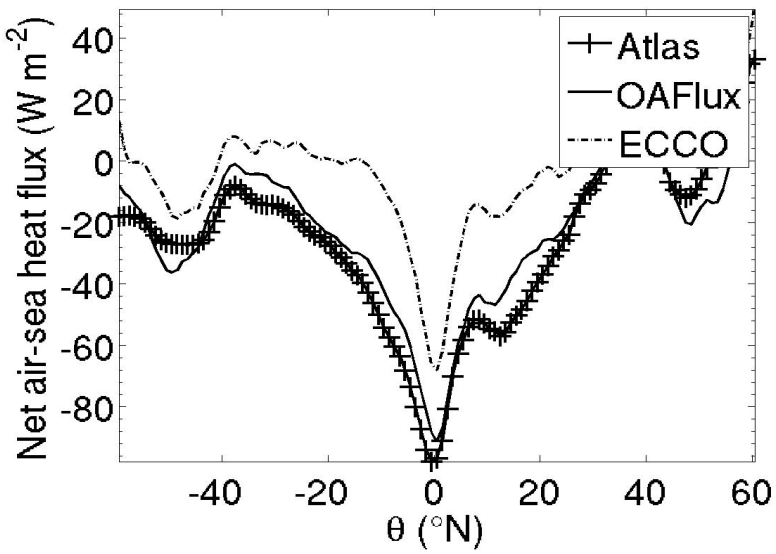


89.86%

Energy balance comparison
(net air-sea heat flux)

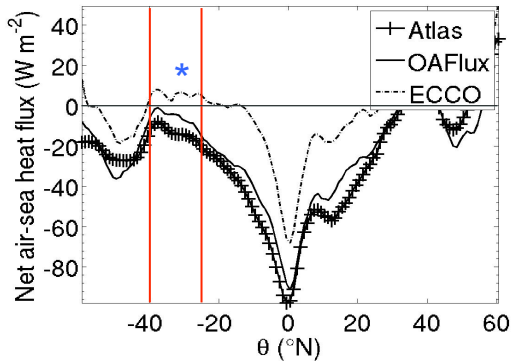


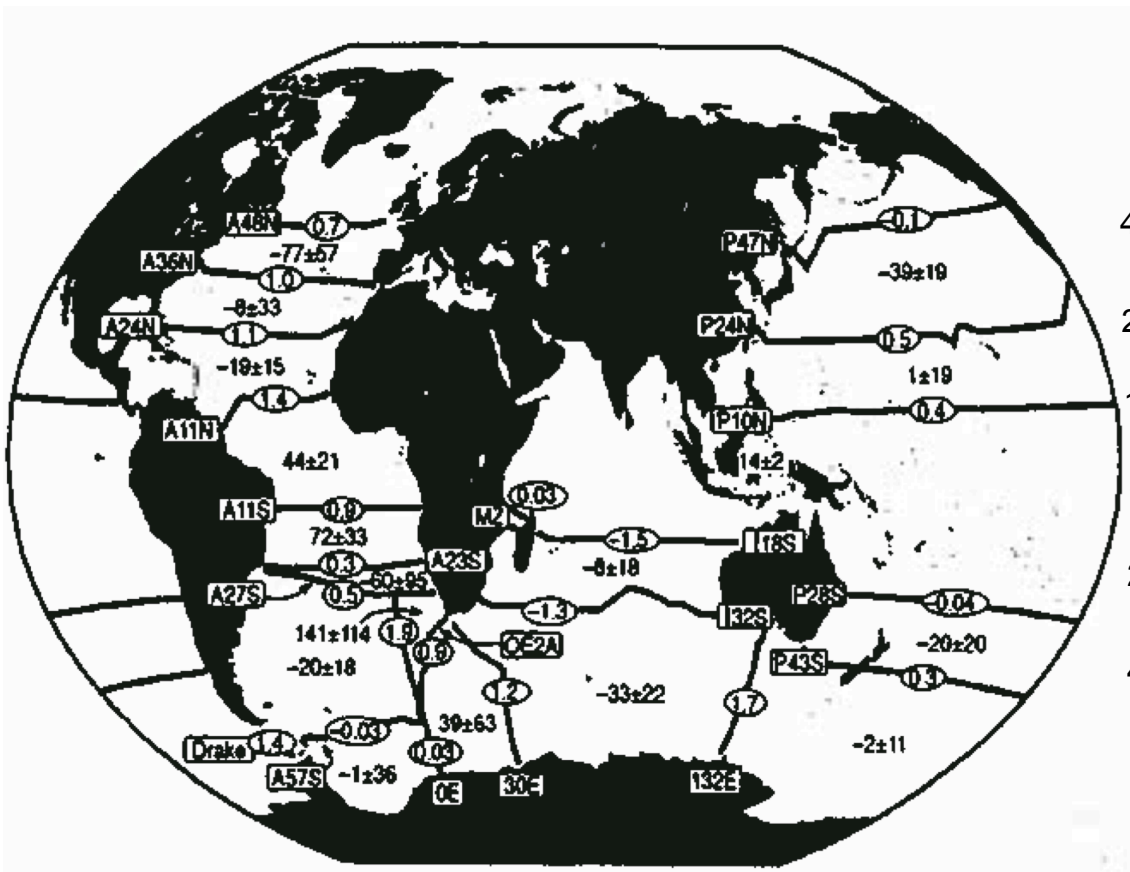




I. Cerovecki, L.D. Talley, and M. R. Mazloff. *J. of Climate*, 2011.

Energy balance comparison
(net air-sea heat flux)





A.M. Macdonald and C. Wunsch. *Nature*, 1996.

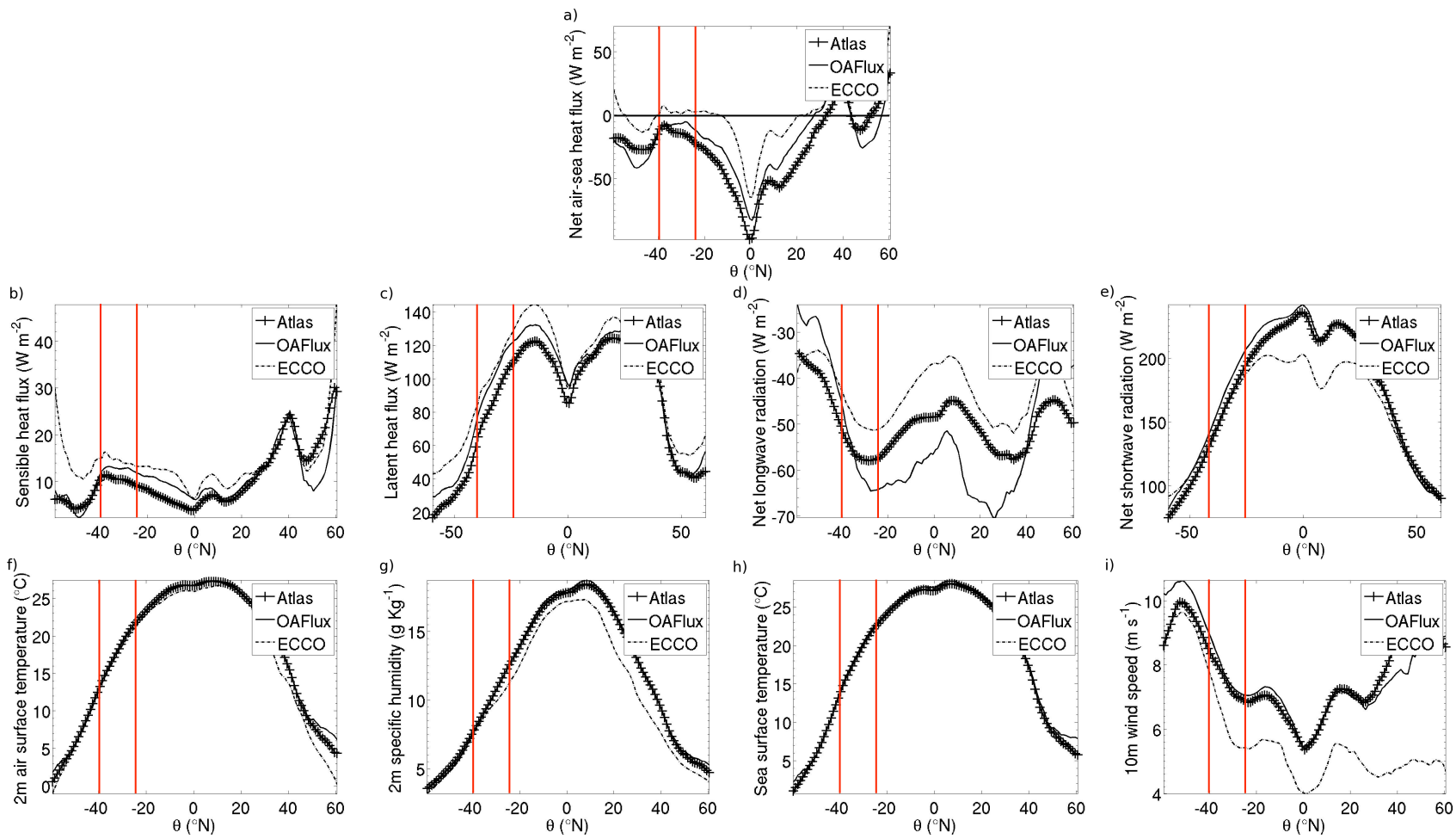
40N
24N
10N
10S
24S
40S

Net heat loss in N Atlantic and Pacific Oceans (divergence)

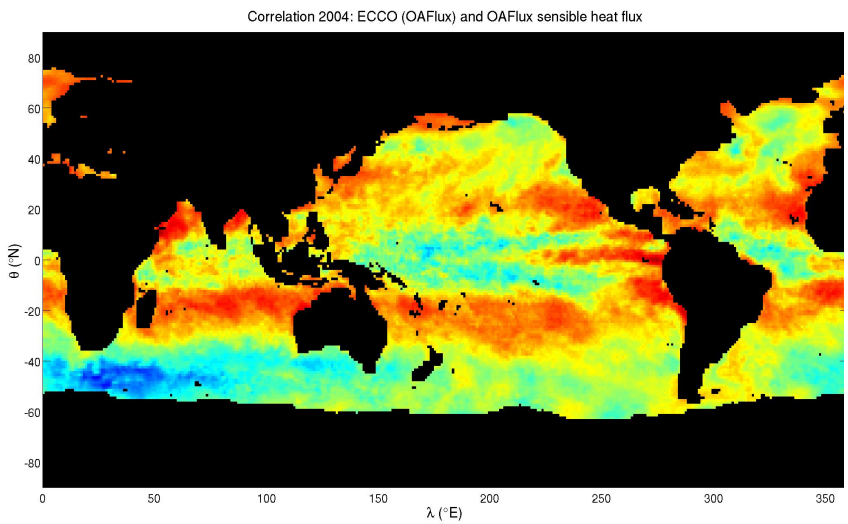
Net heat gain around equatorial regions (convergence)

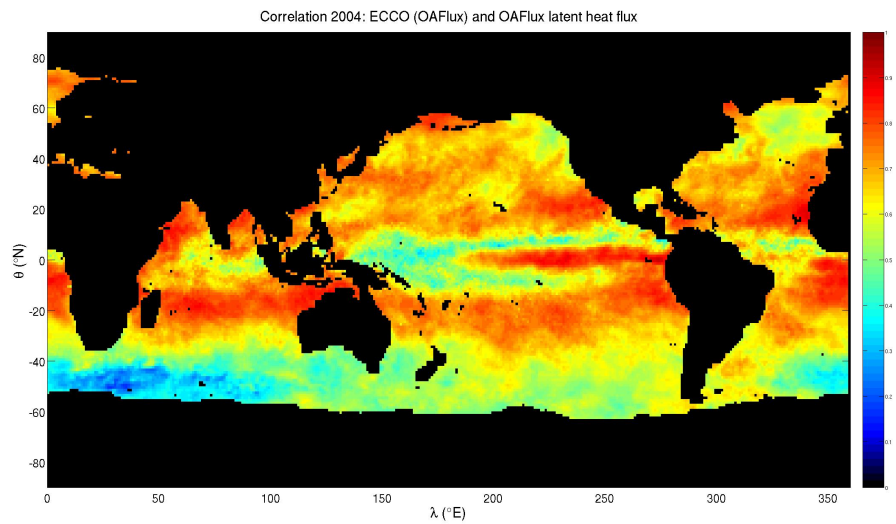
* Net heat loss throughout southern subtropics (divergence)

Energy balance comparison
(net air-sea heat flux)



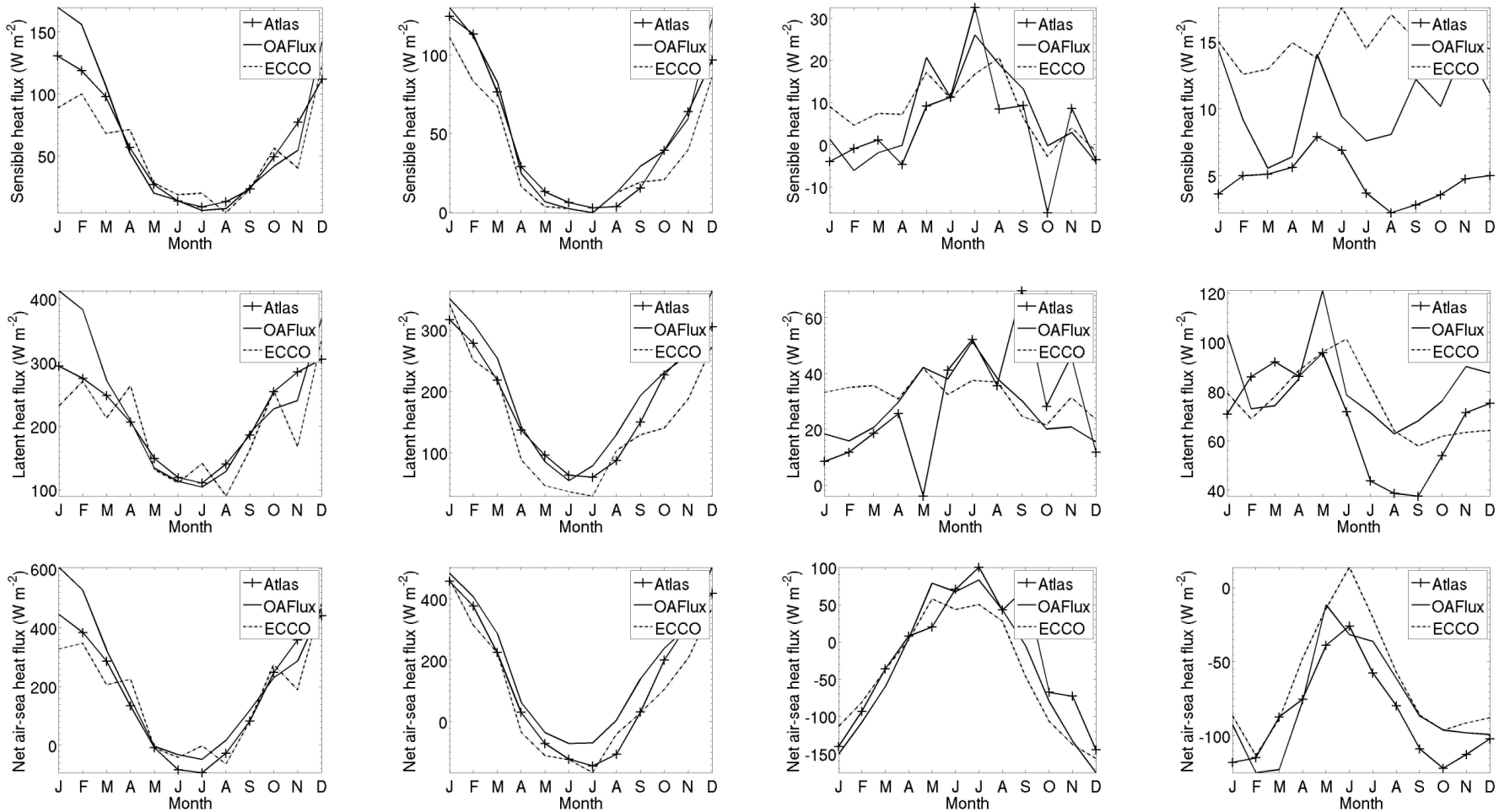
Algorithm comparison
(MITgcm offline experiments)





Input variables and flux components comparison

Loc 1: (109.5 E, 36.5 N) **Loc 2: (-36.5 E, 34.5 N)** **Loc 3: (-96.5 E, -54.5 N)** **Loc 4: (-167.5 E, -11.5 N)**



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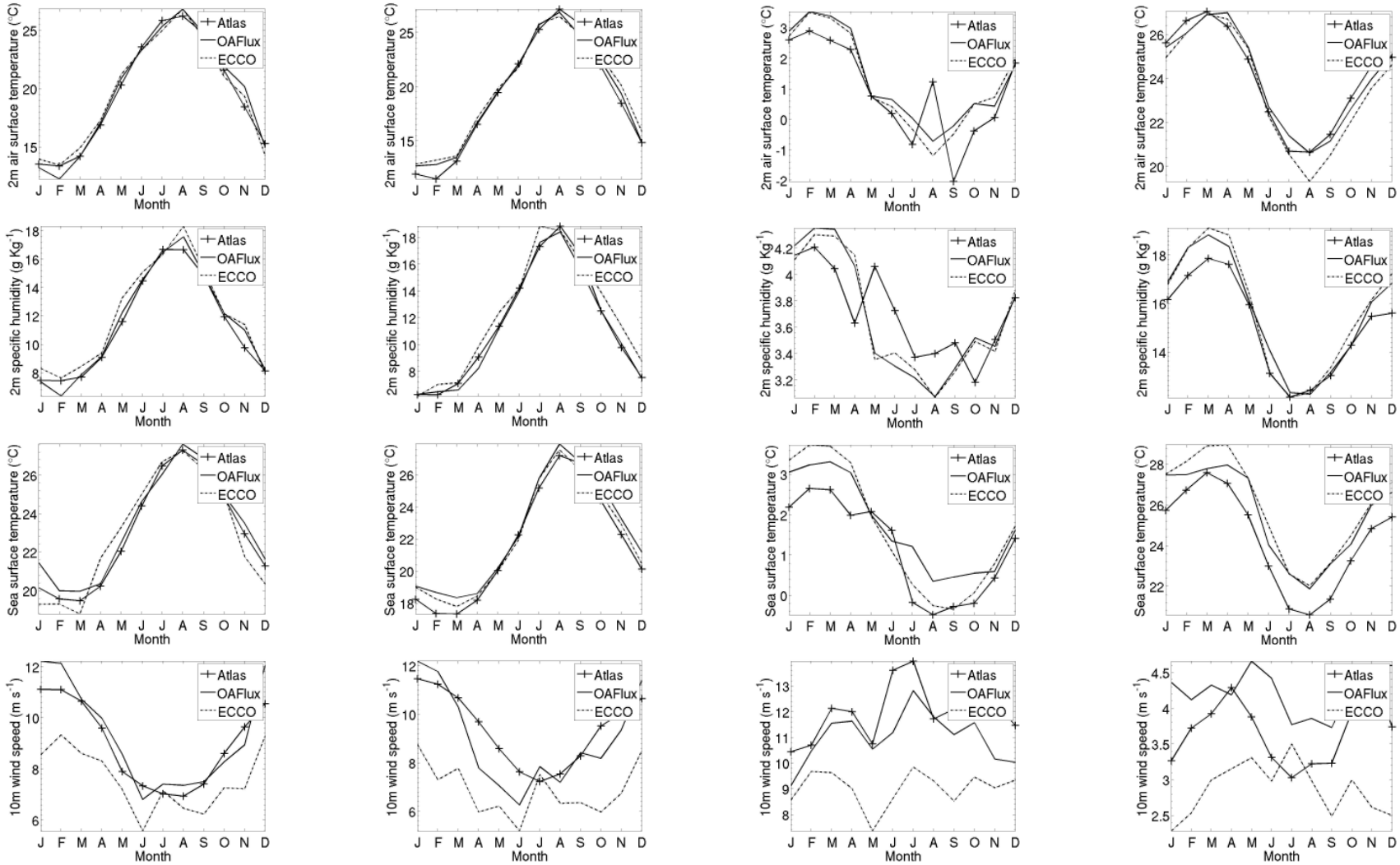
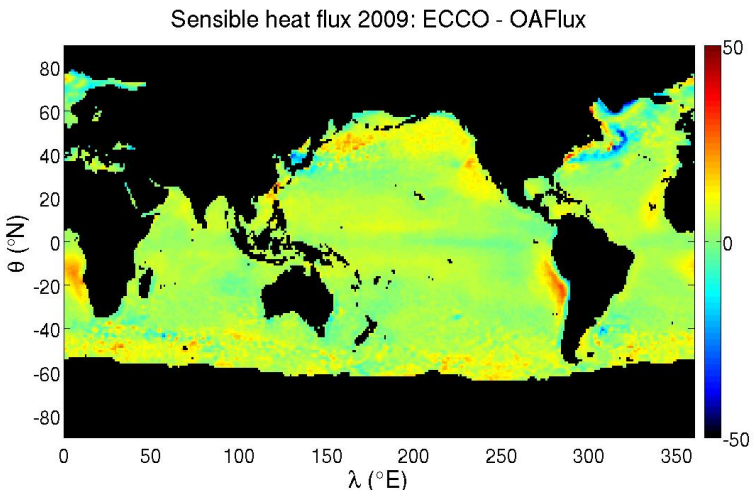
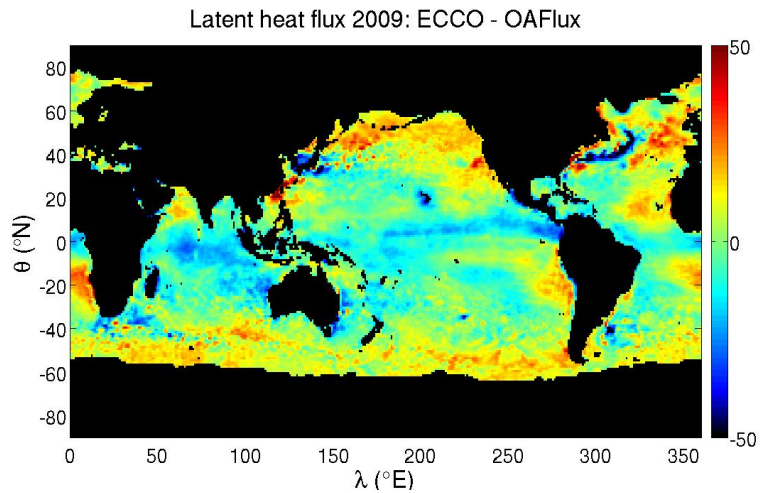


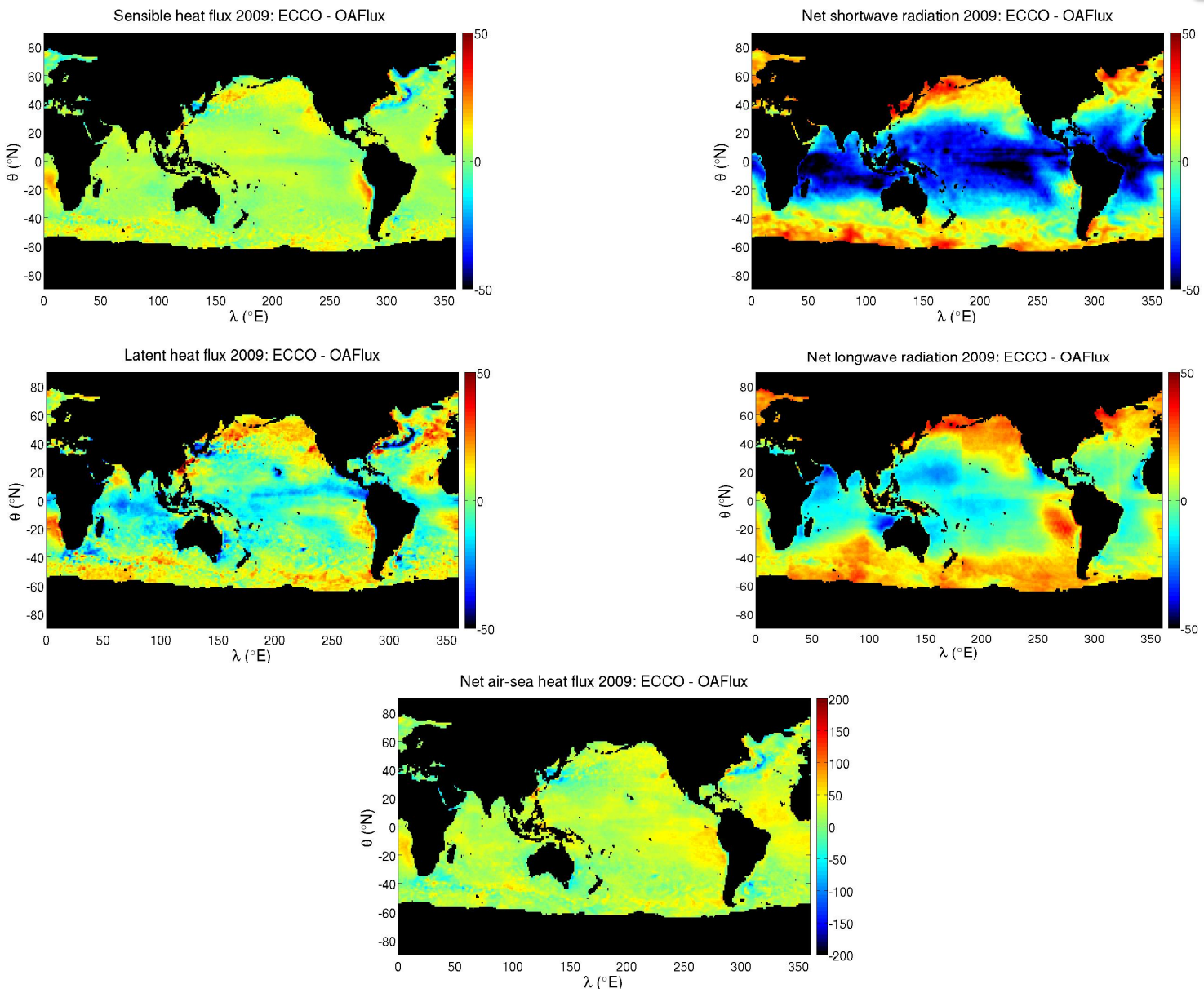
Mean Diff





Mean difference	Sensible heat (Wm^{-2})	Latent heat (Wm^{-2})
Σ (OAFlux - Atlas)	0.69	5.90
Σ (ECCO - Atlas)	17.30	12.19
Σ (ECCO – OAFlux)	2.64	2.85
Σ abs(OAFlux – Atlas)	3.49	9.84
Σ abs(ECCO – Atlas)	18.44	17.11
Σ abs(ECCO – OAFlux)	6.19	10.81

Mean Diff


Sensible heat flux 2009: ECCO - OAFlux
Net shortwave radiation 2009: ECCO - OAFlux
Latent heat flux 2009: ECCO - OAFlux
Net longwave radiation 2009: ECCO - OAFlux
Net air-sea heat flux 2009: ECCO - OAFlux
θ (°N)
λ (°E)