Shortwave incident/reflected light CERES compared to GISS and CM2

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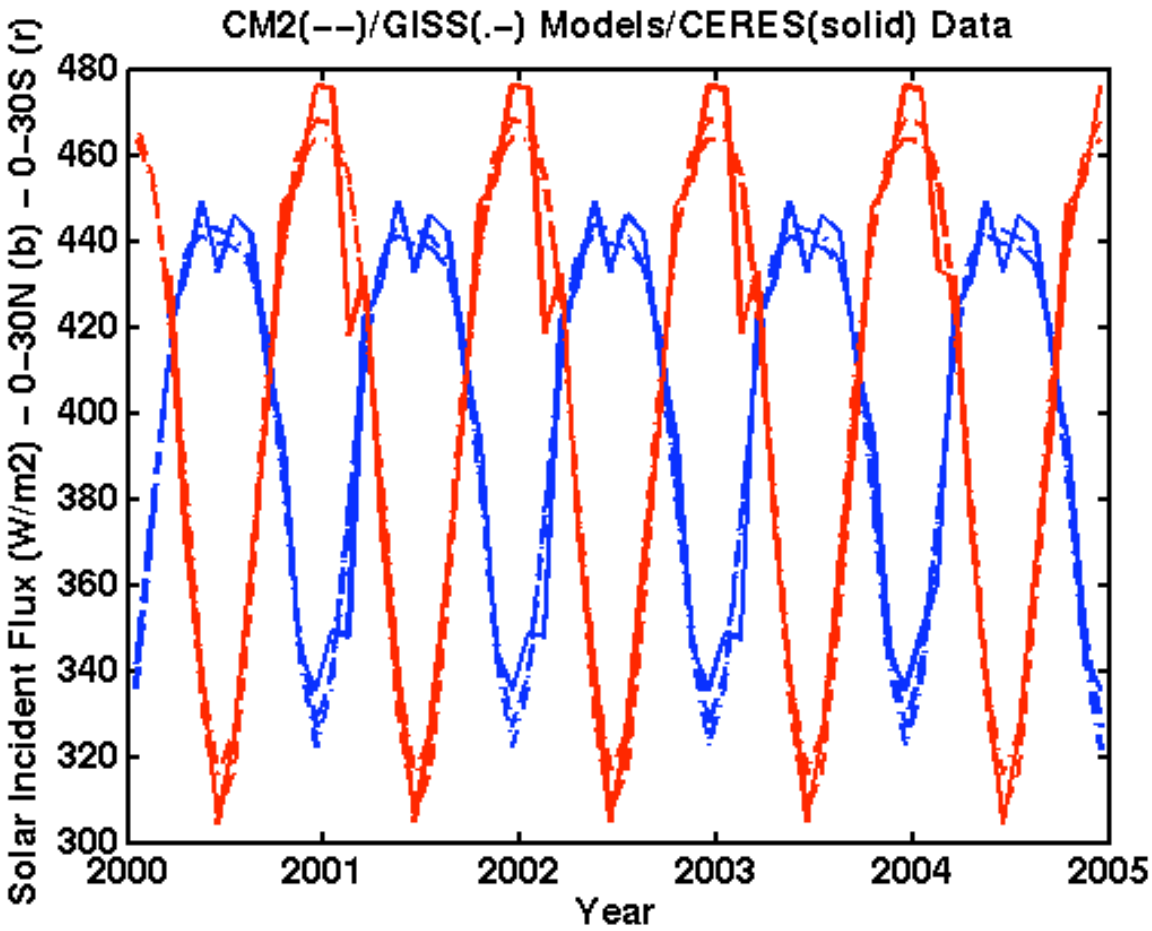
Comparison of GISS, CM2 models with CERES ES4 Data and AVN SST over 30° zones.

- AIRS may provide new insights into clouds and water vapor useful for climate modeling.
- Differences between energy distributions of models and CERES tell us where to look with AIRS.

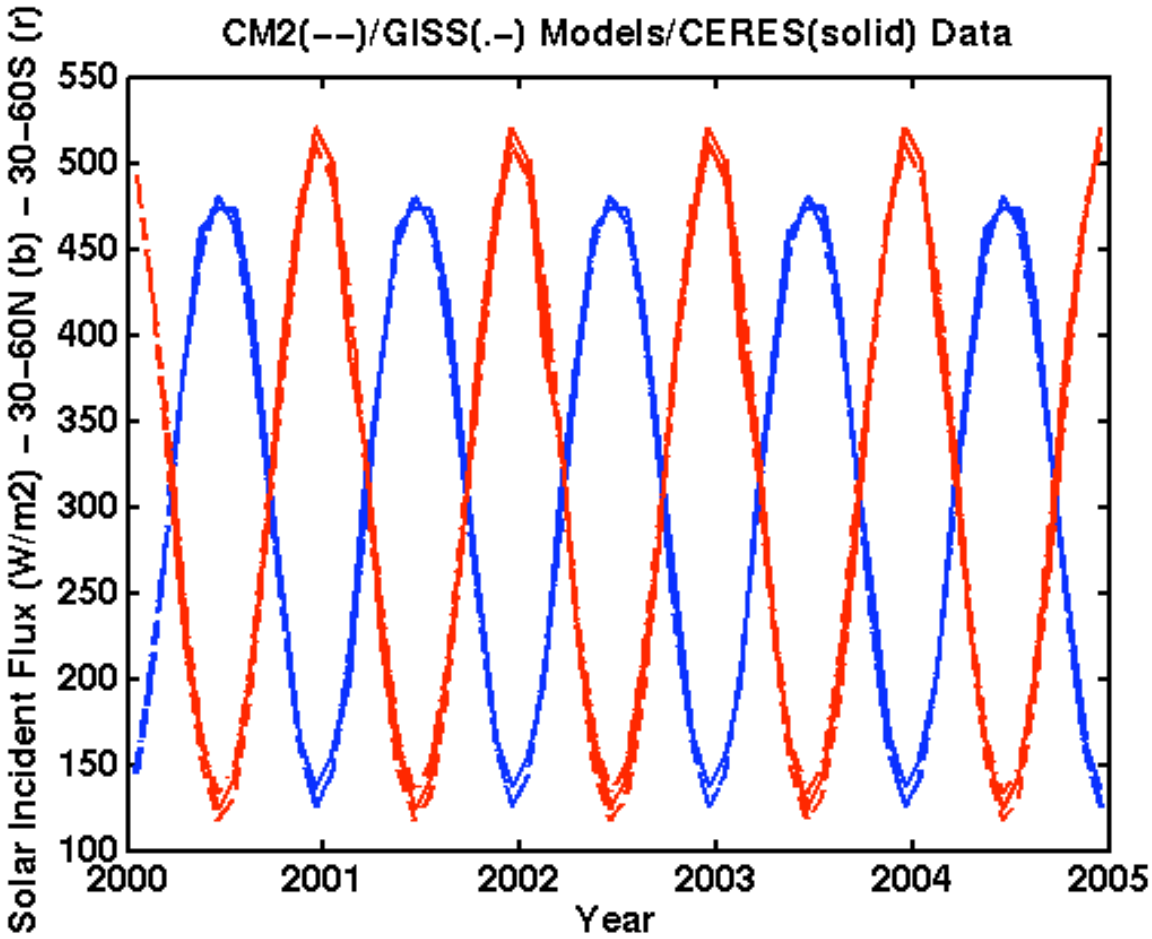
Credits

- CM2 GFDL monthly zonal means – Yi Huang
- GISS (Hansen) 4°x5° maps – Duane Waliser via Frank Li (JPL)
- CERES 2.5° maps, 10° zonal, global means – Langley ASDC (eosweb.larc.nasa.gov)
- AVN SST daily zonal means – NCEP via George Aumann's ACDS matchups

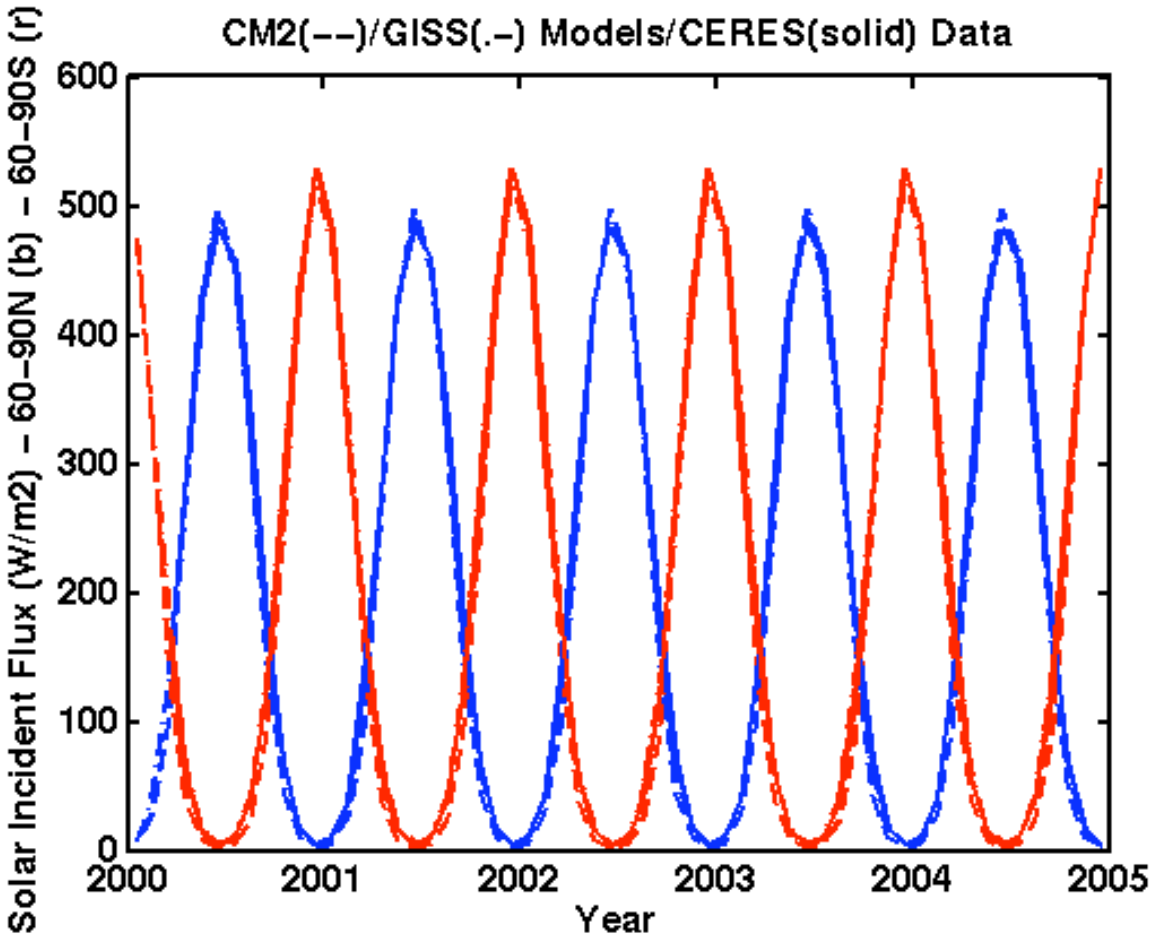
Solar Incident Flux (Tropical)



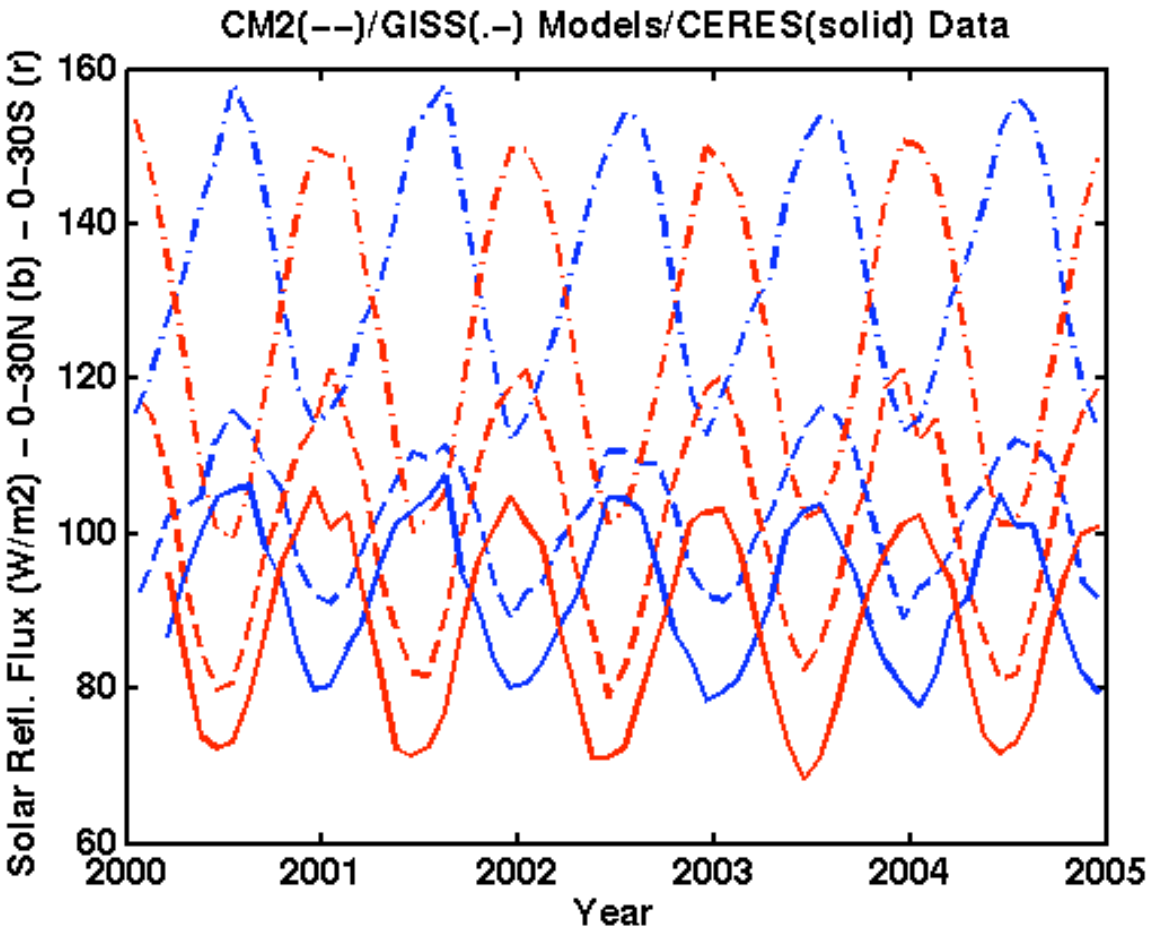
Solar Incident Flux (Temperate)



Solar Incident Flux (Polar)



Solar Reflected Flux (Tropical)



CERES mean - model mean (W/m^2)

	N	S
CM2	10.5	13.4
GISS	42.3	38.4

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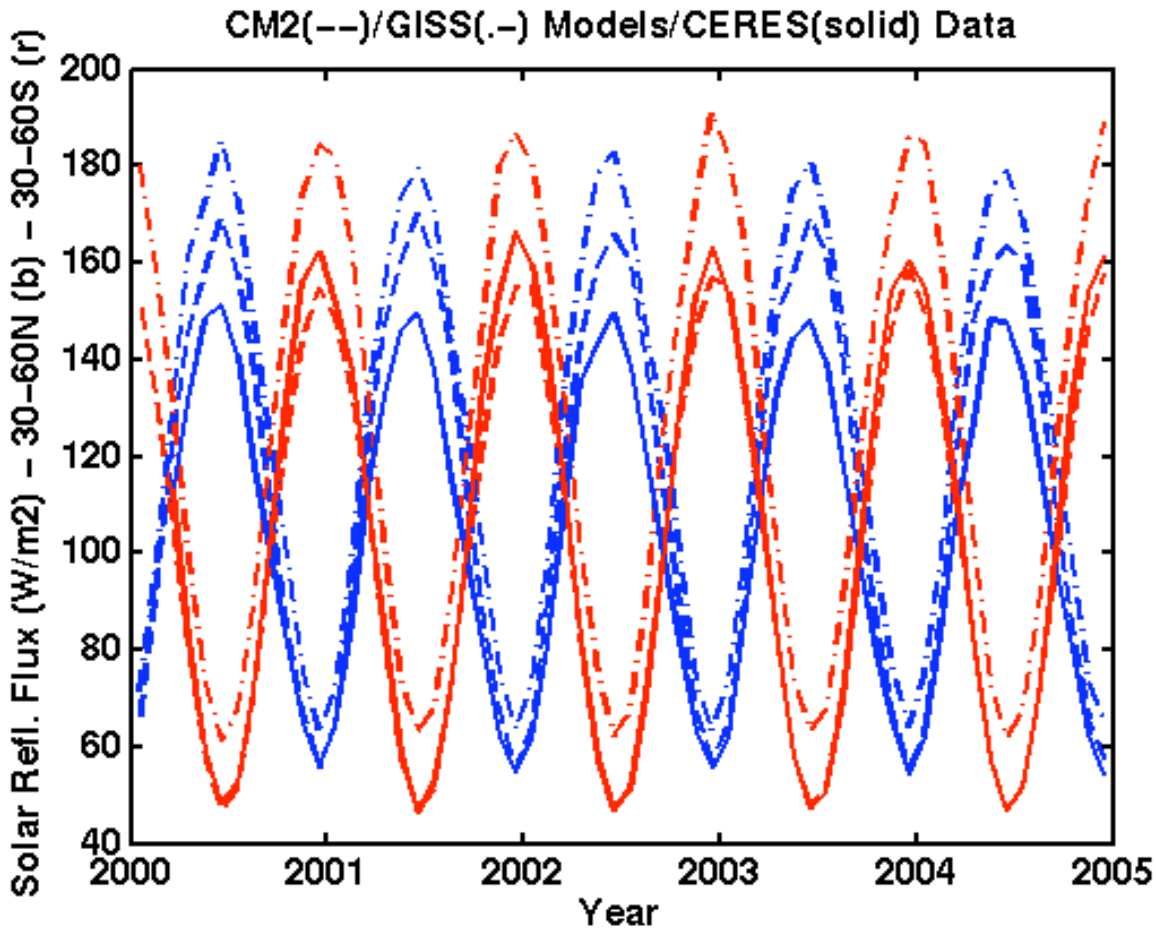
Solar Reflected Flux (Temperate)



CERES mean - model mean (W/m^2)

	N	S
CM2	10.8	-3.1
GISS	21.4	19.9

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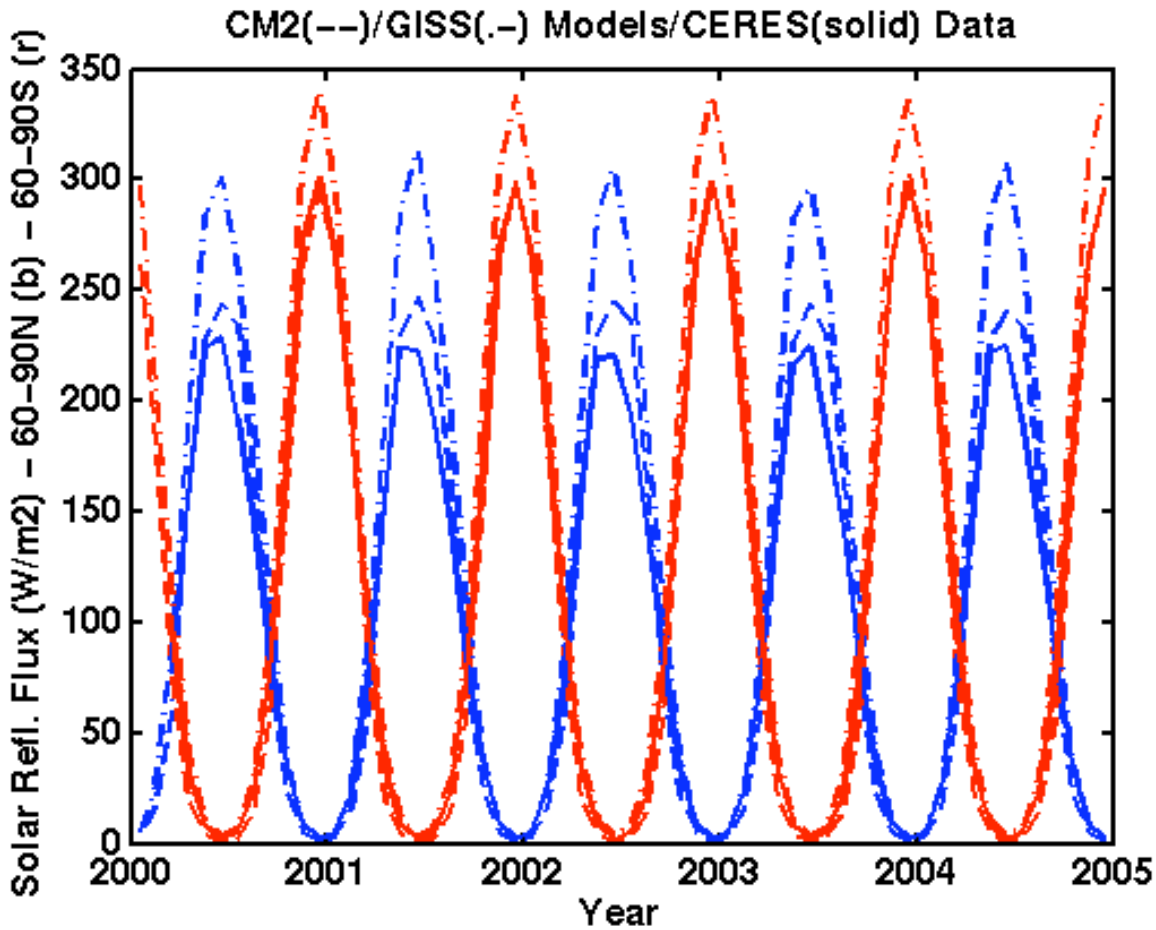
Solar Reflected Flux (Polar)



CERES mean - model mean (W/m^2)

	N	S
CM2	3.0	-7.2
GISS	28.0	18.3

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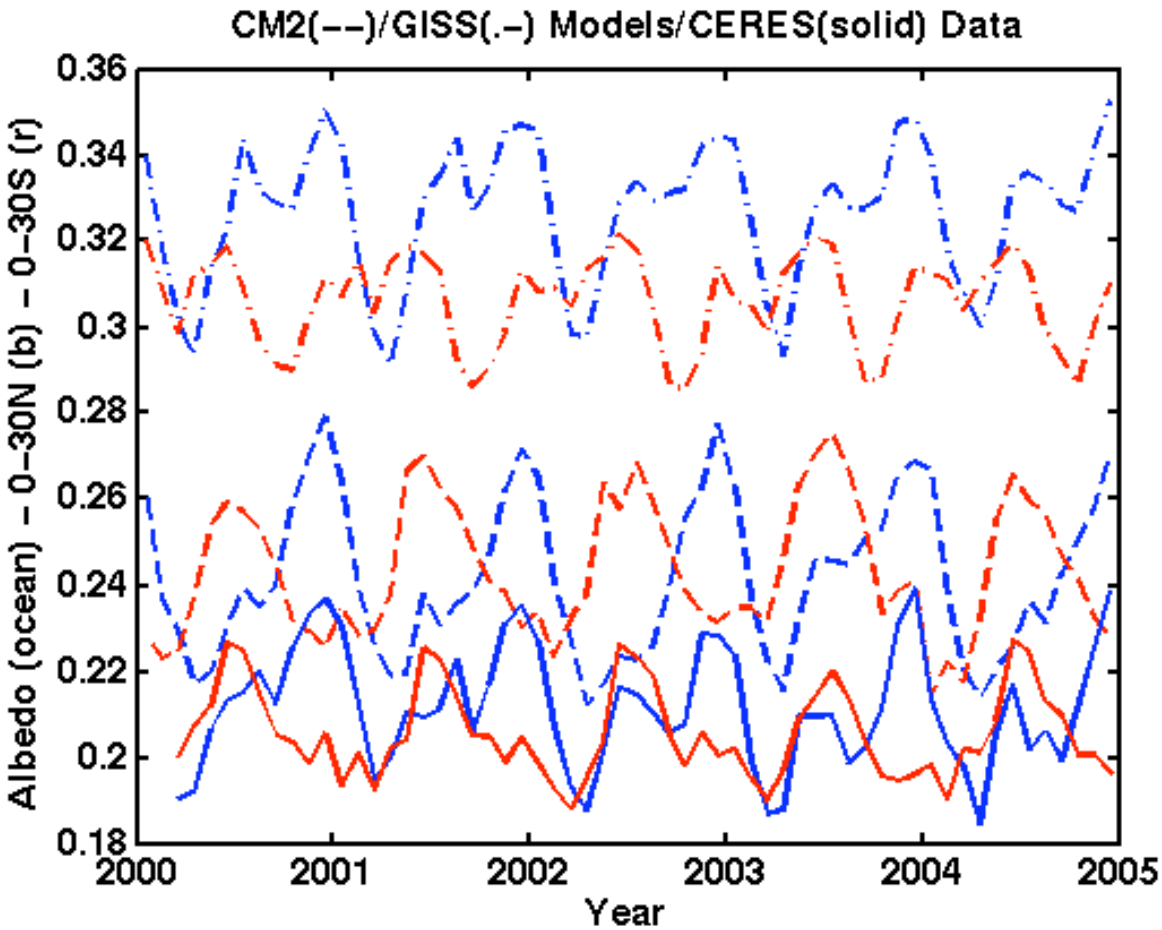
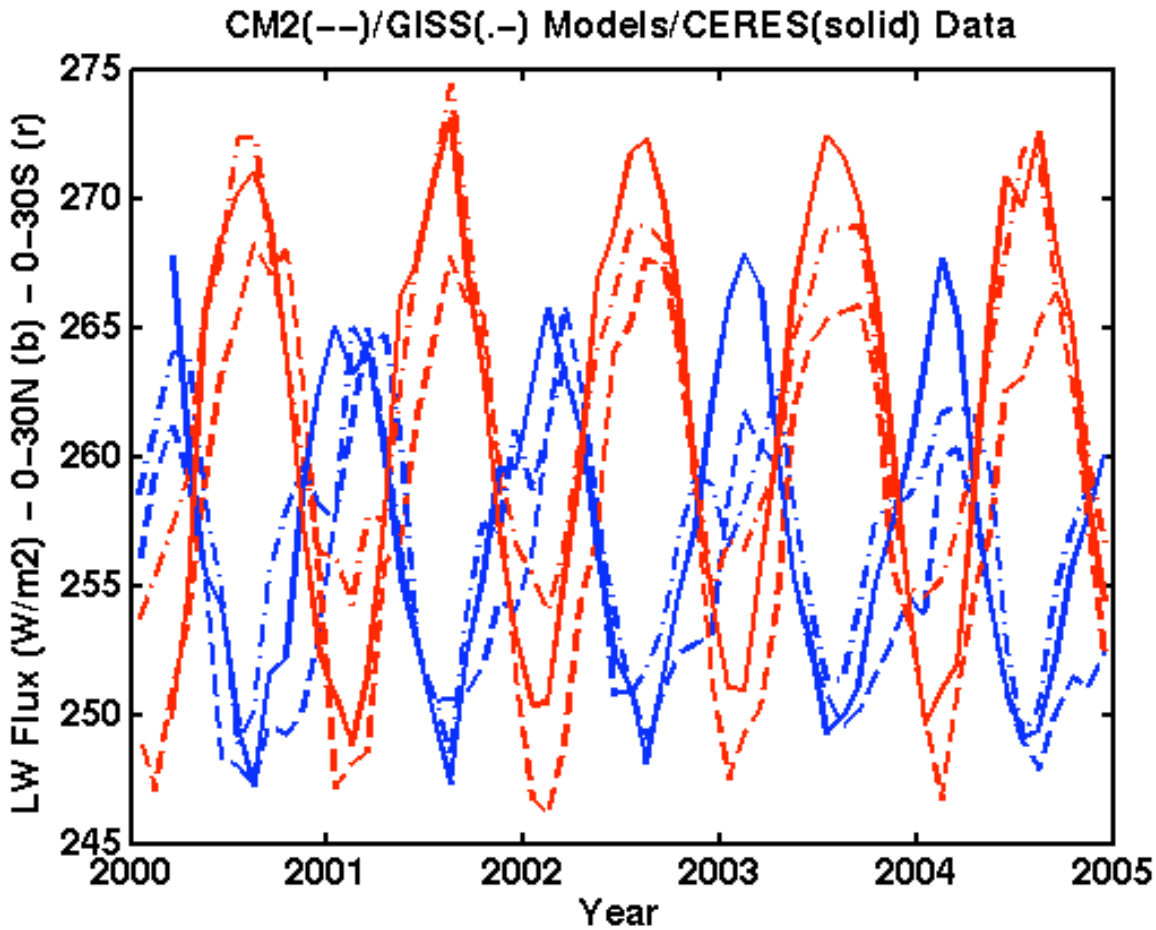
Albedo (ocean)



CERES mean - model mean

	N	S
CM2	-0.03	-0.04
GISS	-0.11	-0.10

Outgoing Longwave Flux (Tropical)



CERES mean - model mean (W/m^2)

	N	S
CM2	2.9	3.5
GISS	0.0	-0.9

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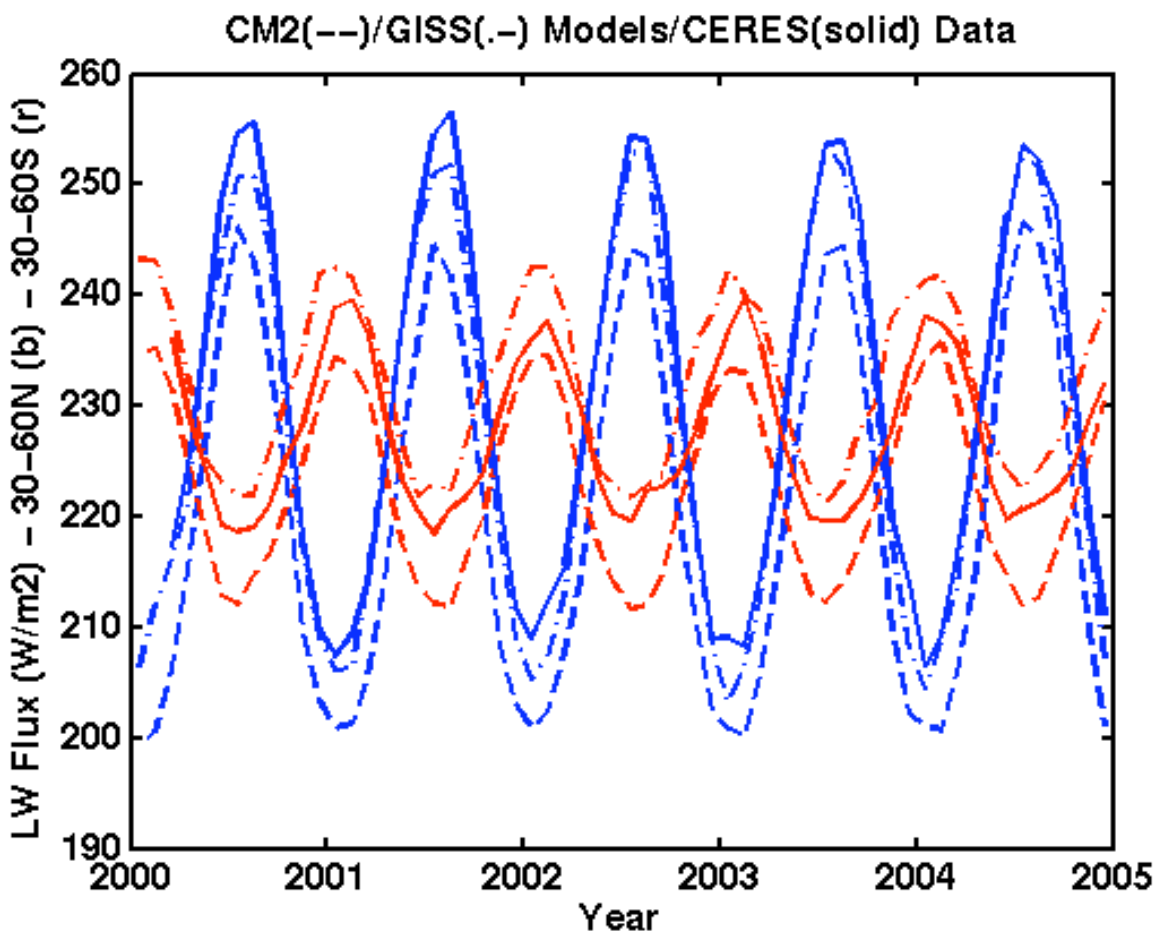
Outgoing Longwave Flux (Temperate)



CERES mean - model mean (W/m^2)

	N	S
CM2	9.9	5.0
GISS	2.1	-4.0

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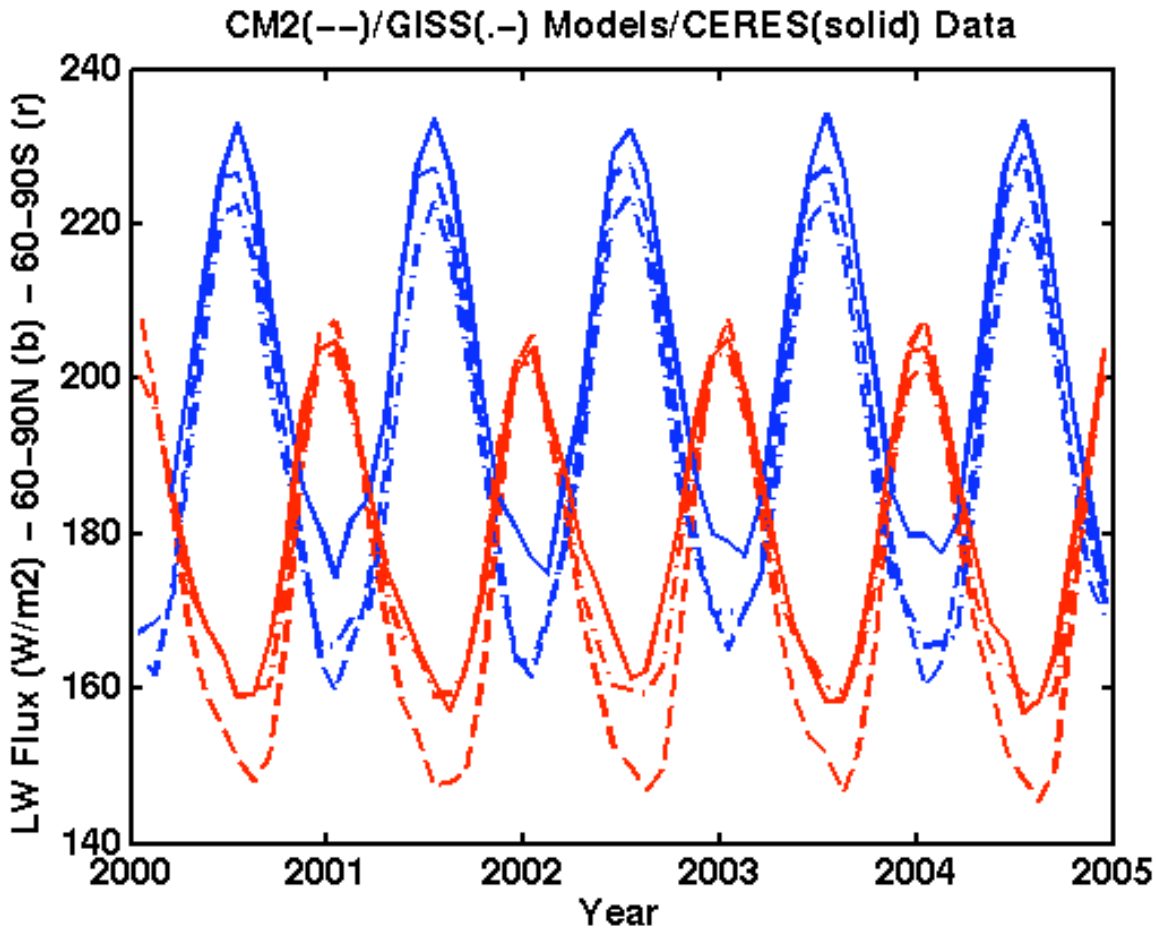
Outgoing Longwave Flux (Polar)



CERES mean - model mean (W/m^2)

	N	S
CM2	7.5	7.1
GISS	10.5	2.1

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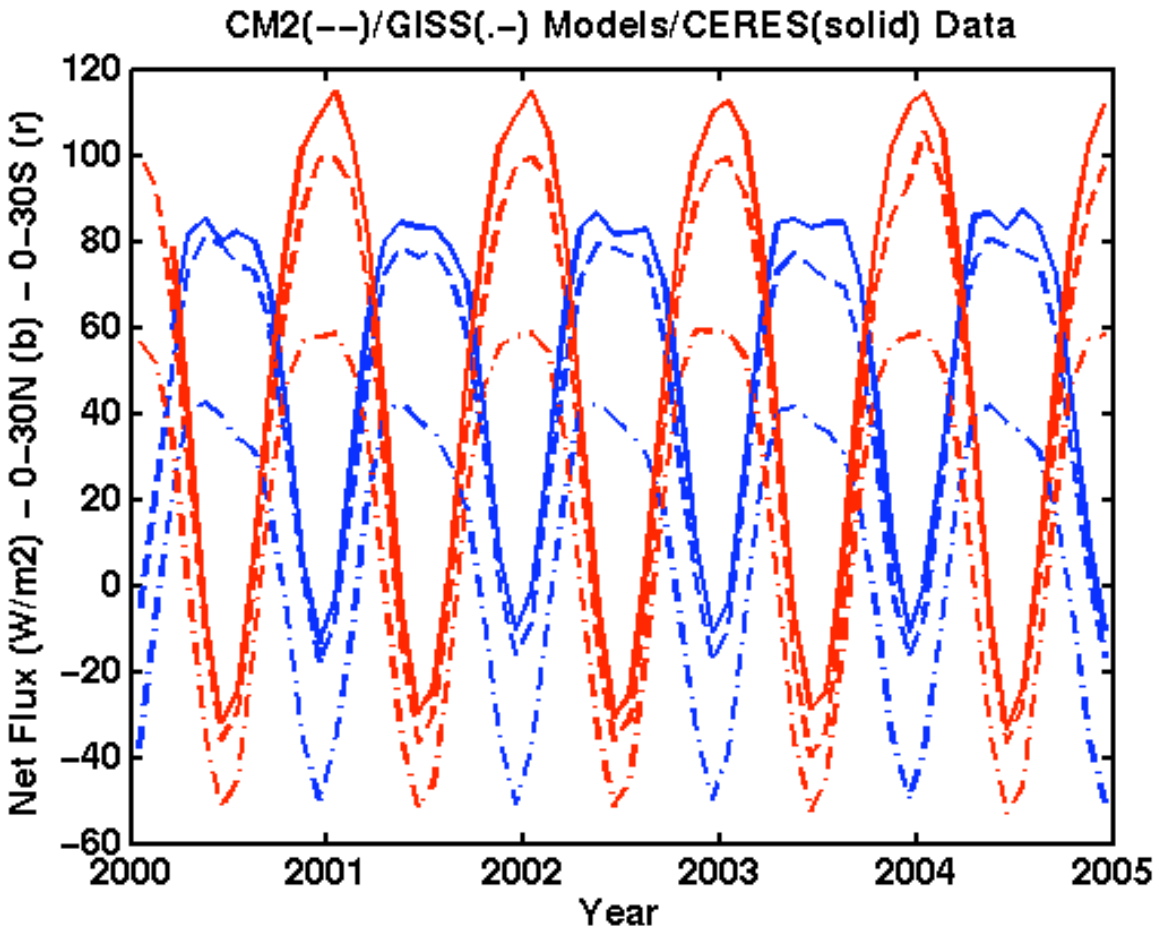
Net Flux (Tropical)



CERES mean - model mean (W/m^2)

	N	S
CM2	8.3	10.6
GISS	44.0	36.9

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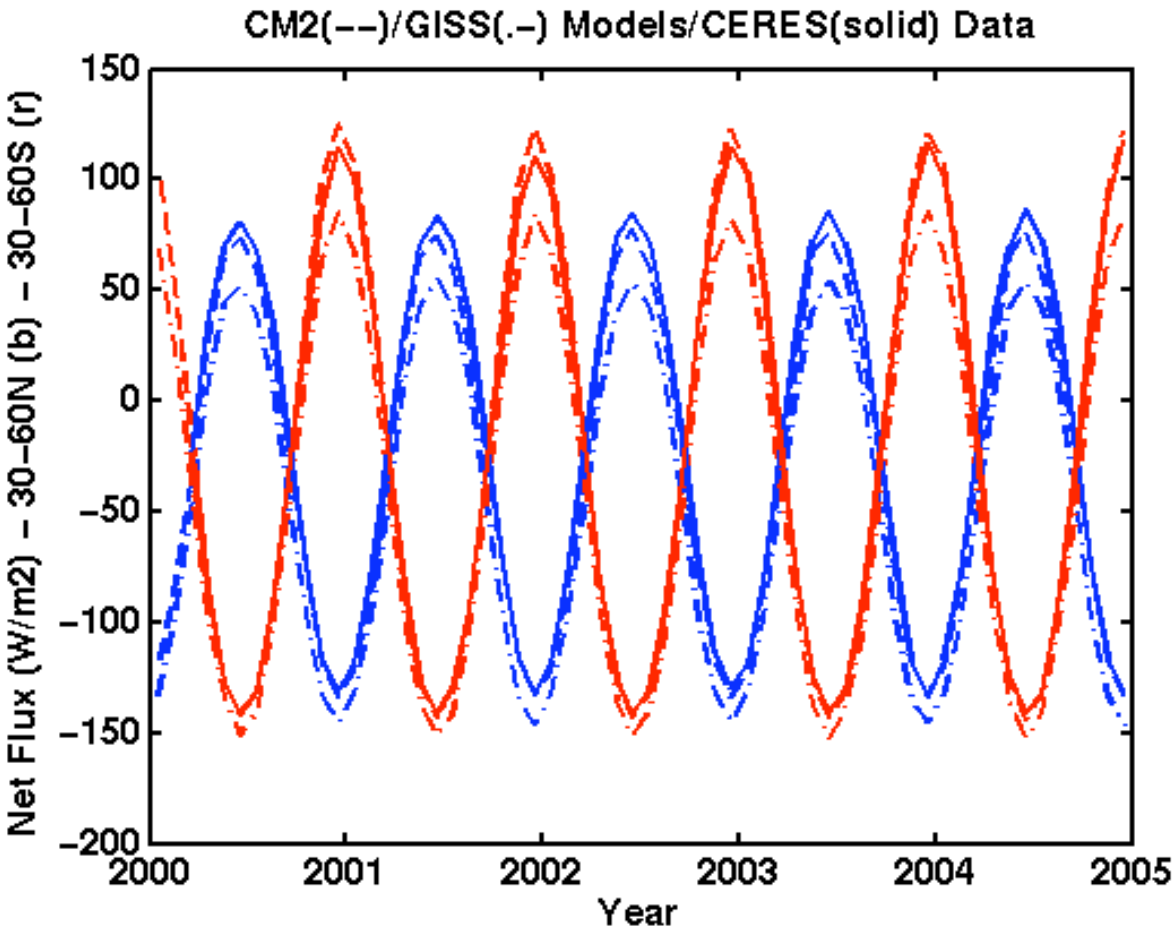
Net Flux (Temperate)



CERES mean - model mean (W/m^2)

	N	S
CM2	6.8	-2.3
GISS	24.1	18.4

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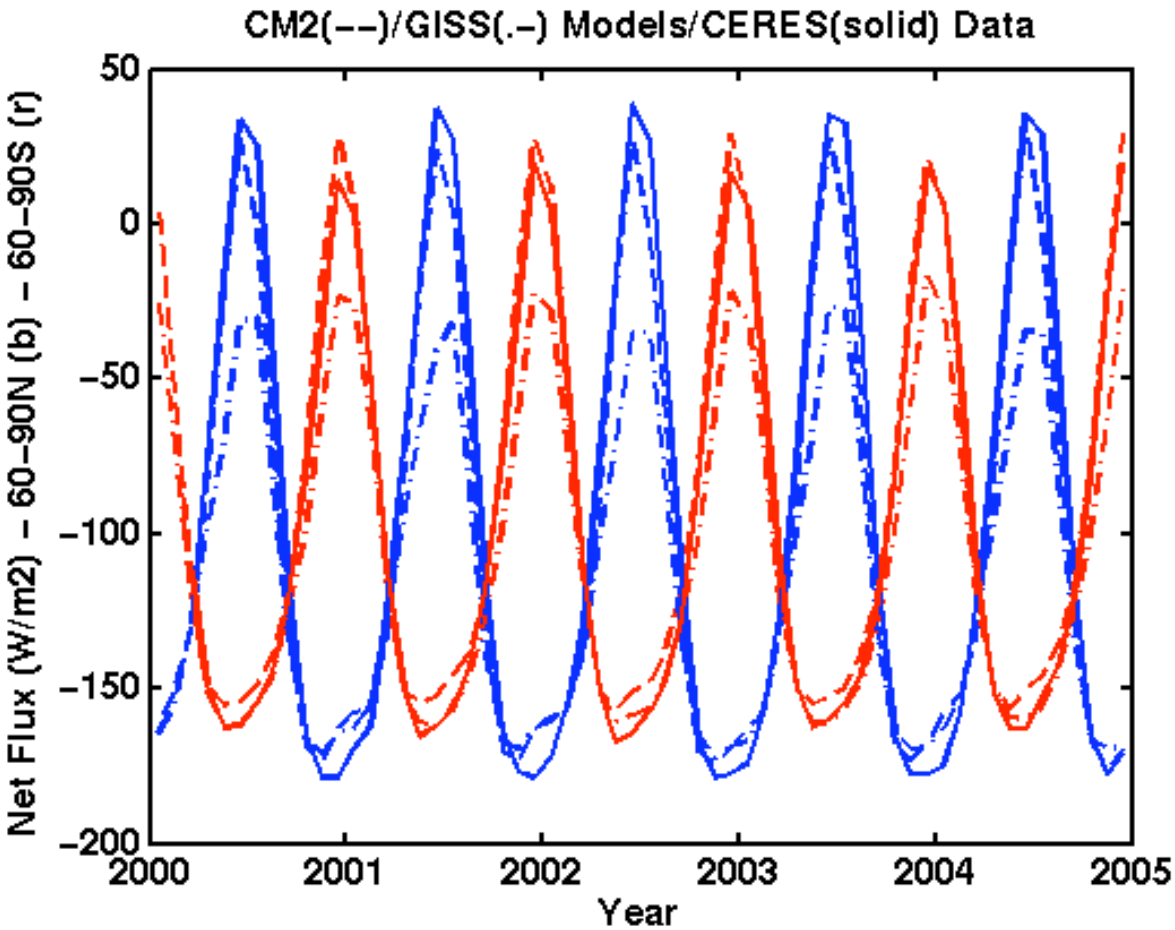
Net Flux (Polar)



CERES mean - model mean (W/m^2)

	N	S
CM2	5.7	-4.4
GISS	20.2	12.9

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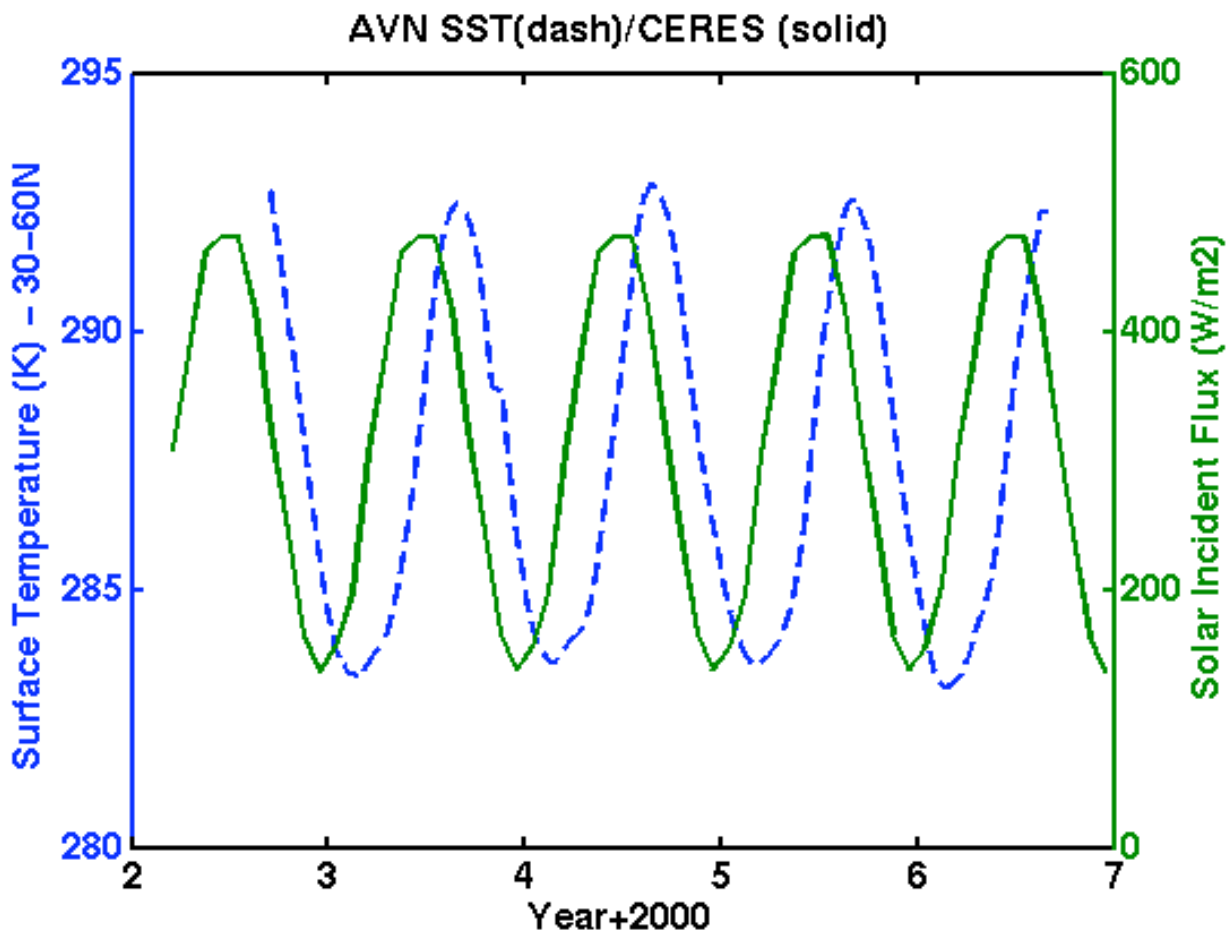
Global Net Flux

- CERES = 4.9 W/m^2 (10° zones)
- CM2 = -0.7 W/m^2
- GISS = -25.3 W/m^2

- Problem with closure in GISS model

Surface Temperature vs. Solar Incident Flux



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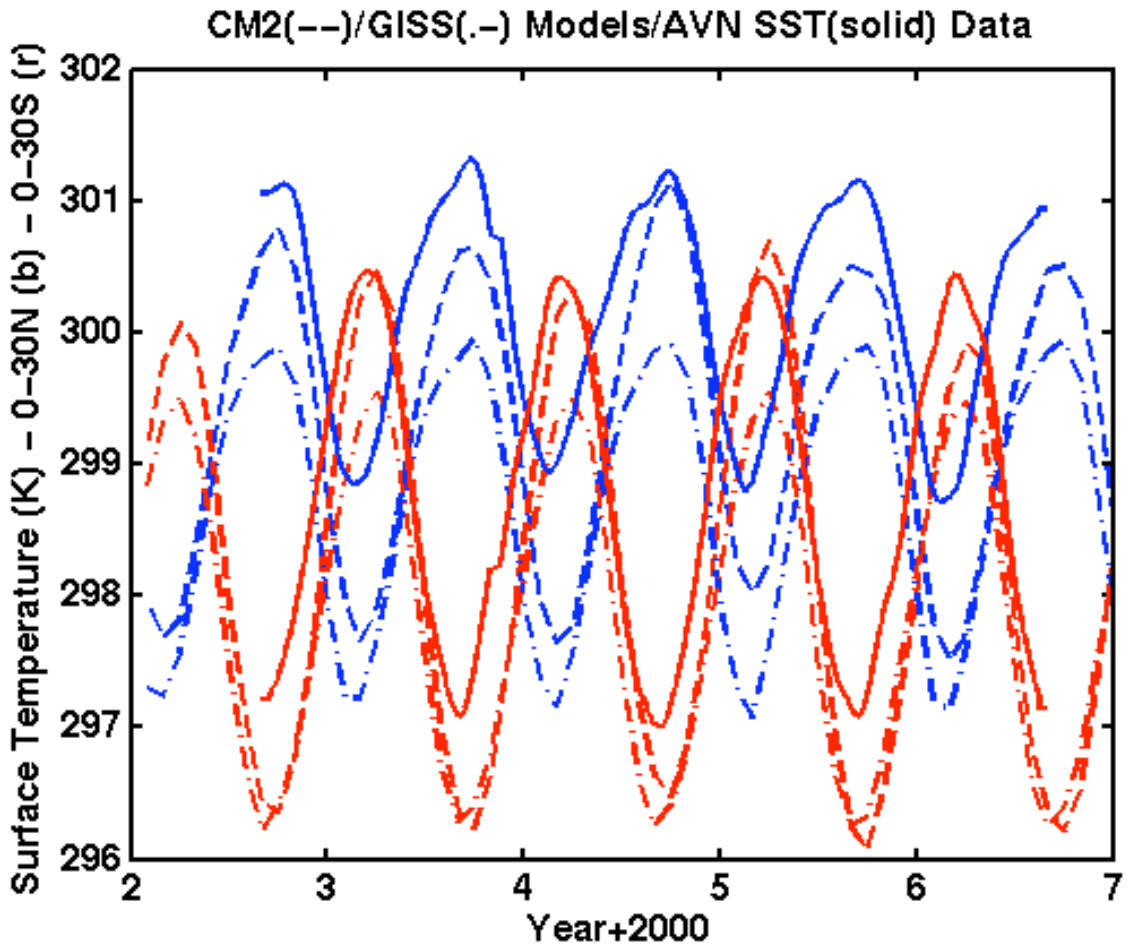
Ocean Surface Temperature (Tropical)



AVN mean - model mean (°K)

	N	S
CM2	0.88	0.54
GISS	1.43	0.90

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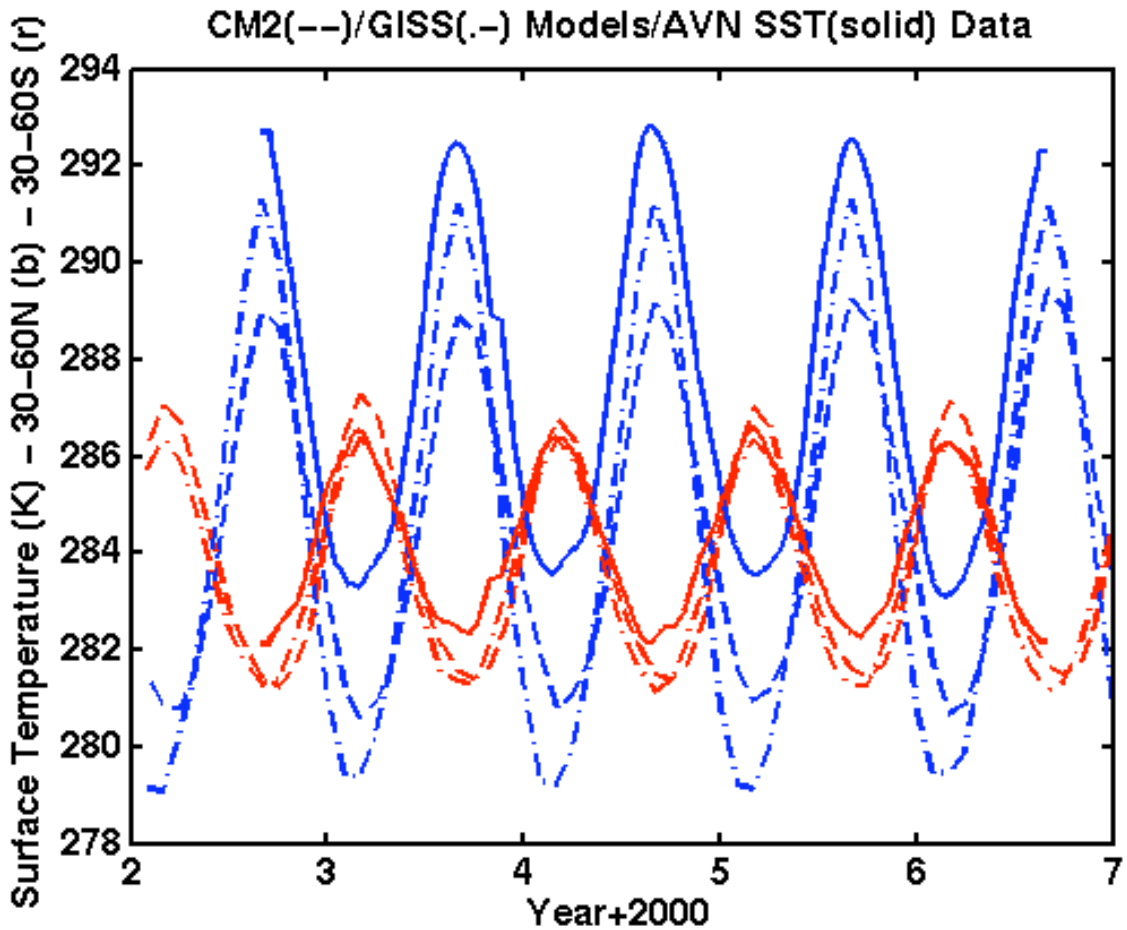
Ocean Surface Temperature (Temperate)



AVN mean - model mean (°K)

	N	S
CM2	2.76	0.38
GISS	2.88	0.63

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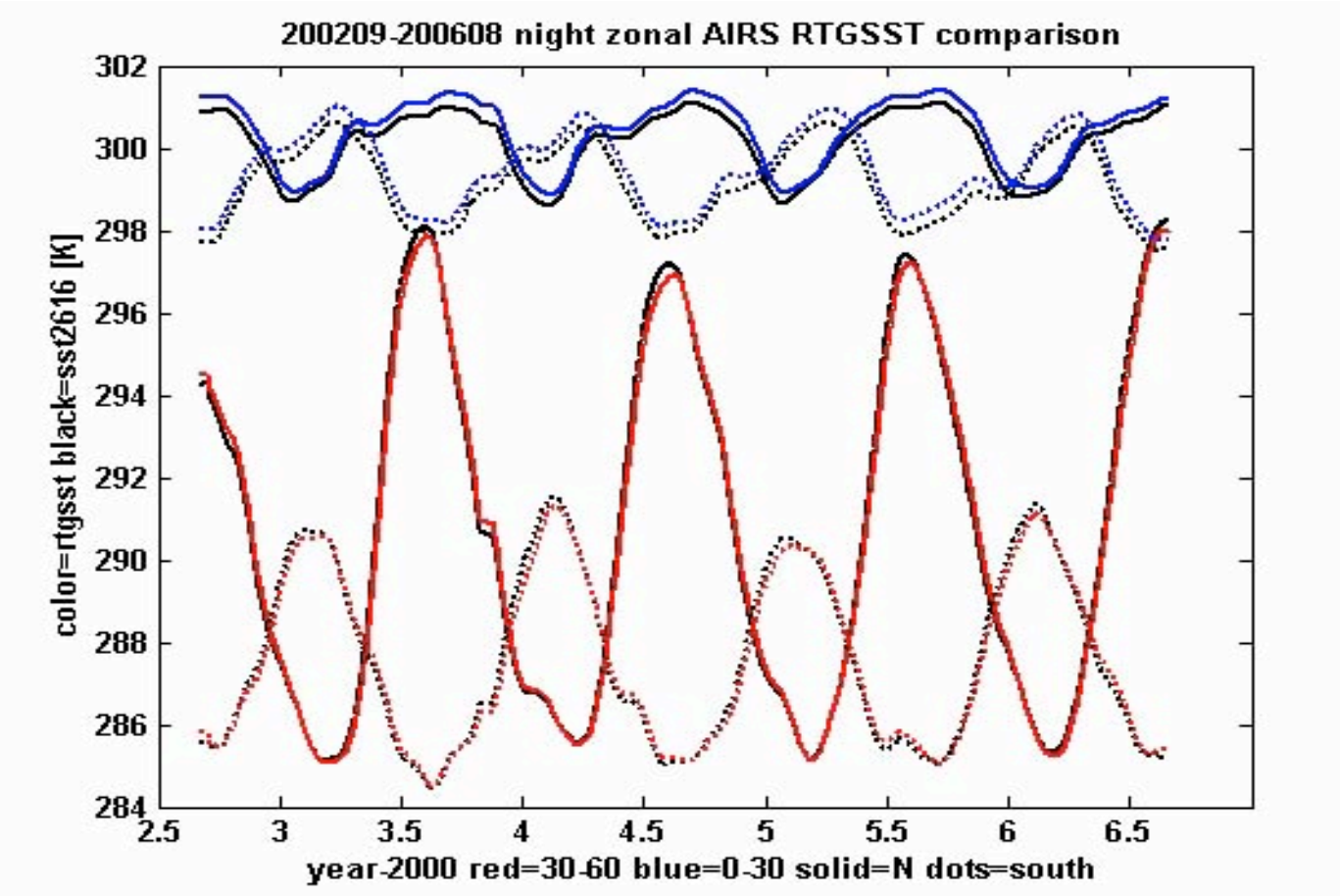
AIRS/RTGSST Comparison



Clear data only (warm bias)

Summary

- Solar Reflected Flux too high in models compared to CERES (very high in GISS)
- OLR problems in 0-30 zone (phase and amplitude)
- Net Flux ok except for GISS
- Sea Surface Temperature too low compared to AVN (AIRS compares favorably where available)