

PORT (Parallel Offline Rad Tool)

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AMWG/ChemClimWG Thurs Feb 11, 2010 9:35am

Development Team

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The PORT Tool(s)

Purpose

Computing Radiative Forcing

Comparing Optical Parametrizations

Driving reference computations to test RT method

What is it?

1. (CAM Code Mod) Outputs all data used by radiation
2. (New Code) Runs Only Radiation with Specified Data

Practical Matters

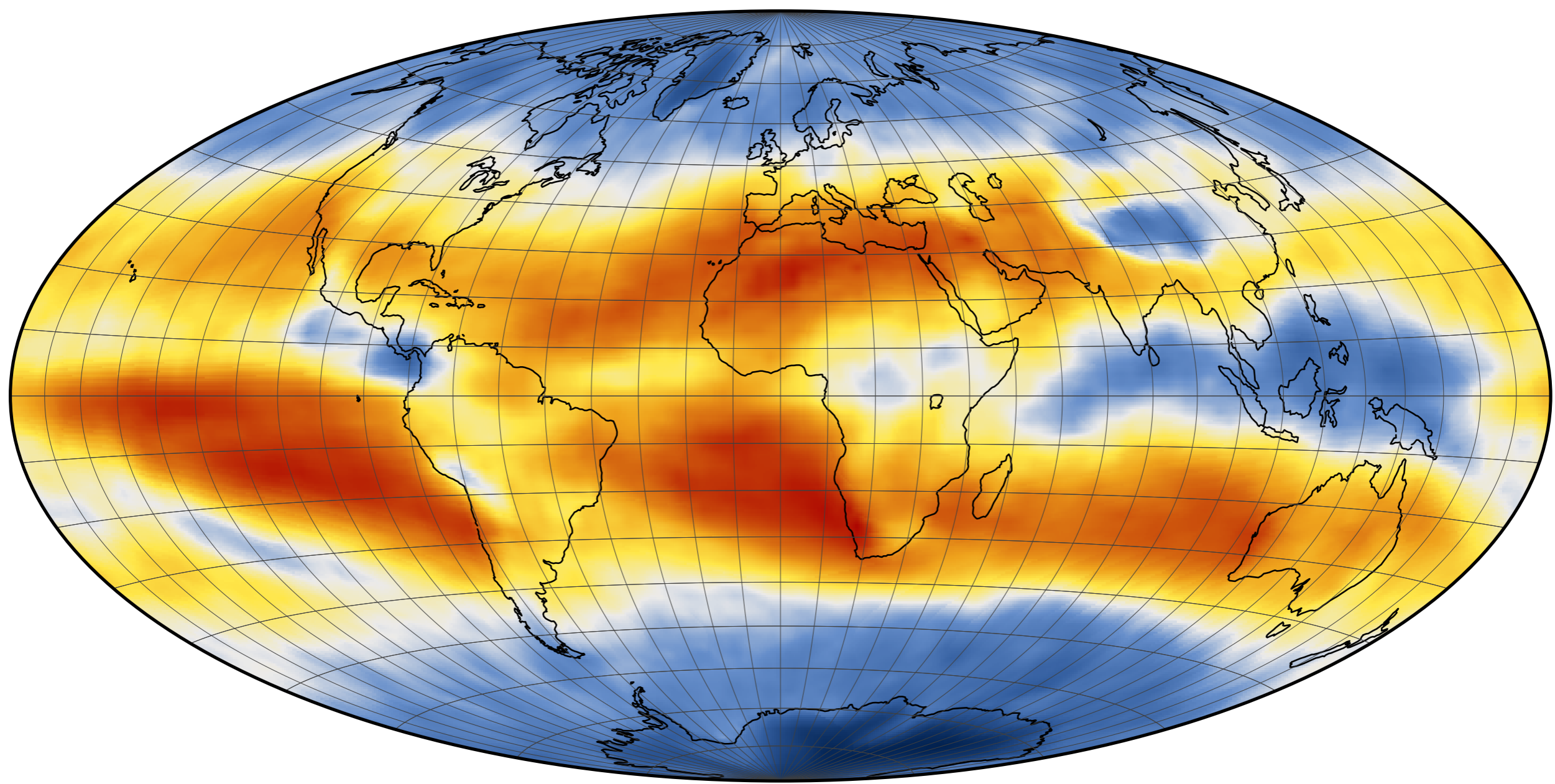
- ❖ Input Baseline State: 8.5 GB (for 1 year)
- ❖ Examples: CAM 3_6_66 CAMRT
- ❖ Only global data sets on standard CAM grids
- ❖ Timing: $\text{PORT} = (5/83) * \text{CAM}$ (fv1.9x2.5 -chem none CAMRT)
- ❖ (Not Yet) Stratospheric Adjustment/Fixed Dynamical Heating
- ❖ Bit for bit test is easy to validate your configuration
- ❖ Not yet available for public use

CO2 Forcing (280->367 ppm)

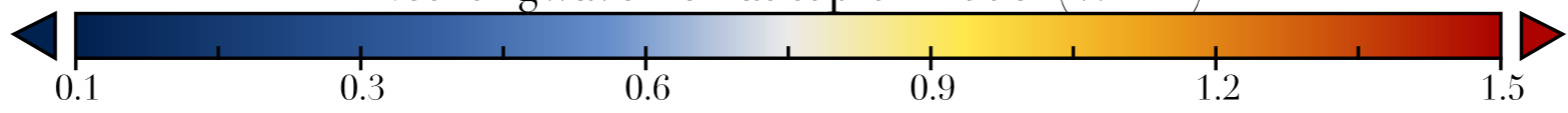
Net	LW	SW
Top	0.857	0.005
Top / CS	1.191	0.005
Surf	0.389	0.227
Surf / CS	0.653	0.048

IPCC: 1.66 W / m² (278->379)

CO2 Net Top LW Forcing

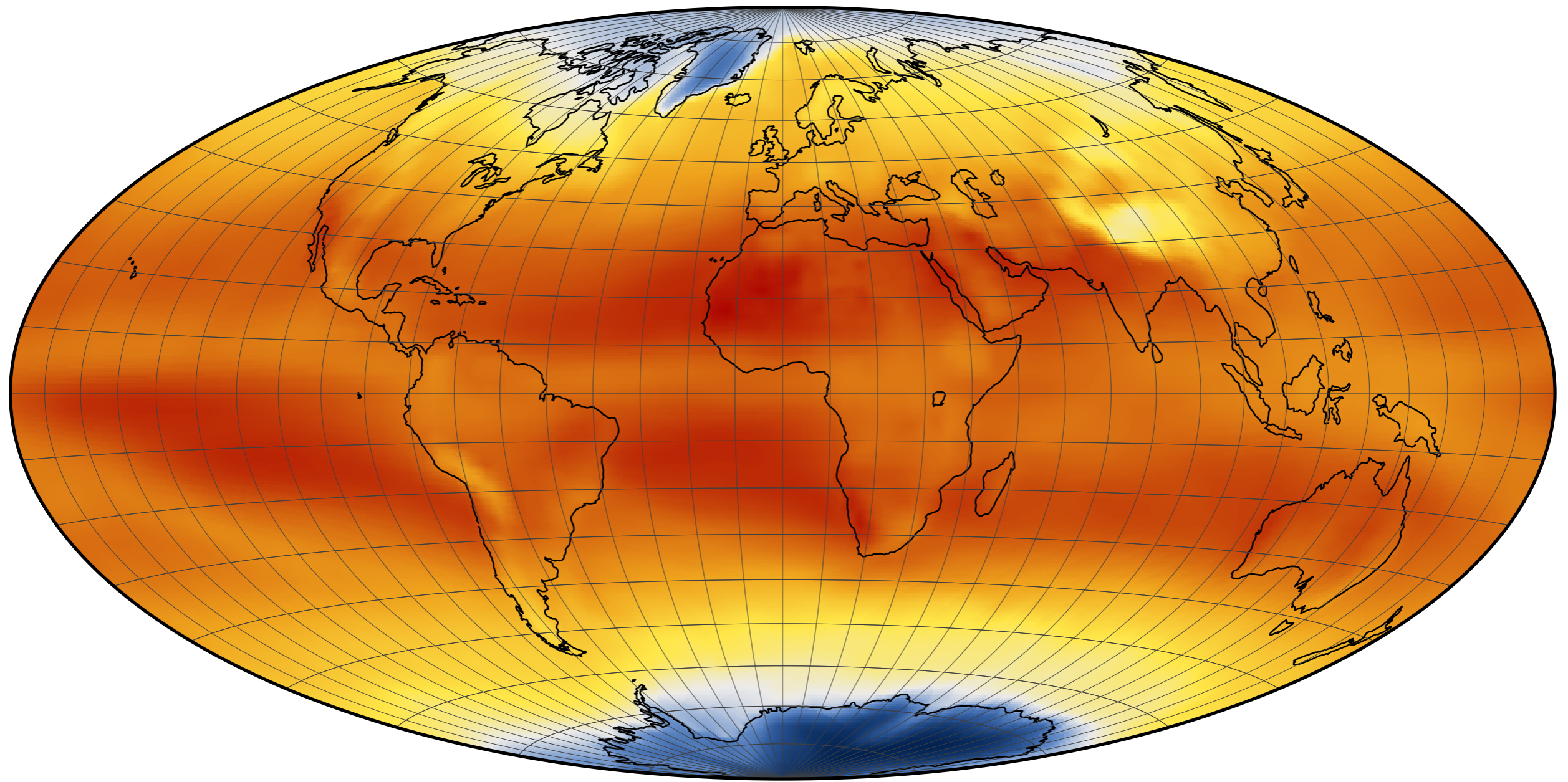


Net longwave flux at top of model (W/m2)



Data Min = 0.1, Max = 1.5

Clearsky CO2 Net Top LW Forcing

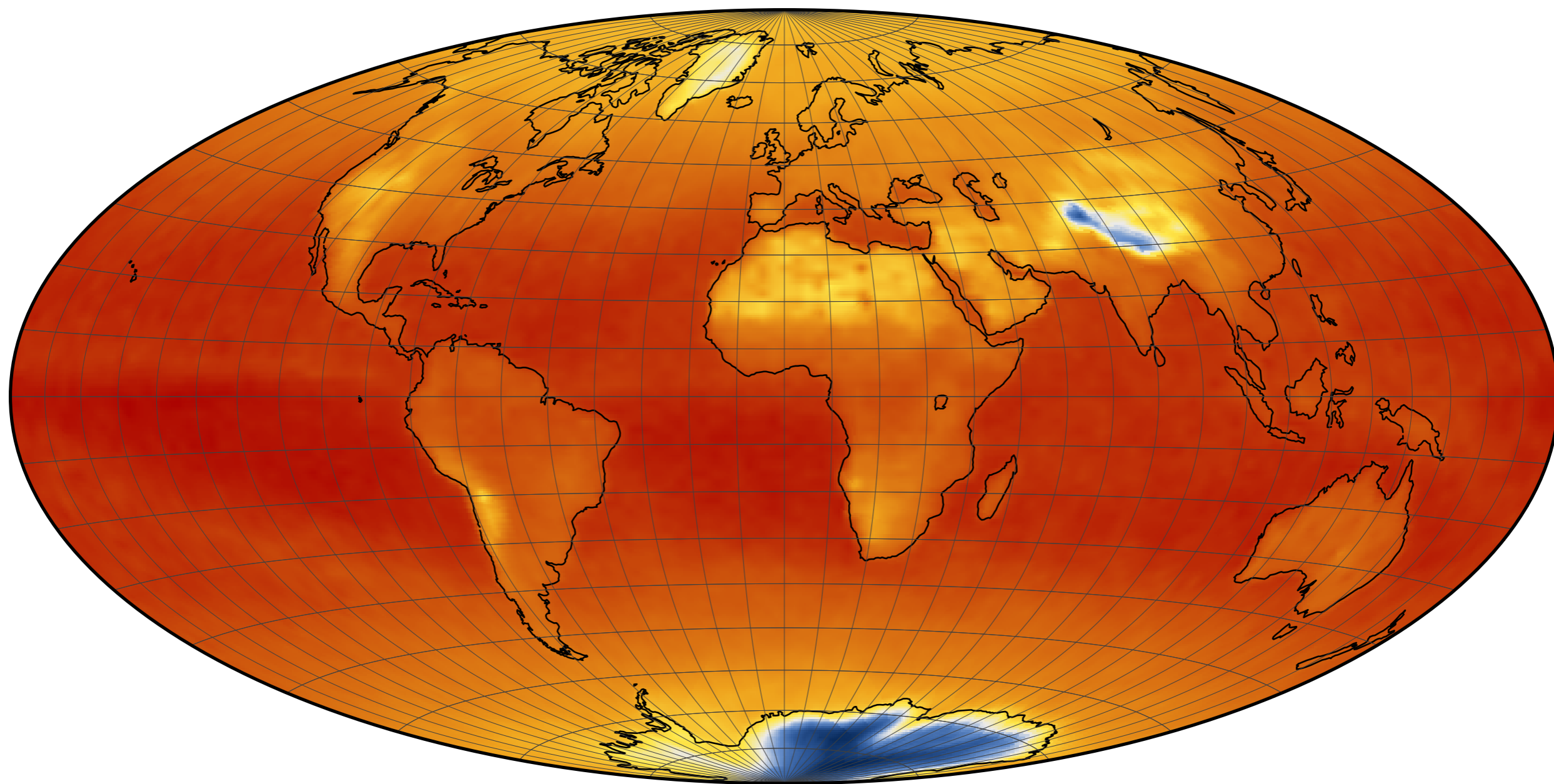


Clearsky net longwave flux at top of model (W/m²)

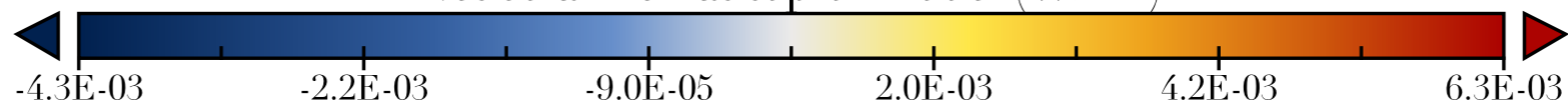


Data Min = 0.1, Max = 1.5

CO2 Net Top SW Forcing

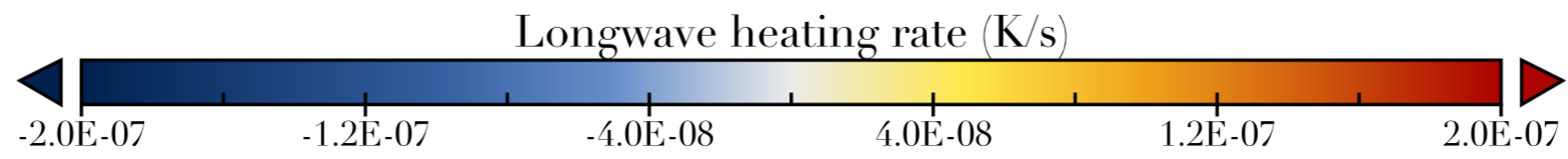
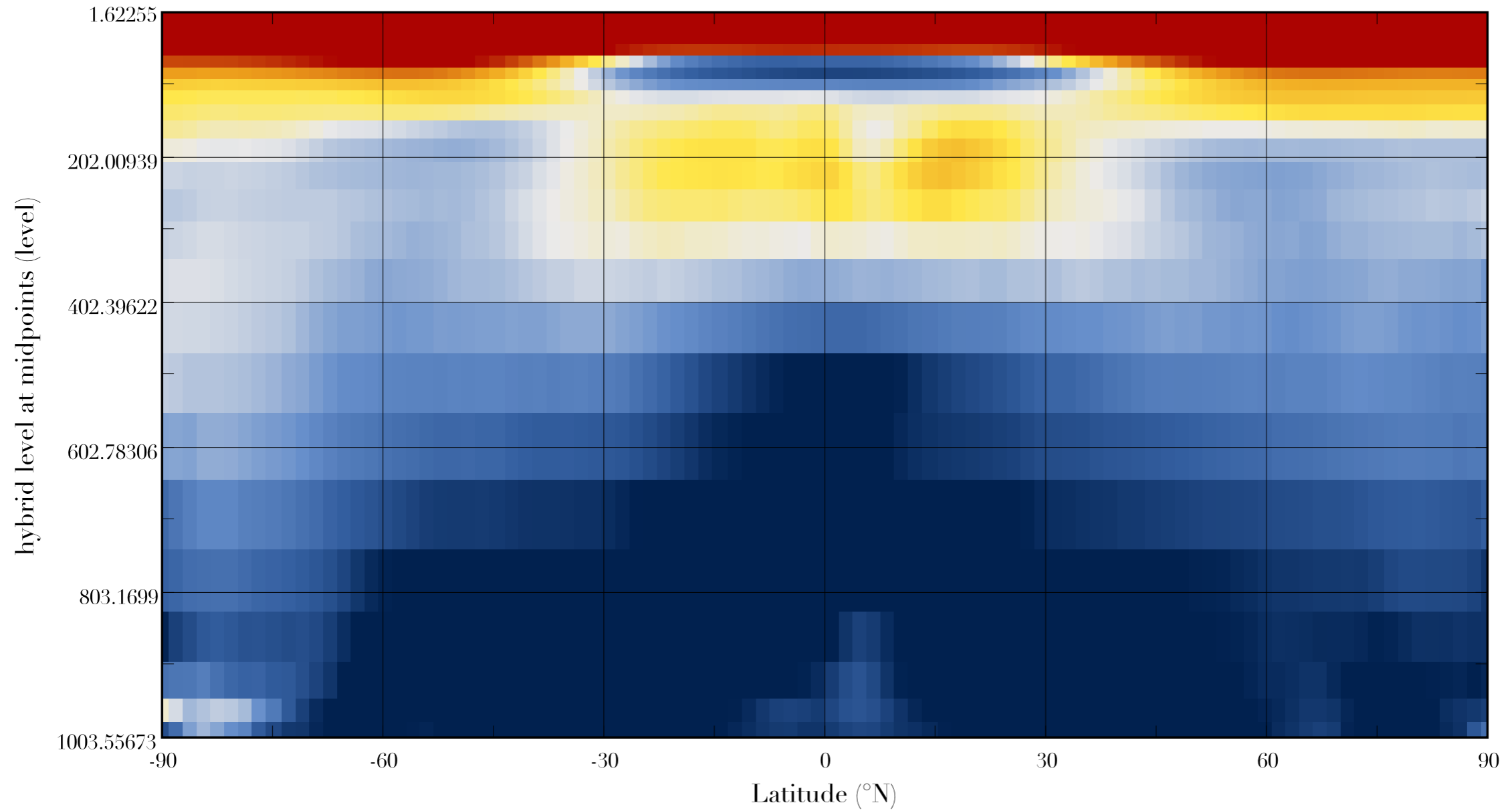


Net solar flux at top of model (W/m^2)



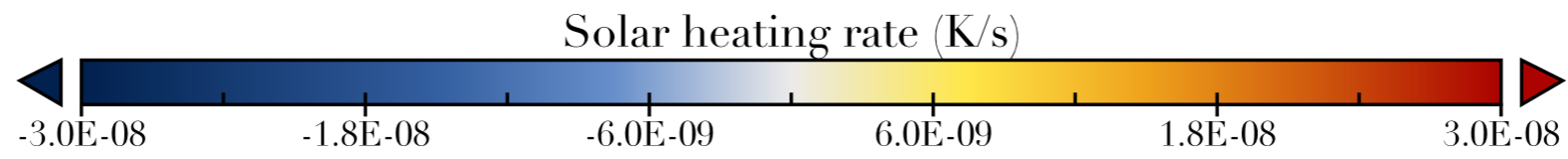
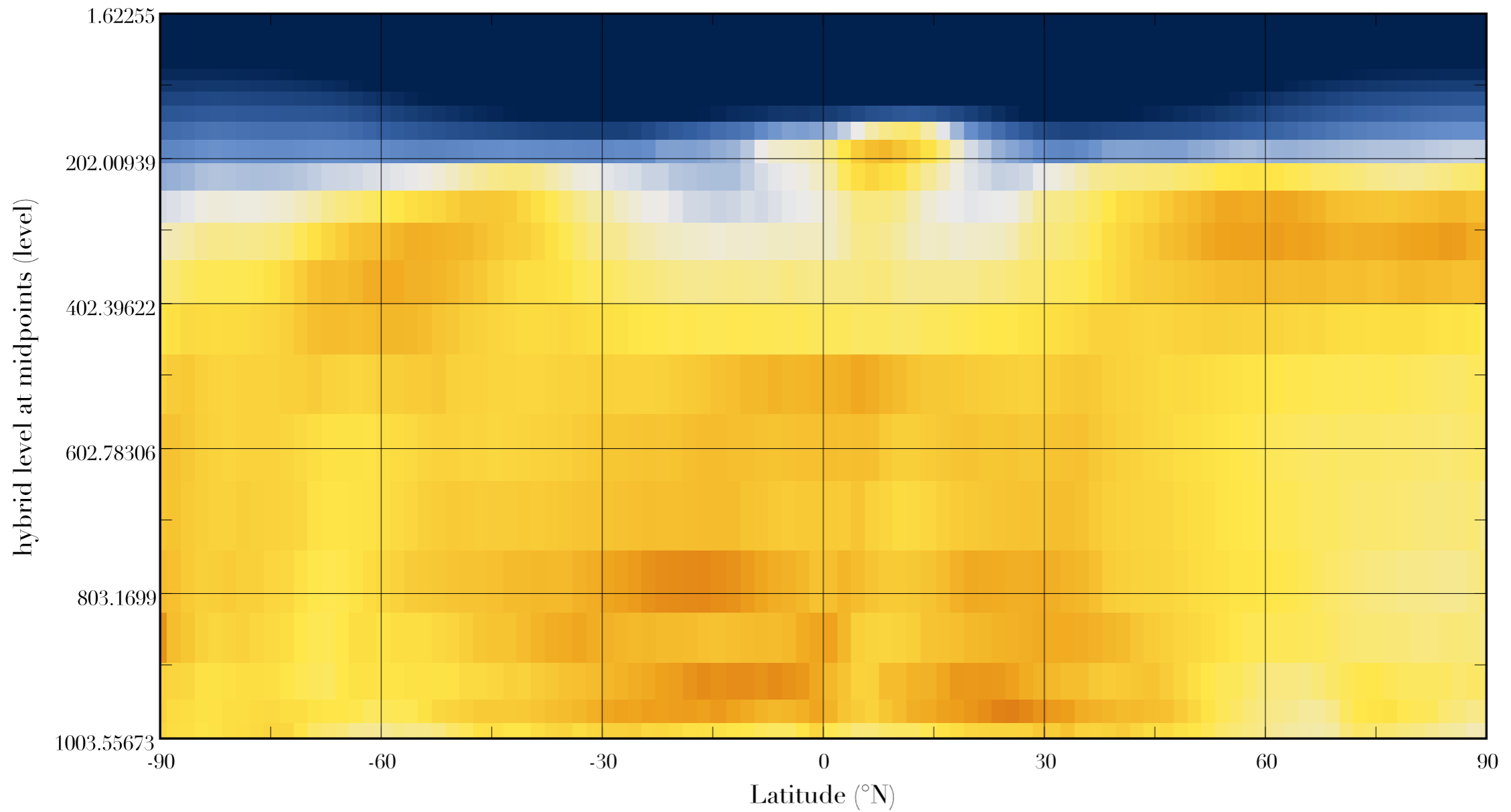
Data Min = $-4.3\text{E-}03$, Max = $6.3\text{E-}03$

Zonal CO2 Longwave Heating Rate



Data Min = -4.3E-07, Max = 4.1E-06

Zonal CO2 Shortwave Heating Rate



Data Min = -2.5E-07, Max = 1.8E-08

Methane Forcing (715->1760 ppb)

Net	LW	SW
Top	0.583	0
Top / CS	0.843	0
Surf	0.321	0
Surf / CS	0.544	0

IPCC: .48 W / m² (715->1774)

N₂O Forcing (270->316 ppb)

Net	LW	SW
Top	0.111	0
Top / CS	0.162	0
Surf	0.053	0
Surf / CS	0.093	0

IPCC: 0.16 W / m² (270->319)

CFC Forcing (0 -> 653/535 ppt)

Net	LW	SW
Top	0.216	0
Top / CS	0.410	0
Surf	0.216	0
Surf / CS	0.410	0

IPCC: 0.268 W/m² (All CFCs)

Ozone (zero -> Present Day)

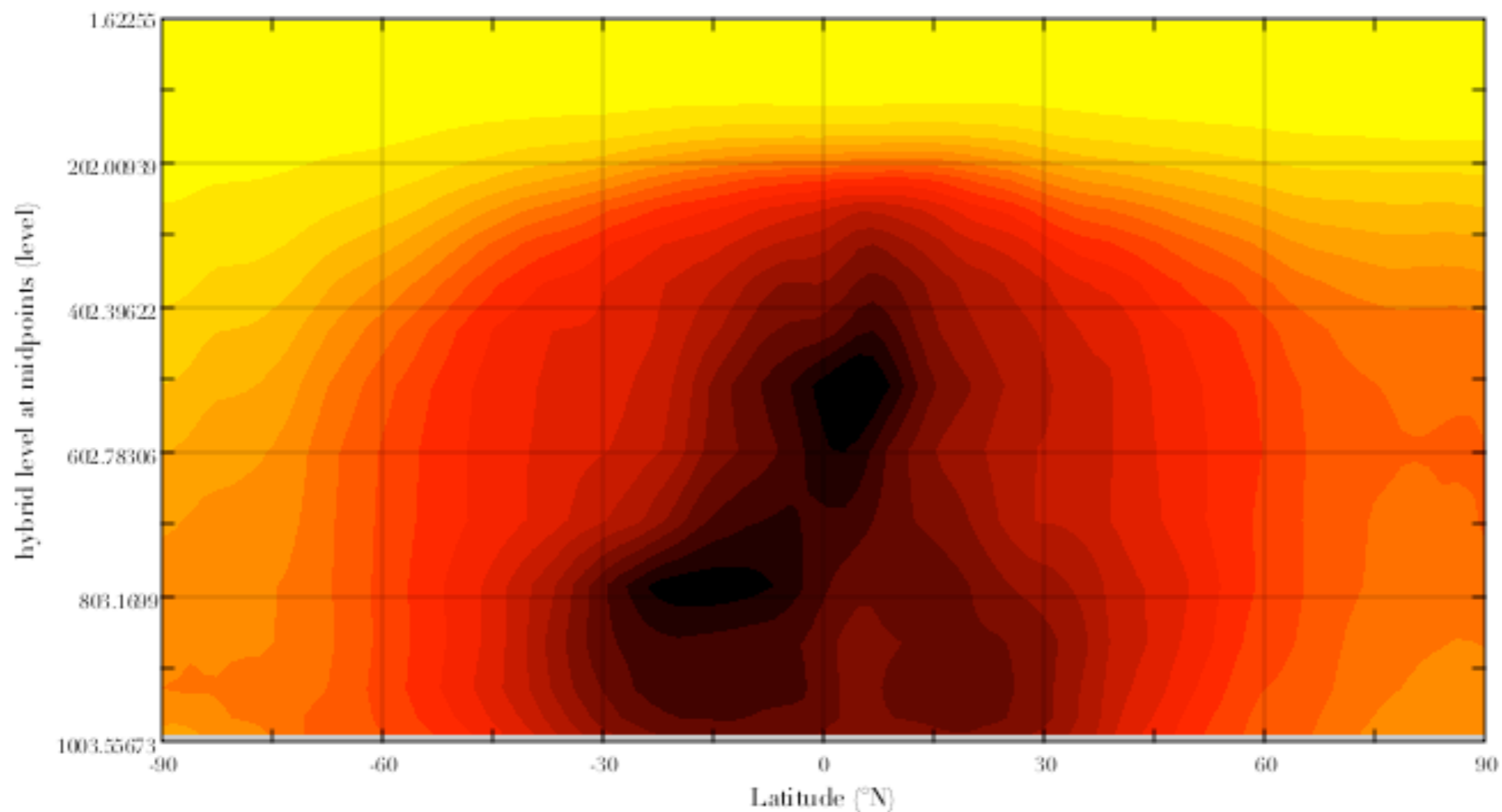
Net	LW	SW
Top	5.057	-5.632
Top / CS	7.633	-2.527
Surf	1.188	3.838
Surf / CS	2.415	5.519

IPCC: Not Comparable

How do you run it?

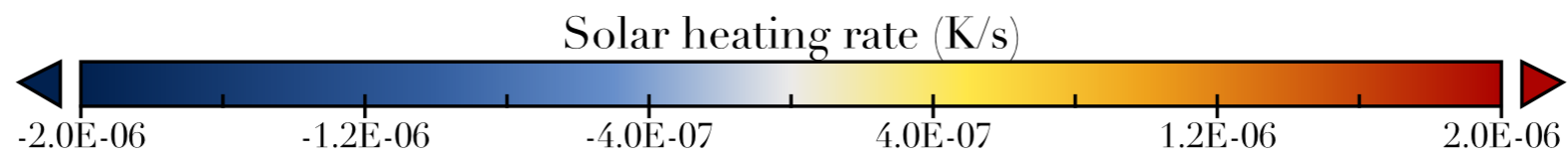
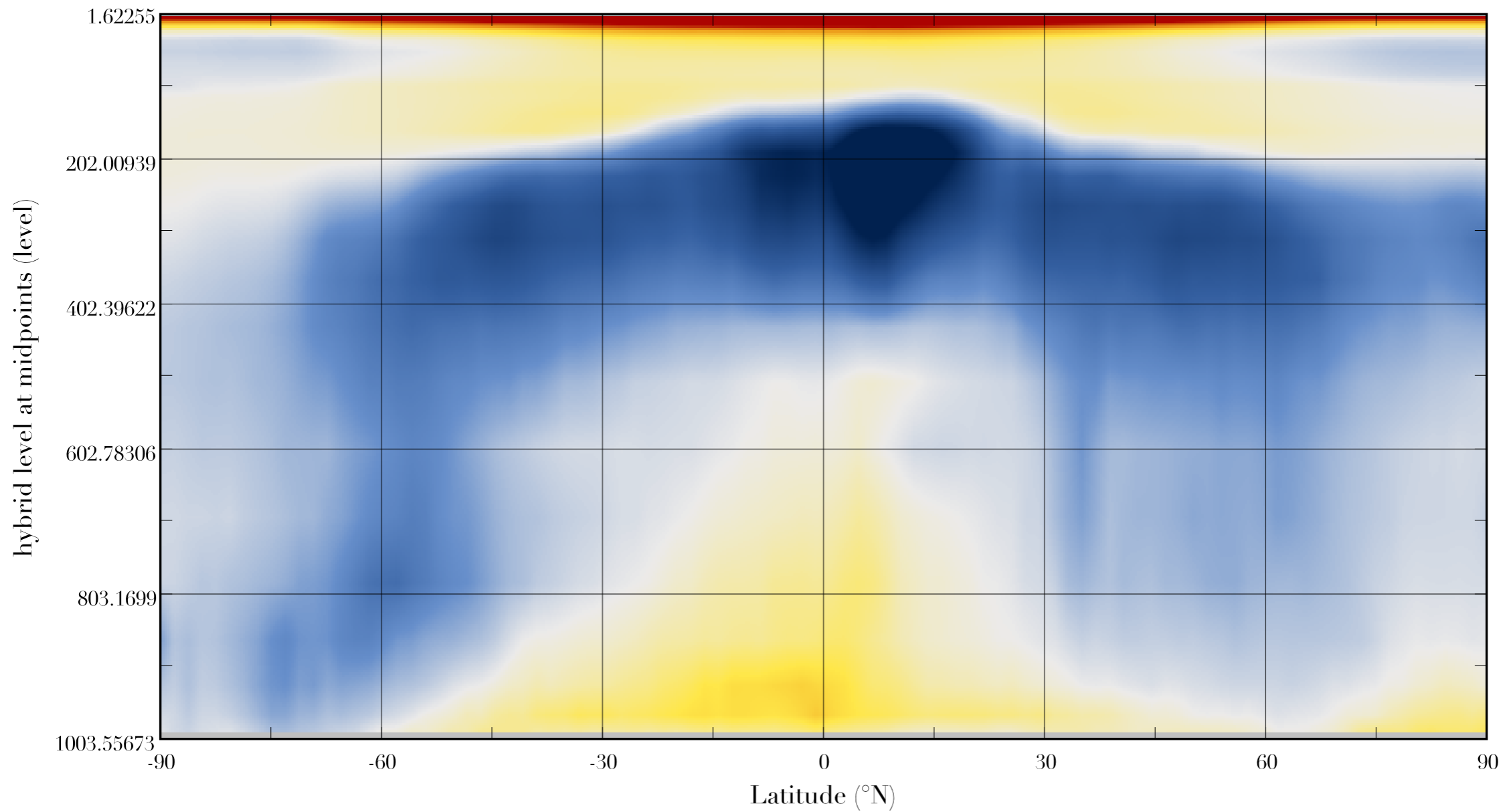
- ❖ Step 1: Create data with CAM or CCSM with namelist.
output_rad_data=.true.
- ❖ Step 2: Change composition in netcdf files
- ❖ Step 3: Run offline code (configure -rad_driver)
- ❖ Forcing = Fluxes(Step 3) - Fluxes(Step 1)

Water Vapor Solar Absorption (Clear Sky) (*-1)



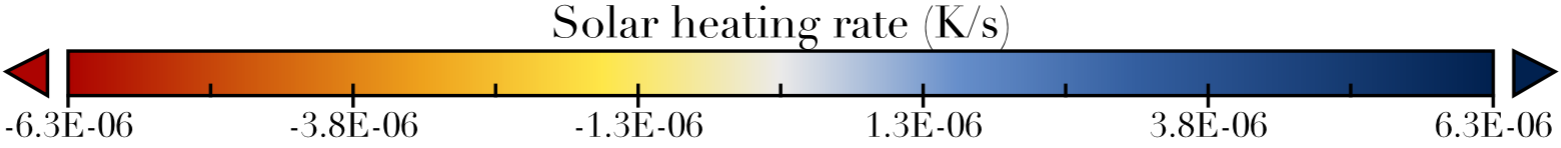
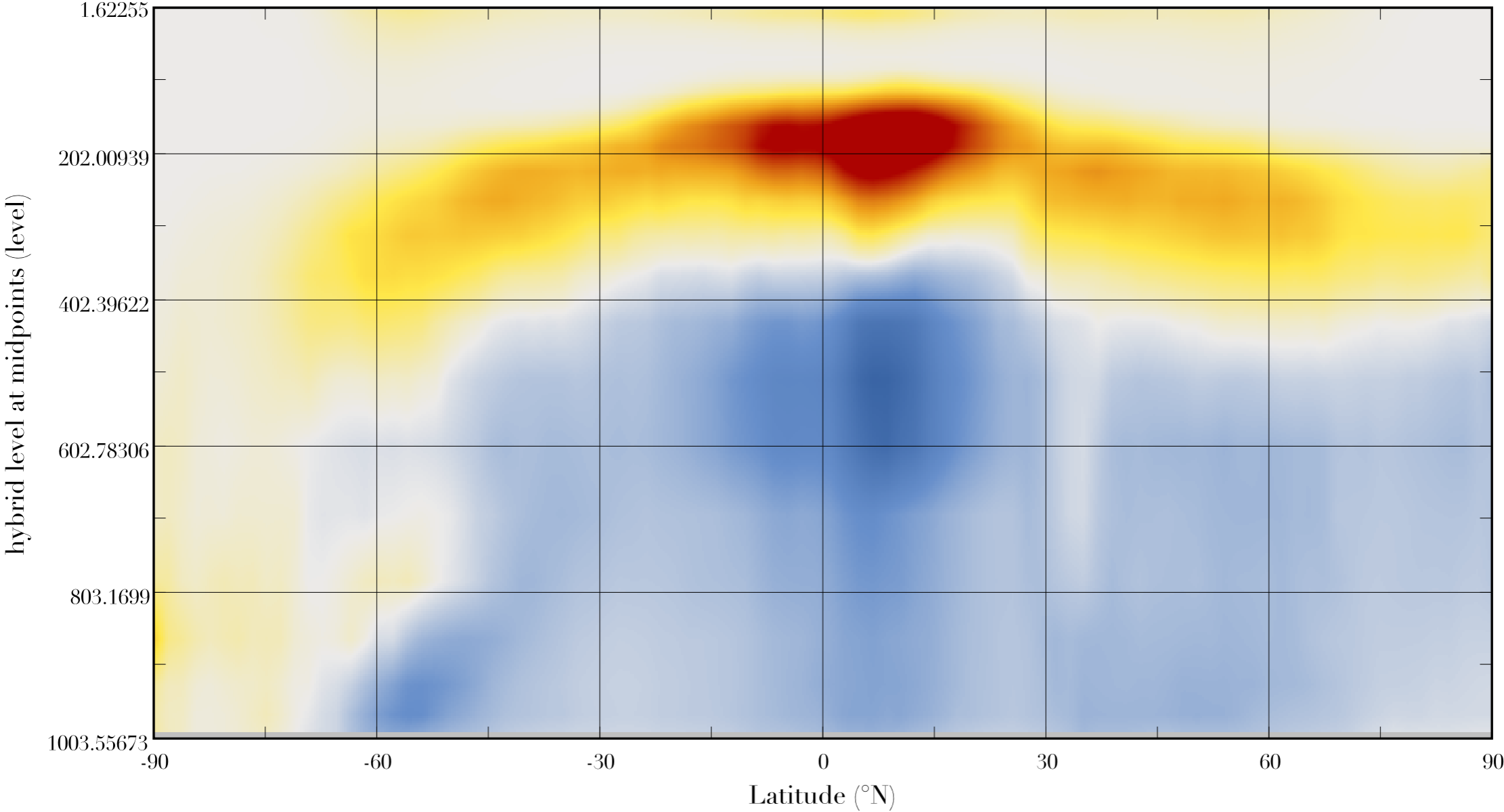
Data Min = -1.1E-05, Max = -1.9E-07

Solar heating rate (RRTMG - CAMRT) ($\pm 2e-6$ shown)



Data Min = $-3.6E-06$, Max = $8.5E-06$

Change in Solar Heating Due to Ice Clouds (-1)



Data Min = -9.6E-06, Max = 3.0E-06



That's all, folks!

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