Analysis of CMIP3 AMIP simulations

Digital supplement tot he following paper:

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"Assessing surface solar radiation fluxes in the CMIP ensembles" DOI: 10.1175/JCLI-D-14-00503.1 Journal of Climate
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Software used: pyCMBS (https://github.com/pygeo/pycmbs/)

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1.1 ISCCP

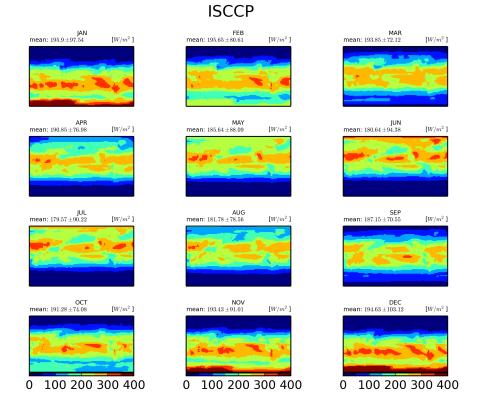


Figure 1: Monthly mean ISCCP

1.1.1 CMIP3 iap fgoals1 0 g-amip

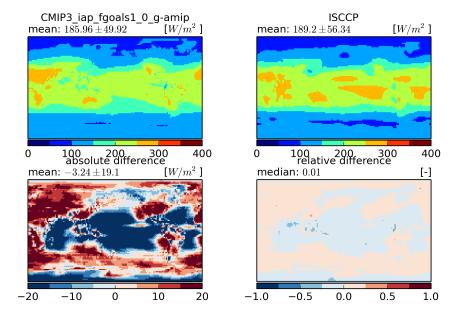


Figure 2: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip

JAN	FEB	MAR
mean: 190.15±91.07 [W/m ²]	mean: 189.48±73.36 [W/m ²]	mean: 188.36 ± 64.22 [W/m ²]
APR	MAY	JUN
mean: 186.8 ± 72.59 [W/m ²]	mean: 183.73 ±88.31 [W/m ²]	mean: 179.62±96.69 [W/m ²]
JUL	AUG	SEP
mean: 177.63 ±90.67 [W/m ²]	mean: 179.45 ±76.76 [W/m ²]	mean: 184.21±66.79 [W/m ²]
mean: 189.42±70.23 [W/m ²]	mean: 191.4±87.69 [W/m ²]	DEC mean: 191.27±99.45 [W/m ²] 0 100 200 300 400

Figure 3: Monthly mean climatology for iap-fgoals1-0-g

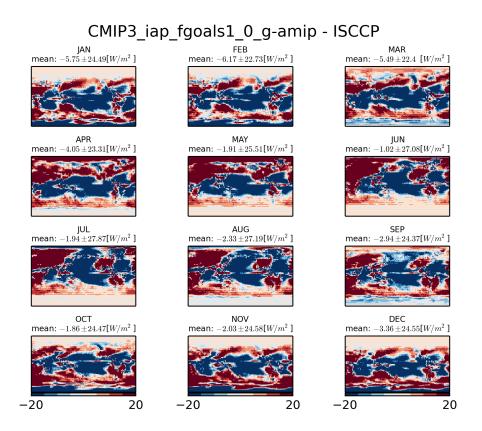


Figure 4: Monthly mean climatology of difference between IAP-FGOALS1-0-G and ISCCP

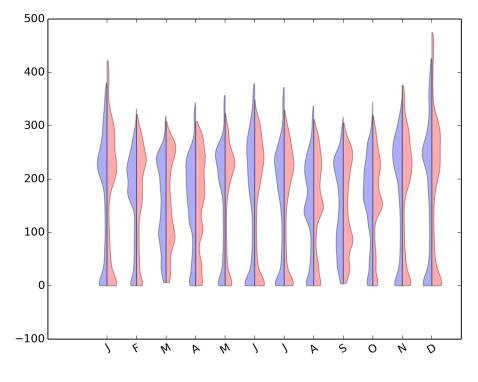


Figure 5: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

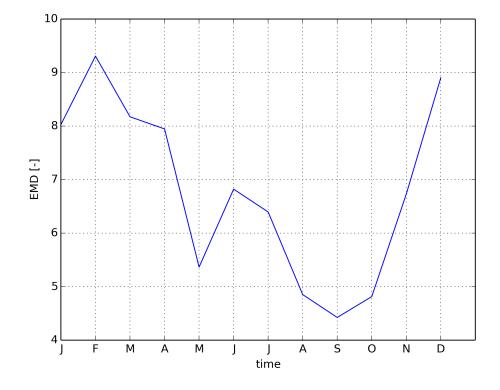


Figure 6: Timeseries of EMD

1.1.2 CMIP3 inmcm3 0-amip

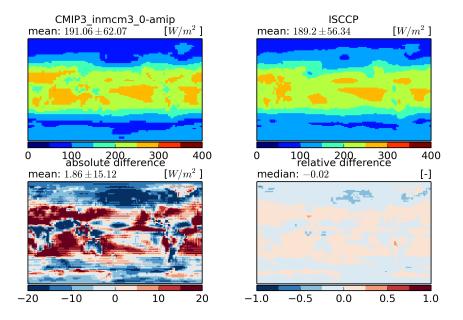


Figure 7: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip

JAN mean: 195.57±95.95	[W/m ²]	FEB mean: 197.34 ±82.78	[W/m ²]	MAR mean: 196.84±75.94	[W/m ²]
within the		3923			
APR mean: 193.54 ± 79.8	[W/m ²]	MAY mean: 186.48 ±89.41	[W/m ²]	JUN mean: 180.46 ± 95.08	[W/m ²]
				22	
JUL mean: 180.11±92.32	[W/m ²]	AUG mean: 183.92±83.87	[<i>W</i> / <i>m</i> ²]	SEP mean: 190.56 ±75.25	[W/m ²]
OCT mean: 195.58±76.69	$[W/m^2]$	NOV mean: 196.83 ±91.04	$[W/m^2]$	DEC mean: 195.48±101.3	$[W/m^2]$
0 100 200 3	300 400	0 100 200 3	00 400	0 100 200 3	200 400

Figure 8: Monthly mean climatology for inmcm3-0

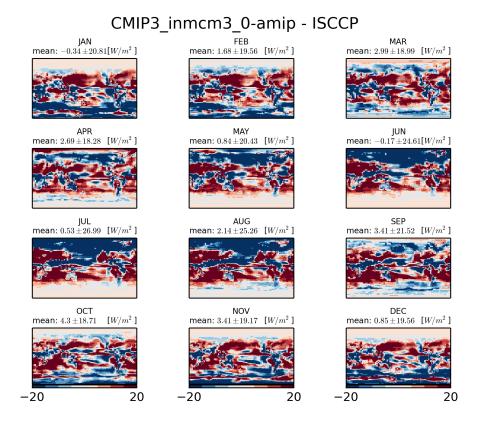


Figure 9: Monthly mean climatology of difference between INMCM3-0 and ISCCP

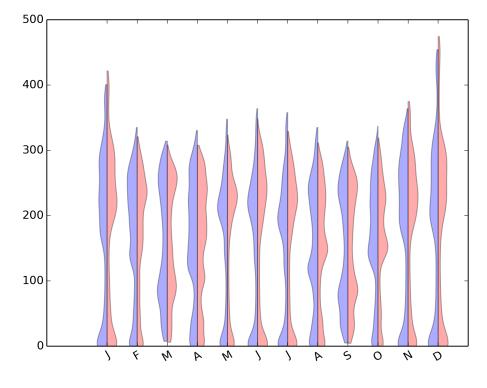


Figure 10: Violin plot for CMIP3-INMCM3-0-AMIP

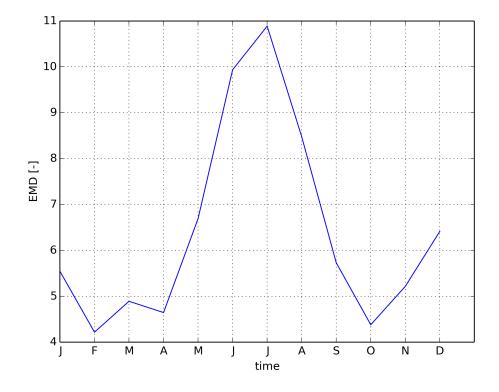


Figure 11: Timeseries of EMD

1.1.3 model mean

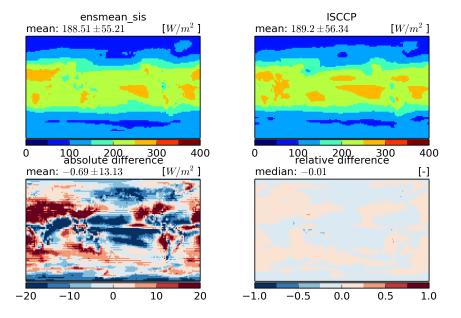


Figure 12: Temporal mean fields (top) and absolute and relative differences (bottom)

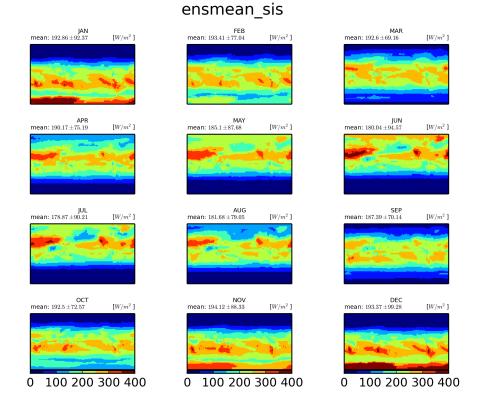


Figure 13: Monthly mean climatology for mean-model

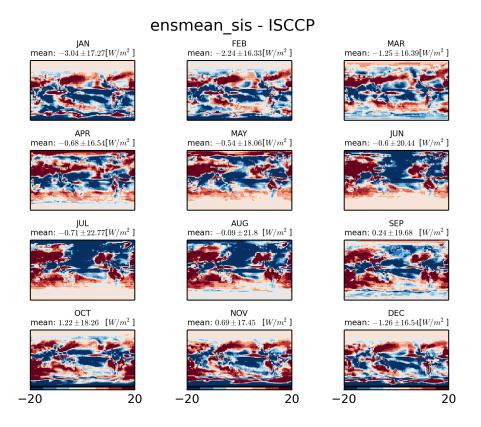


Figure 14: Monthly mean climatology of difference between MEAN-MODEL and ISCCP

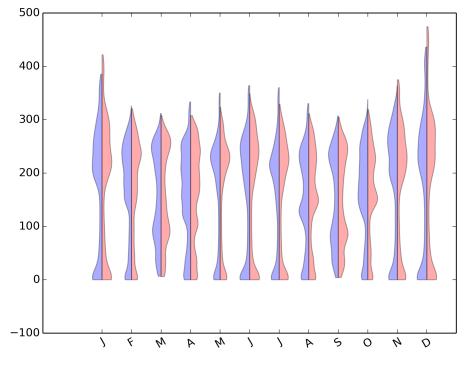


Figure 15: Violin plot for ENSMEAN-SIS

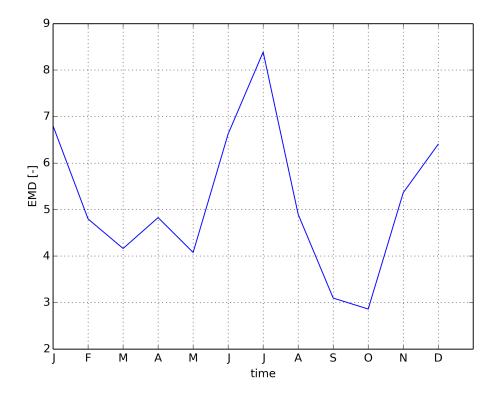


Figure 16: Timeseries of EMD

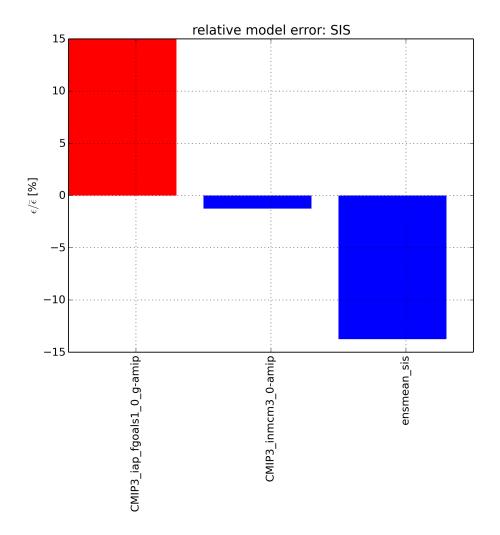


Figure 17: Relative model performance for SIS

1.2 CLARA

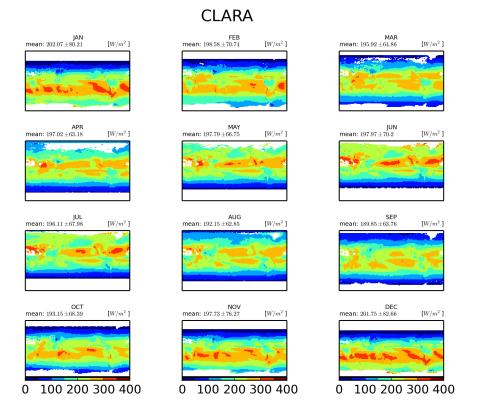


Figure 18: Monthly mean CLARA

1.2.1 CMIP3 iap fgoals1 0 g-amip

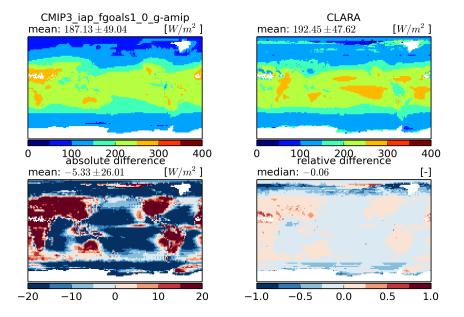


Figure 19: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip

JAN	FEB	MAR
mean: 186.89±89.04 [W/m ²]	mean: 189.24±73.68 [W/m ²]	mean: 190.85±61.5 [W/m ²]
APR	MAY	JUN
mean: 190.35 ± 67.34 [W/m ²]	mean: 187.07±83.88 [W/m ²]	mean: 182.71 ± 92.93 [W/m ²]
JUL	AUG	SEP
mean: 181.04 ± 87.04 [W/m ²]	mean: 183.37±72.53 [W/m ²]	mean: 187.57 ±63.16 [W/m ²]
mean: 190.43±70.21 [W/m ²] (W/m ²] (W/m ²] (W/m ²] (W/m ²) (W/m ²) (W/m ²) (W/m ²)	NOV mean: 180.03±86.79 [W/m ²] (W/m ²] 0 100 200 300 400	DEC mean: 187.0±95.98 [W/m ²]

Figure 20: Monthly mean climatology for iap-fgoals1-0-g

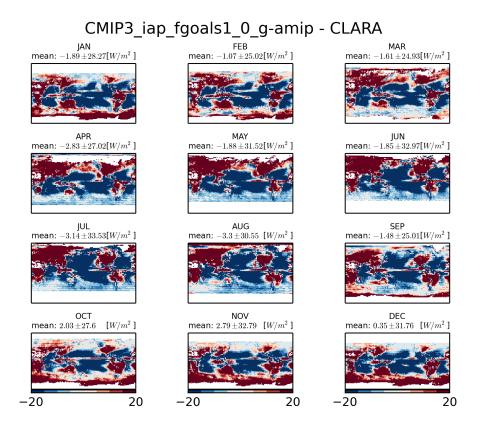


Figure 21: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CLARA

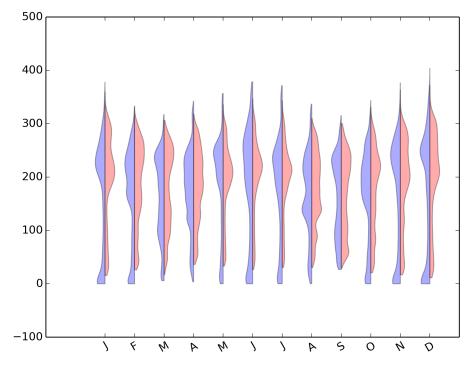


Figure 22: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

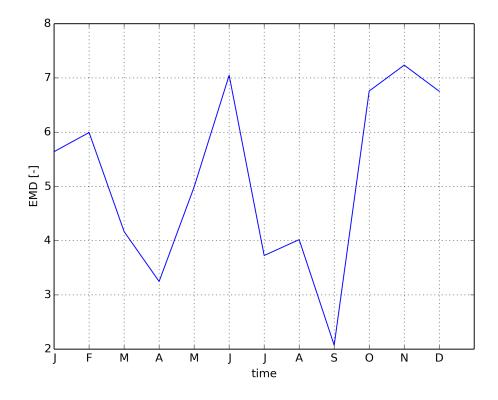


Figure 23: Timeseries of EMD

1.2.2 CMIP3 inmcm3 0-amip

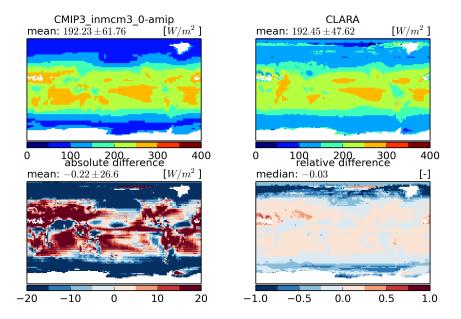


Figure 24: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip

JAN		FEB		MAR	
mean: 192.24±93.82	[W/m ²]	mean: 197.16±83.35	$[W/m^2]$	mean: 199.6 ±73.95	[W/m ²]
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APR		MAY		JUN	
mean: 197.35 ± 75.13	$[W/m^2]$	mean: 189.97 ±85.09	$[W/m^2]$	mean: 183.62±91.24	$[W/m^2]$
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		AUG		SEP	
JUL mean: 183.42 ±88.51	$[W/m^2]$	mean: 187.55 ± 79.61	$[W/m^2]$	mean: 193.85 ±71.95	$[W/m^2]$
		the second second	3.4	and the second	
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		design of the second second			
OCT		NOV		DEC	
mean: 196.58 ± 76.96	$[W/m^2]$	mean: 194.35 ±90.02	$[W/m^2]$	mean: 191.1 ±97.4	$[W/m^2]$
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0 100 200 3	00 400	0 100 200 3	00 400	0 100 200 3	800 400

Figure 25: Monthly mean climatology for inmcm3-0

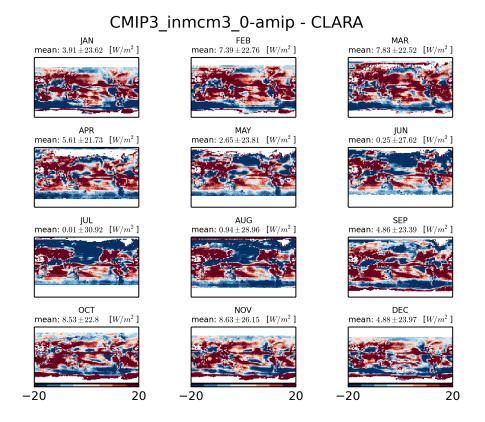


Figure 26: Monthly mean climatology of difference between INMCM3-0 and CLARA $\,$

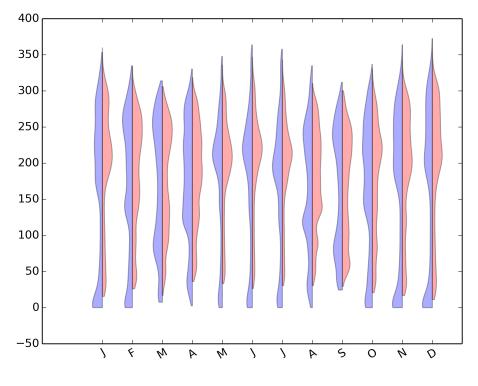


Figure 27: Violin plot for CMIP3-INMCM3-0-AMIP

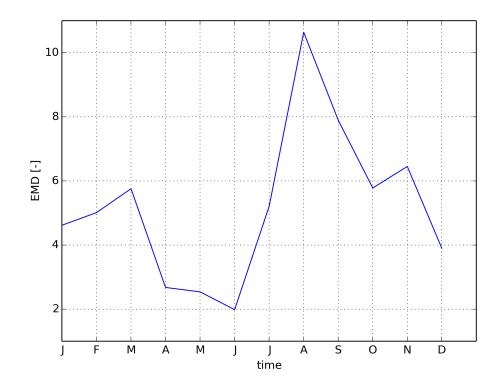


Figure 28: Timeseries of EMD

1.2.3 model mean

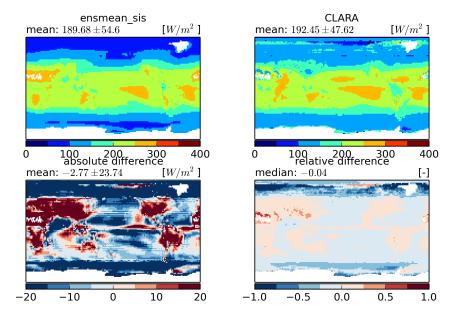
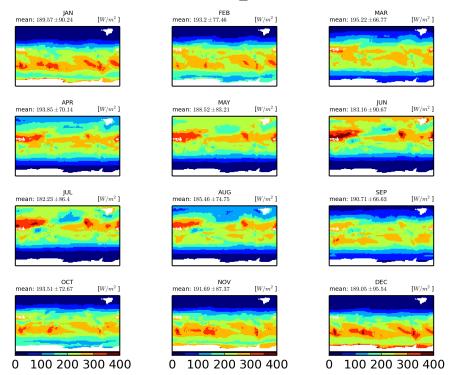


Figure 29: Temporal mean fields (top) and absolute and relative differences (bottom)



ensmean_sis

Figure 30: Monthly mean climatology for mean-model

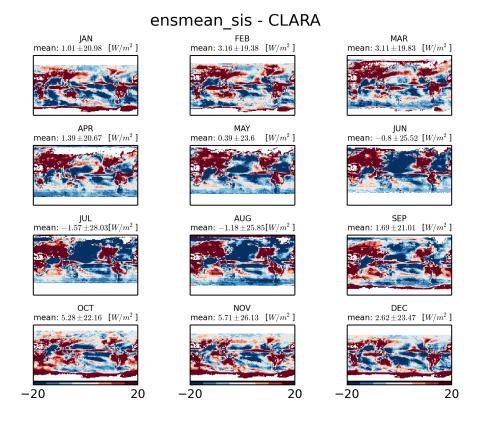


Figure 31: Monthly mean climatology of difference between MEAN-MODEL and CLARA

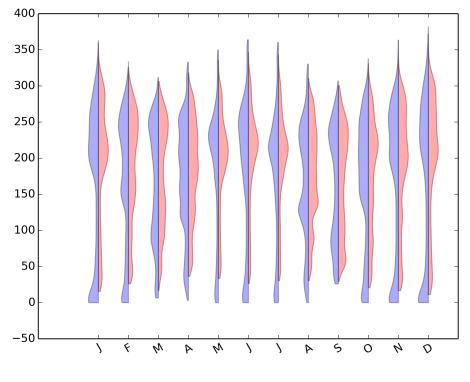


Figure 32: Violin plot for ENSMEAN-SIS

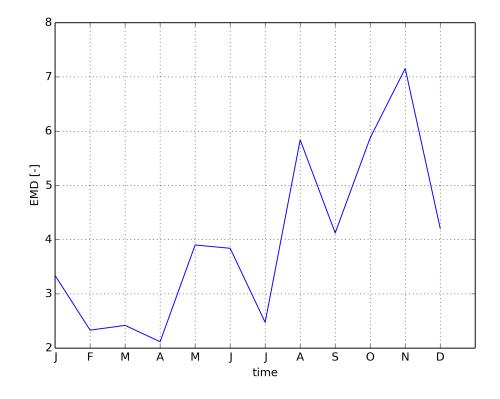


Figure 33: Timeseries of EMD

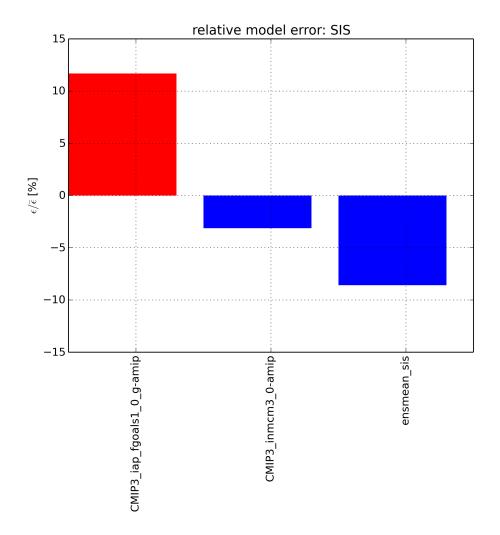


Figure 34: Relative model performance for SIS

1.3 CERES2.7

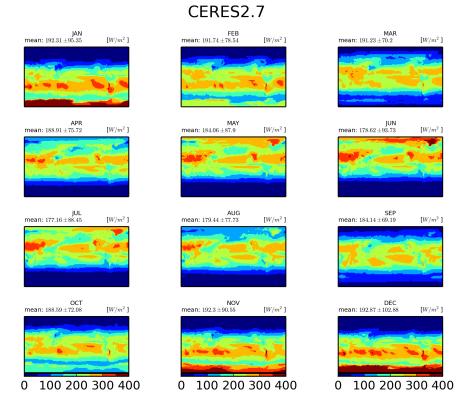


Figure 35: Monthly mean CERES2.7

1.3.1 CMIP3 iap fgoals1 0 g-amip

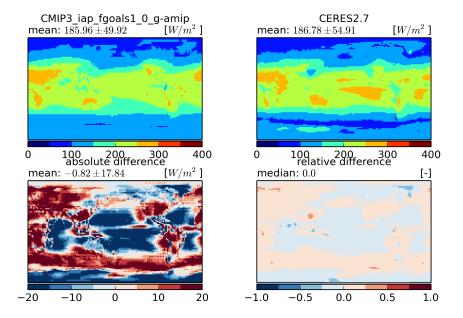


Figure 36: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip

JAN mean: 190.15±91.07 [W/m ²]	FEB mean: 189.48 ± 73.36 [W/m^2]	MAR mean: 188.36 ± 64.22 [W/m^2]
APR mean: 186.8 ± 72.59 [W/m ²]	MAY mean: 183.73 ± 88.31 [W/m^2]	JUN mean: 179.62 ± 96.69 [W/m^2]
JUL mean: 177.63 ± 90.67 [W/m^2]	AUG mean: 179.45 ± 76.76 [W/m^2]	SEP mean: 184.21 ± 66.79 [W/m^2]
OCT mean: 189.42 ±70.23 [W/m ²]	NOV mean: 191.4 ± 87.63 [W/m^2]	DEC mean: 191.27 ±99.45 [W/m ²]
0 100 200 300 400	0 100 200 300 400	0 100 200 300 400

Figure 37: Monthly mean climatology for iap-fgoals1-0-g

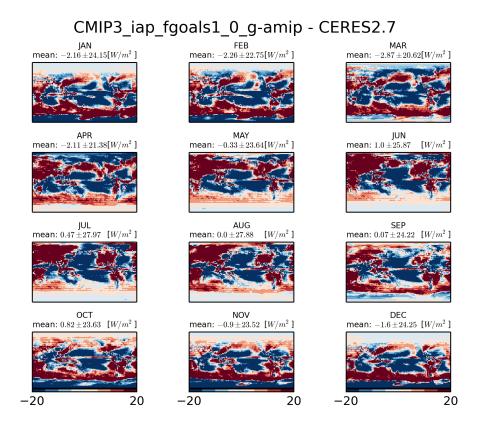


Figure 38: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CERES2.7

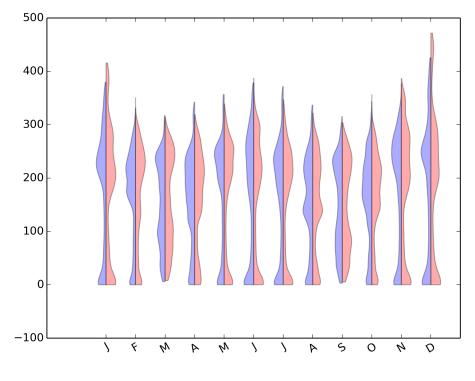


Figure 39: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

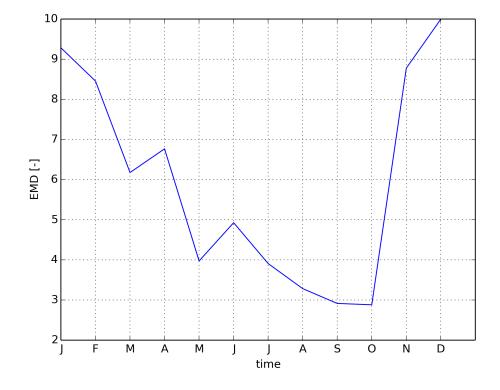


Figure 40: Timeseries of EMD

1.3.2 CMIP3 inmcm3 0-amip

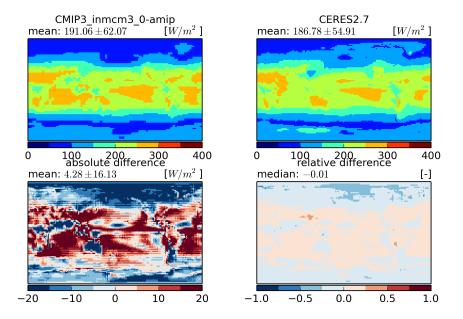


Figure 41: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip

JAN mean: 195.57±95.95	[W/m ²]	FEB mean: 197.34 ±82.78	[W/m ²]	MAR mean: 196.84±75.94	[W/m ²]
within the		3923			
APR mean: 193.54 ± 79.8	[W/m ²]	MAY mean: 186.48 ±89.41	[W/m ²]	JUN mean: 180.46 ± 95.08	[W/m ²]
				22	
JUL mean: 180.11±92.32	[W/m ²]	AUG mean: 183.92±83.87	[W/m ²]	SEP mean: 190.56 ±75.25	[W/m ²]
OCT mean: 195.58±76.69	$[W/m^2]$	NOV mean: 196.83 ±91.04	$[W/m^2]$	DEC mean: 195.48±101.3	$[W/m^2]$
0 100 200 3	300 400	0 100 200 3	00 400	0 100 200 3	300 400

Figure 42: Monthly mean climatology for inmcm3-0

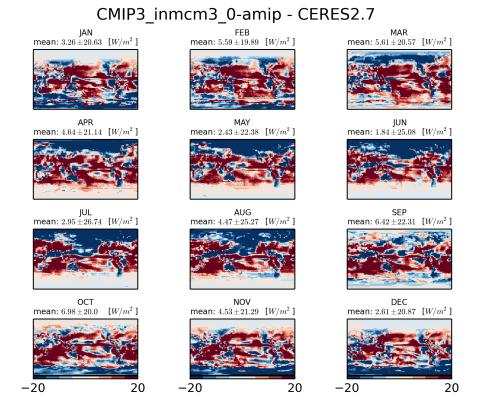


Figure 43: Monthly mean climatology of difference between INMCM3-0 and CERES2.7

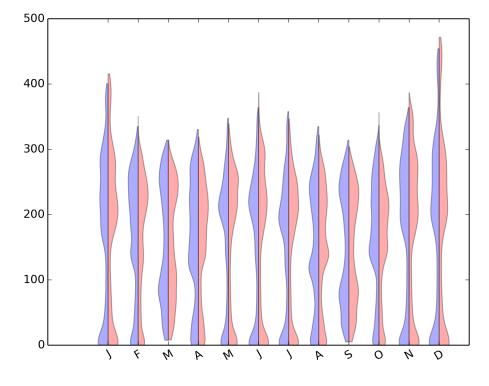


Figure 44: Violin plot for CMIP3-INMCM3-0-AMIP

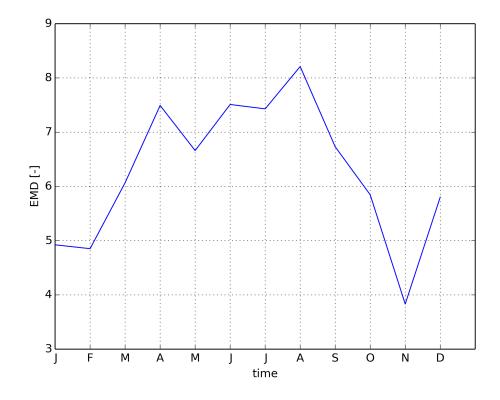


Figure 45: Timeseries of EMD

1.3.3 model mean

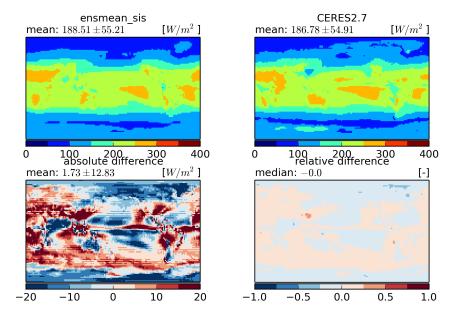


Figure 46: Temporal mean fields (top) and absolute and relative differences (bottom)

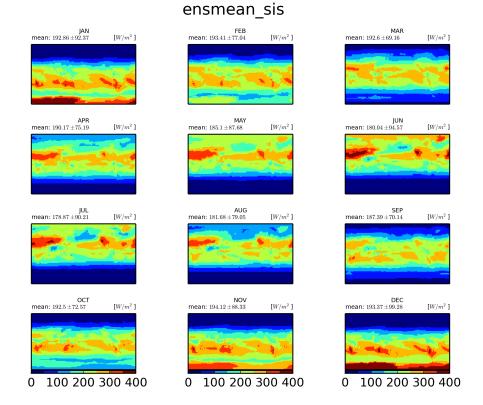


Figure 47: Monthly mean climatology for mean-model

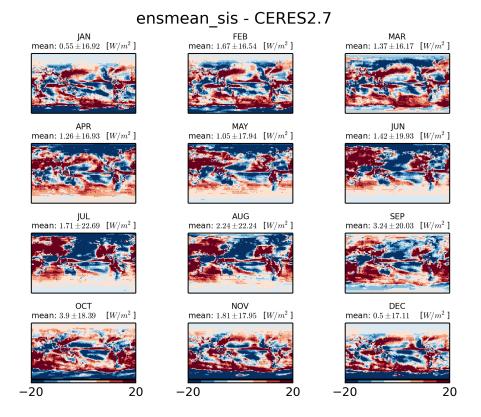


Figure 48: Monthly mean climatology of difference between MEAN-MODEL and CERES2.7

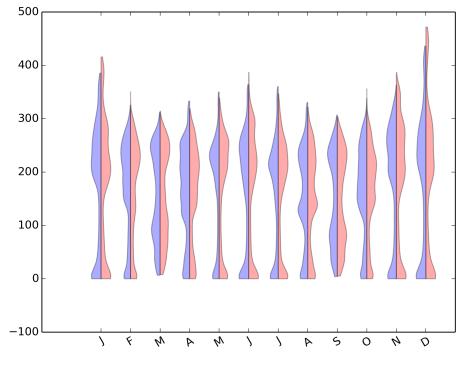


Figure 49: Violin plot for ENSMEAN-SIS

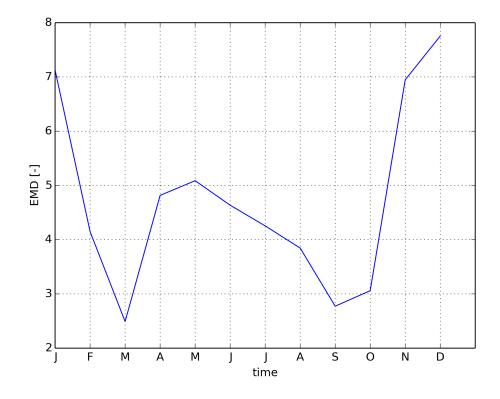


Figure 50: Timeseries of EMD

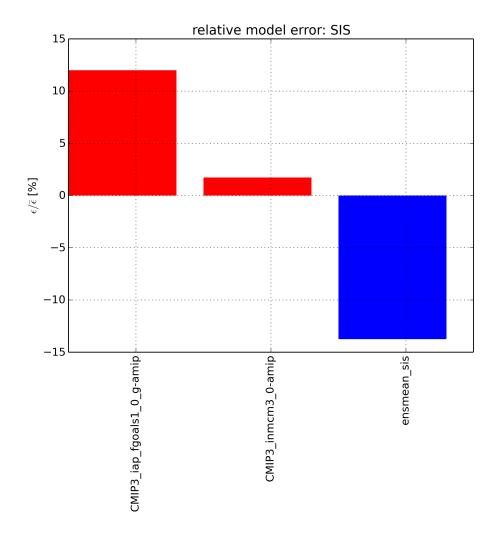


Figure 51: Relative model performance for SIS

1.4 SRBv3.0

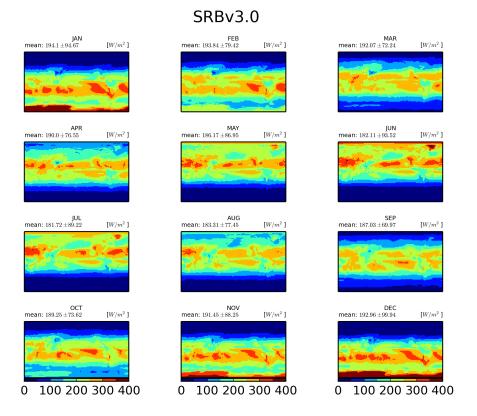


Figure 52: Monthly mean SRBv3.0

1.4.1 CMIP3 iap fgoals1 0 g-amip

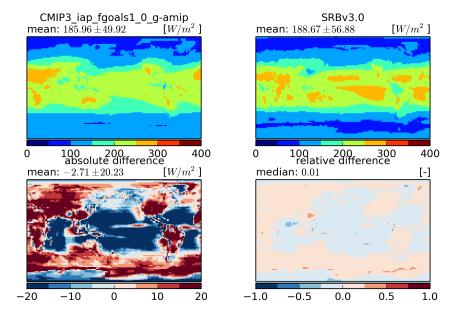


Figure 53: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip

JAN	FEB	MAR
mean: 190.15±91.07 [W/m ²]	mean: 189.48±73.36 [W/m ²]	mean: 188.36 ± 64.22 [W/m ²]
APR	MAY	JUN
mean: 186.8 ± 72.59 [W/m ²]	mean: 183.73±88.31 [W/m ²]	mean: 179.62±96.69 [W/m ²]
JUL	AUG	SEP
mean: 177.63 ±90.67 [W/m ²]	mean: 179.45±76.76 [W/m ²]	mean: 184.21±66.79 [W/m ²]
0 100 200 300 400	MOV mean: 191.4 ±87.63 [W/m ²]	DEC mean: 191.27±99.45 [W/m ²] 0 100 200 300 400

Figure 54: Monthly mean climatology for iap-fgoals1-0-g

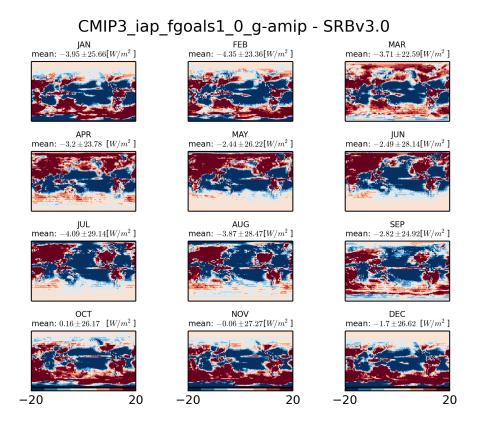


Figure 55: Monthly mean climatology of difference between IAP-FGOALS1-0-G and SRBV3.0 $\,$

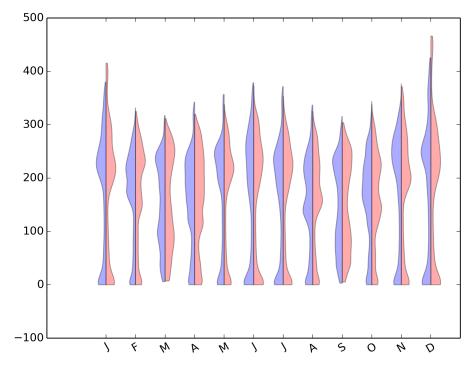


Figure 56: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

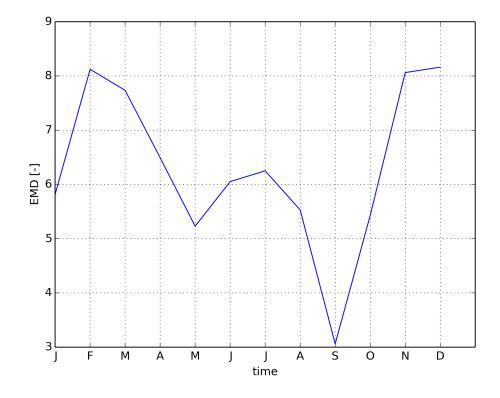


Figure 57: Timeseries of EMD

1.4.2 CMIP3 inmcm3 0-amip

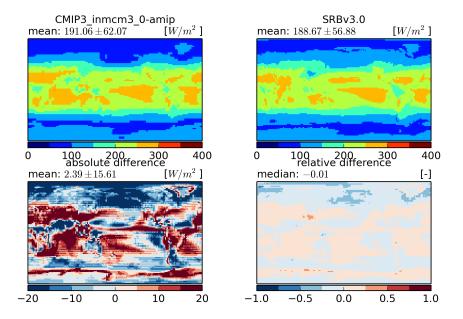


Figure 58: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip

JAN mean: 195.57±95.95	[W/m ²]	FEB mean: 197.34 ±82.78	[W/m ²]	MAR mean: 196.84±75.94	[W/m ²]
within the		3923			
APR mean: 193.54 ± 79.8	[W/m ²]	MAY mean: 186.48 ±89.41	[W/m ²]	JUN mean: 180.46 ± 95.08	[W/m ²]
				22	
JUL mean: 180.11±92.32	[W/m ²]	AUG mean: 183.92±83.87	[W/m ²]	SEP mean: 190.56 ±75.25	[W/m ²]
OCT mean: 195.58±76.69	$[W/m^2]$	NOV mean: 196.83 ±91.04	$[W/m^2]$	DEC mean: 195.48±101.3	$[W/m^2]$
0 100 200 3	300 400	0 100 200 3	00 400	0 100 200 3	300 400

Figure 59: Monthly mean climatology for inmcm3-0

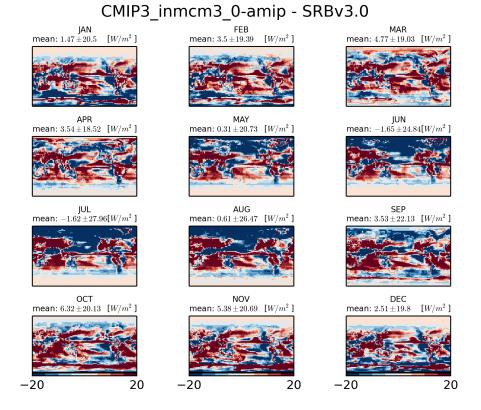


Figure 60: Monthly mean climatology of difference between INMCM3-0 and SRBV3.0 $\,$

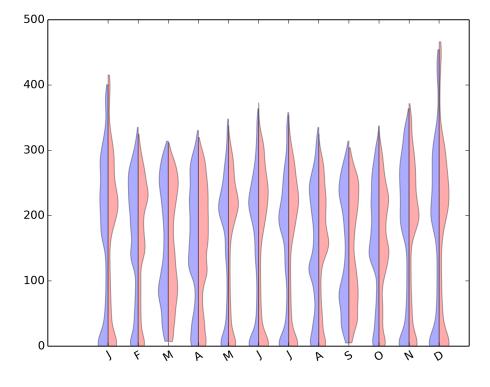


Figure 61: Violin plot for CMIP3-INMCM3-0-AMIP

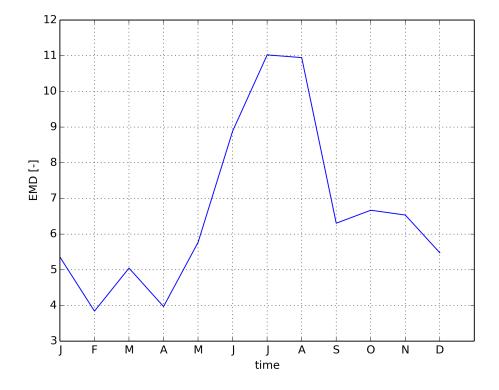


Figure 62: Timeseries of EMD

1.4.3 model mean

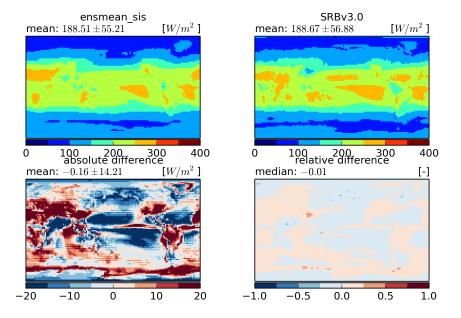


Figure 63: Temporal mean fields (top) and absolute and relative differences (bottom)

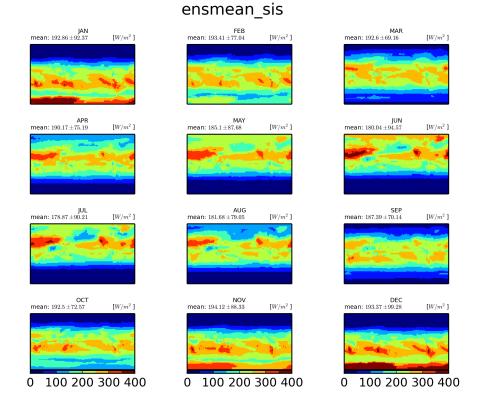


Figure 64: Monthly mean climatology for mean-model

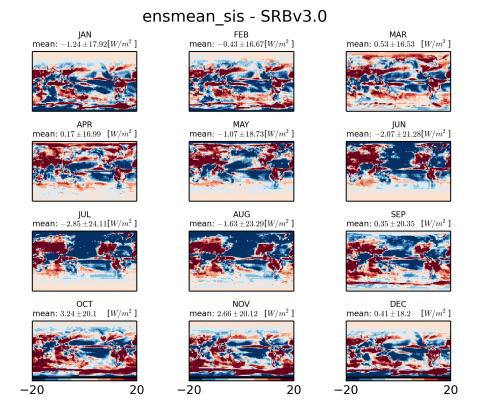


Figure 65: Monthly mean climatology of difference between MEAN-MODEL and SRBV3.0 $\,$

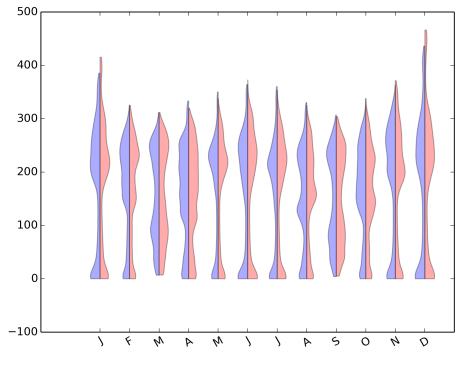


Figure 66: Violin plot for ENSMEAN-SIS

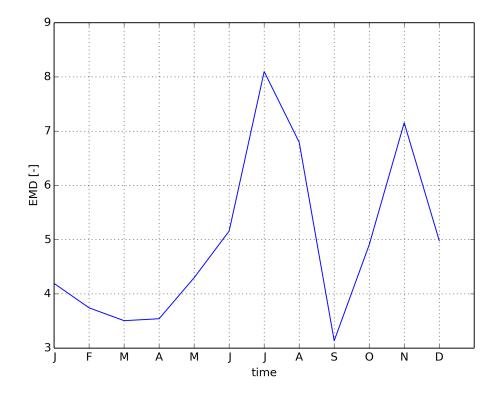


Figure 67: Timeseries of EMD

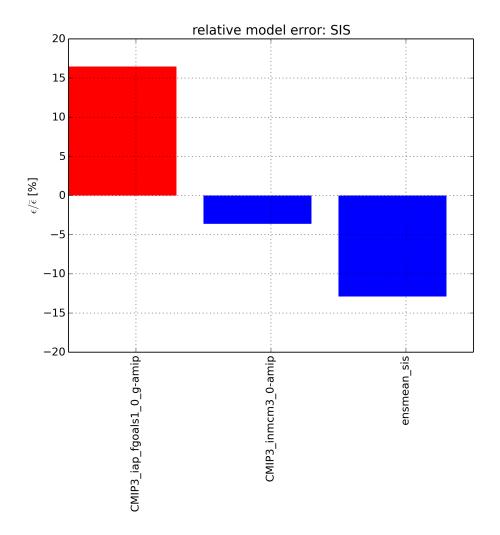


Figure 68: Relative model performance for SIS

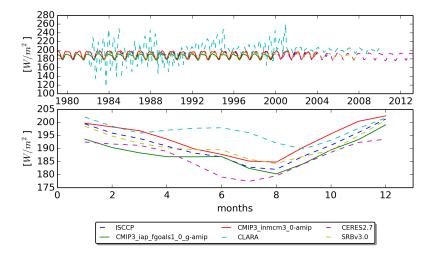


Figure 69: Global means for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR

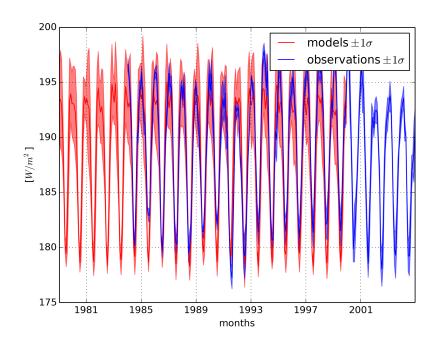


Figure 70: Global means for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR (summary); areas indicate $\pm 1\sigma$ as derived from the ensemble of models or observations

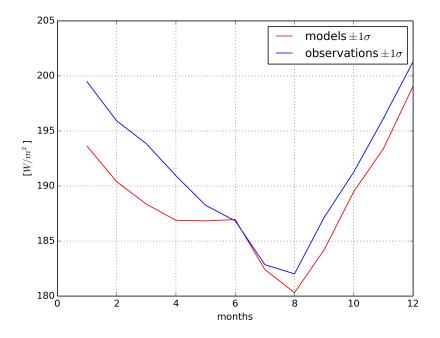


Figure 71: Global means for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR (summary climatology)

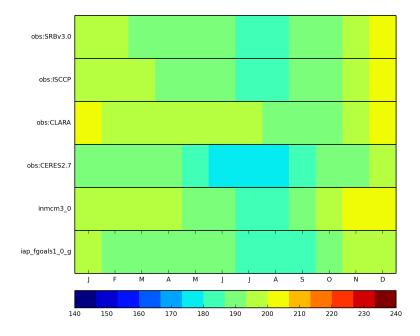


Figure 72: Global means climatology for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR

2.1 ISCCP

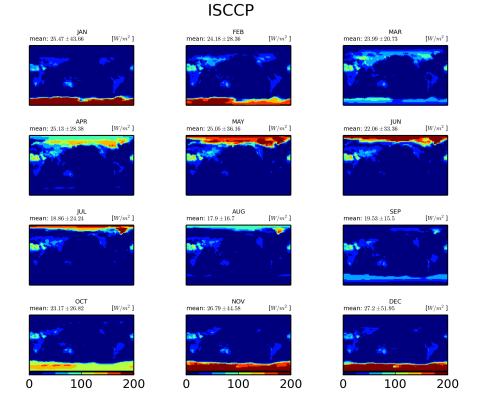


Figure 73: Monthly mean ISCCP

2.1.1 CMIP3 iap fgoals1 0 g-amip

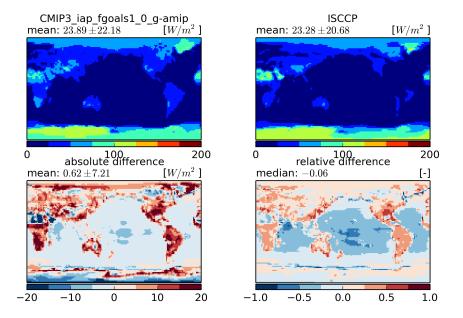


Figure 74: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip

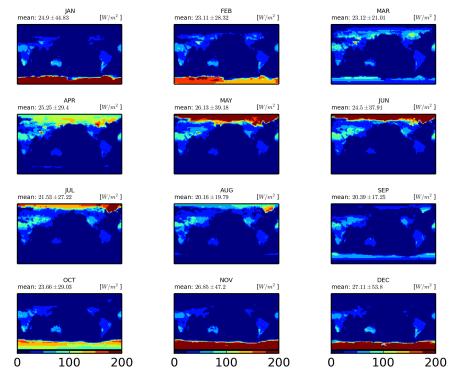


Figure 75: Monthly mean climatology for iap-fgoals1-0-g

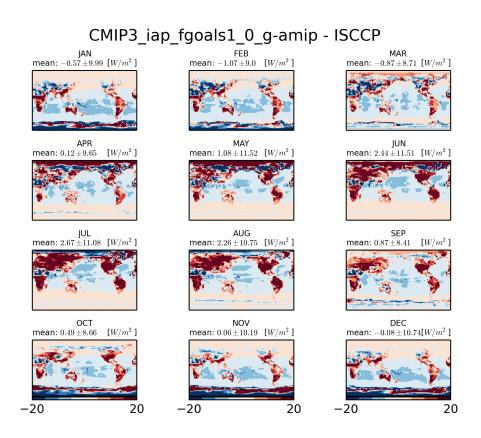


Figure 76: Monthly mean climatology of difference between IAP-FGOALS1-0-G and ISCCP

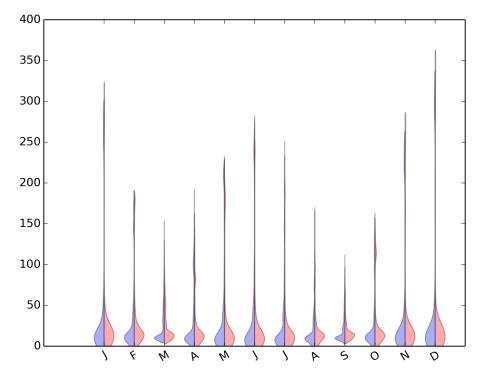


Figure 77: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

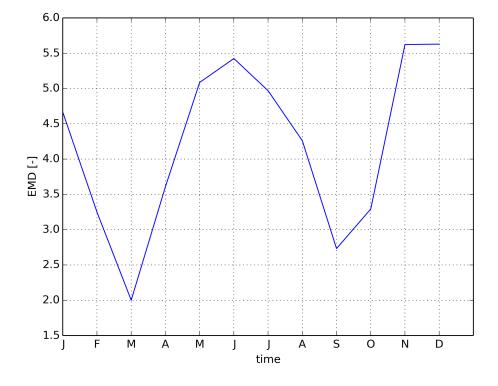


Figure 78: Timeseries of EMD

2.1.2 CMIP3 inmcm3 0-amip

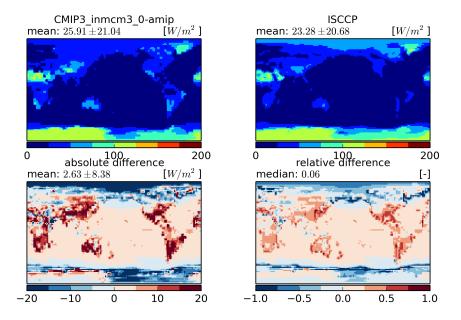


Figure 79: Temporal mean fields (top) and absolute and relative differences (bottom)

FEB mean: 26.91 ±29.47 MAR mean: 26.85 ±22.36 JAN mean: 27.58 ±42.9 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ APR mean: 26.96 ± 26.42 MAY mean: 25.09 ±27.64 JUN mean: 24.14±27.55 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ AUG mean: 22.47 ±20.02 SEP mean: 23.48 ±17.81 JUL mean: 23.27 ± 24.45 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ OCT mean: 26.45 ±27.35 NOV mean: 29.09 ±43.6 DEC mean: 28.63 ±49.22 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ 0 200 100 0 100 200 0 100 200

CMIP3_inmcm3_0-amip

Figure 80: Monthly mean climatology for inmcm3-0

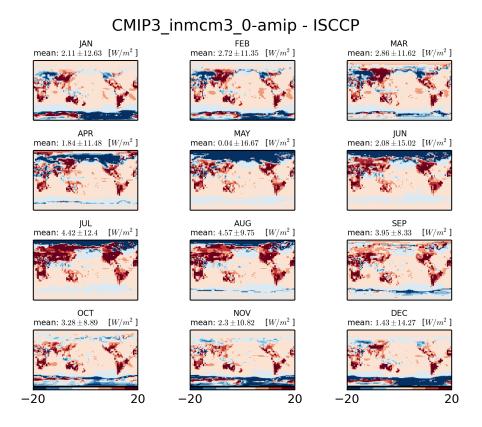


Figure 81: Monthly mean climatology of difference between INMCM3-0 and ISCCP

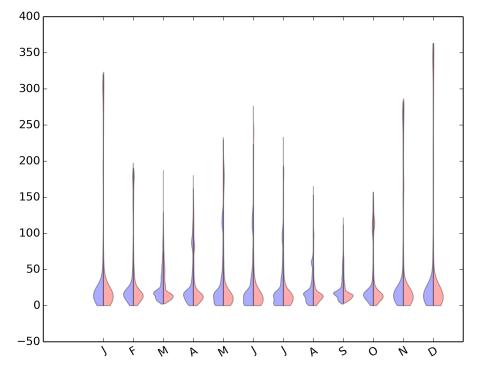


Figure 82: Violin plot for CMIP3-INMCM3-0-AMIP

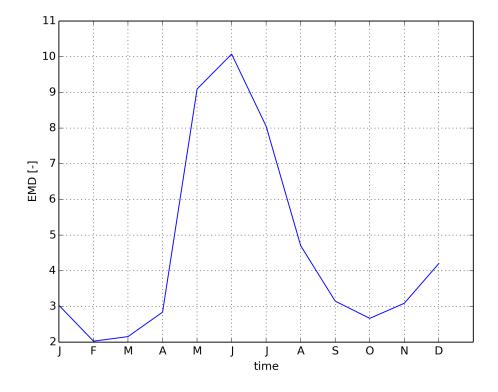


Figure 83: Timeseries of EMD

2.1.3 model mean

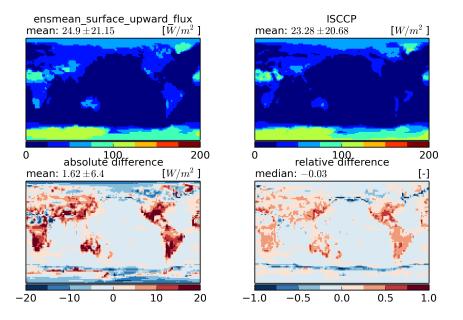


Figure 84: Temporal mean fields (top) and absolute and relative differences (bottom)

ensmean_surface_upward_flux

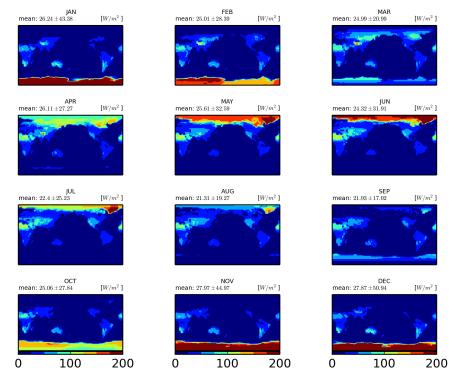


Figure 85: Monthly mean climatology for mean-model

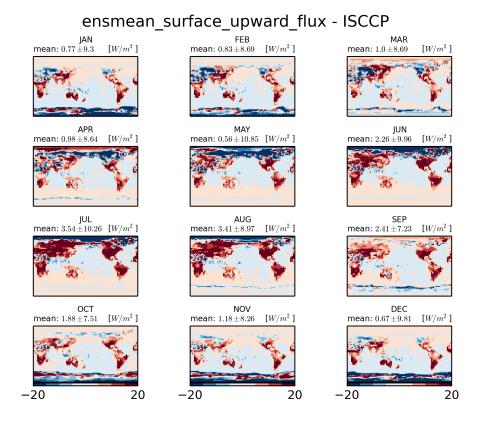


Figure 86: Monthly mean climatology of difference between MEAN-MODEL and ISCCP

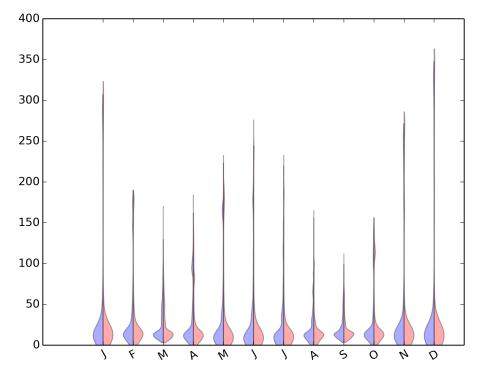


Figure 87: Violin plot for ENSMEAN-SURFACE-UPWARD-FLUX

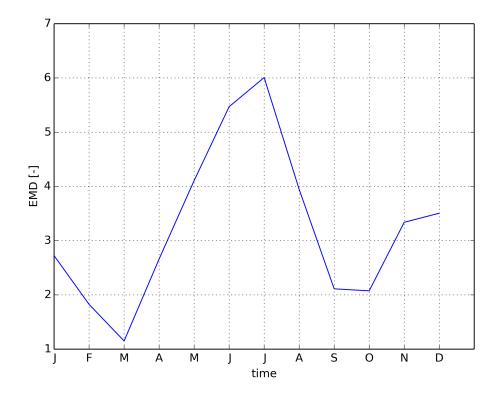
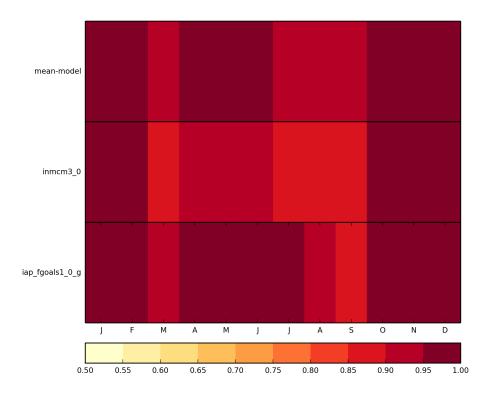


Figure 88: Timeseries of EMD



Pattern correlation: ISCCP

Figure 89: Pattern correlation for ISCCP

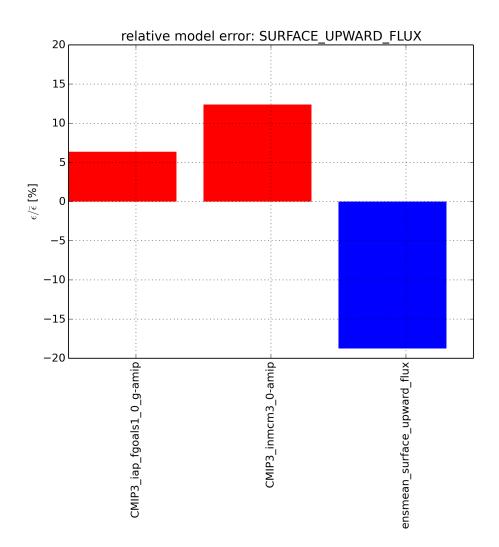


Figure 90: Relative model performance for SURFACE-UPWARD-FLUX

2.2 CERES2.7

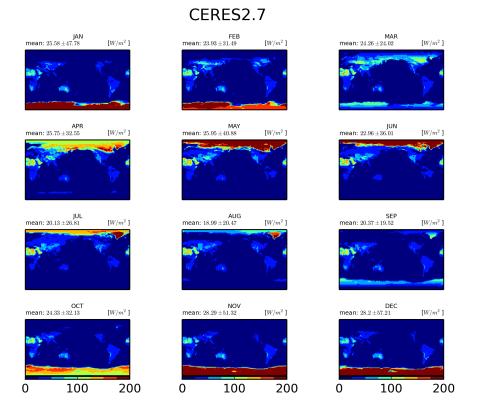


Figure 91: Monthly mean CERES2.7

2.2.1 CMIP3 iap fgoals1 0 g-amip

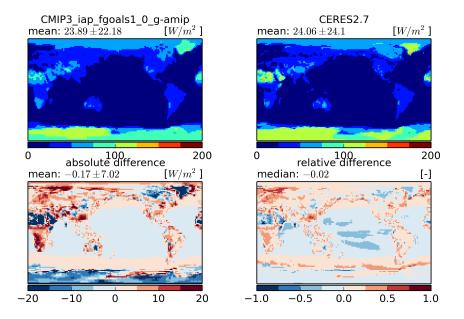


Figure 92: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip

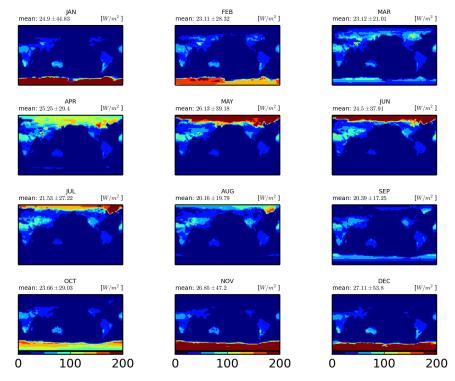


Figure 93: Monthly mean climatology for iap-fgoals1-0-g

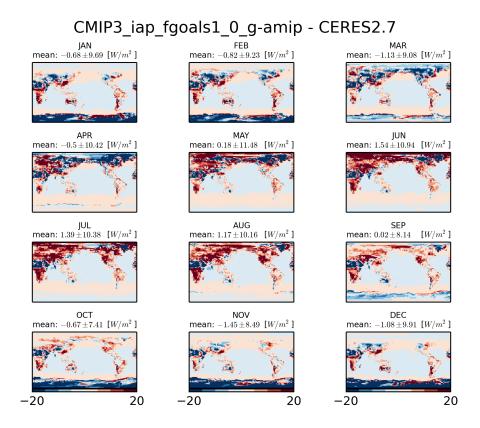


Figure 94: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CERES2.7

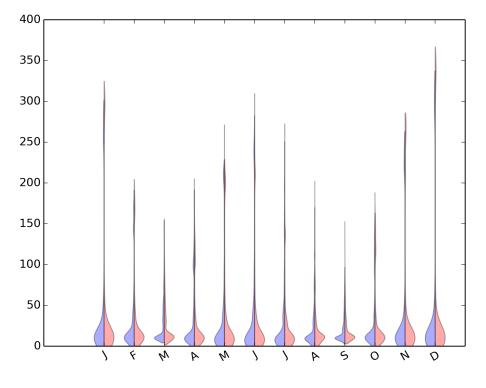


Figure 95: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

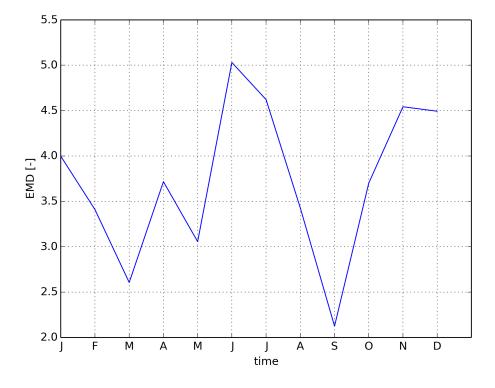


Figure 96: Timeseries of EMD

2.2.2 CMIP3 inmcm3 0-amip

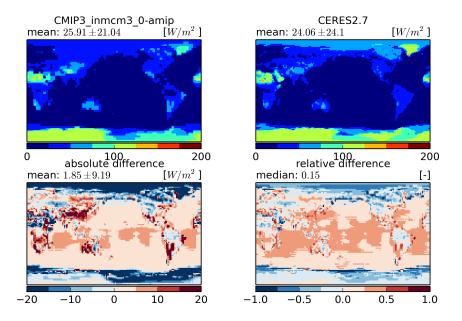


Figure 97: Temporal mean fields (top) and absolute and relative differences (bottom)

FEB mean: 26.91 ±29.47 MAR mean: 26.85 ±22.36 JAN mean: 27.58 ±42.9 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ APR mean: 26.96 ± 26.42 MAY mean: 25.09 ±27.64 JUN mean: 24.14±27.55 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ AUG mean: 22.47 ±20.02 SEP mean: 23.48 ±17.81 JUL mean: 23.27 ± 24.45 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ OCT mean: 26.45 ±27.35 NOV mean: 29.09 ±43.6 DEC mean: 28.63 ±49.22 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ 0 200 100 0 100 200 0 100 200

CMIP3_inmcm3_0-amip

Figure 98: Monthly mean climatology for inmcm3-0

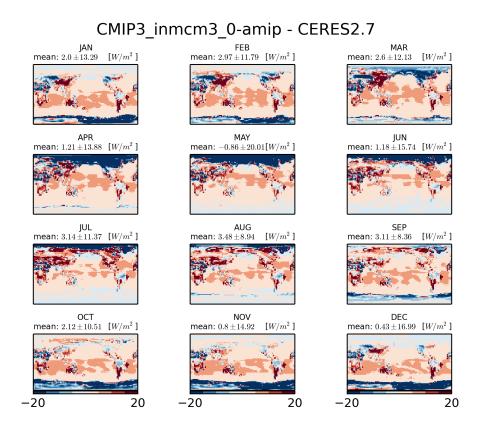


Figure 99: Monthly mean climatology of difference between INMCM3-0 and CERES2.7 $\,$

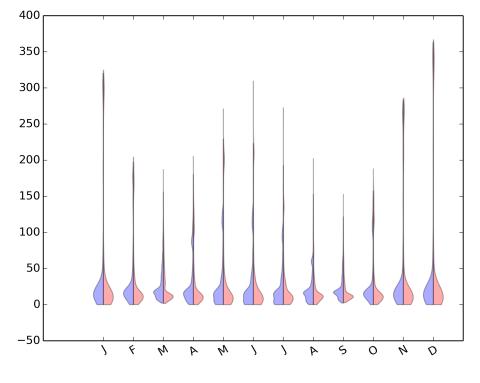


Figure 100: Violin plot for CMIP3-INMCM3-0-AMIP

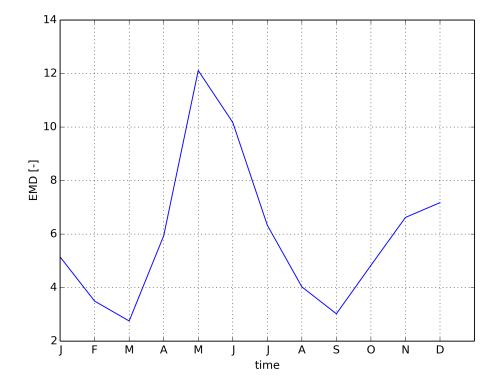


Figure 101: Timeseries of EMD

2.2.3 model mean

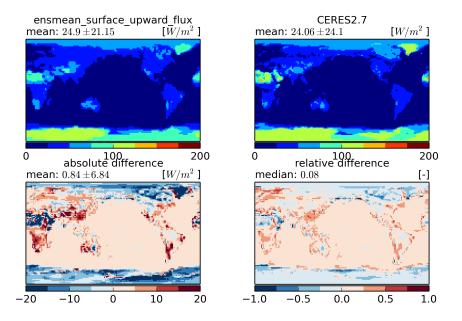


Figure 102: Temporal mean fields (top) and absolute and relative differences (bottom)

ensmean_surface_upward_flux

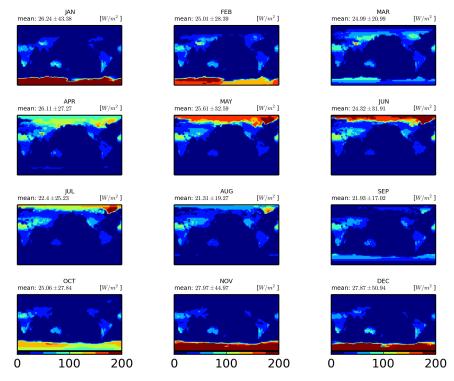


Figure 103: Monthly mean climatology for mean-model

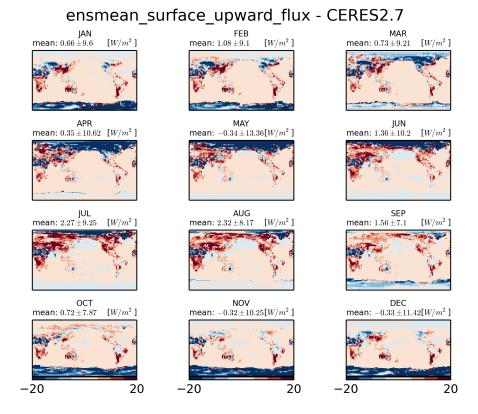


Figure 104: Monthly mean climatology of difference between MEAN-MODEL and CERES2.7

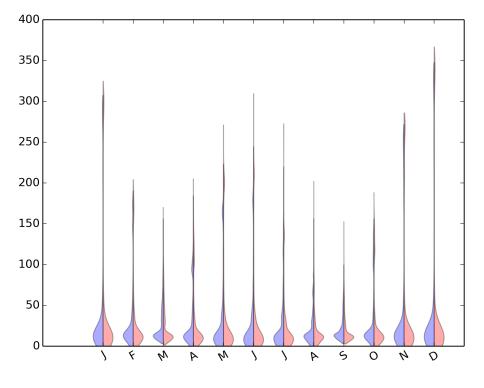


Figure 105: Violin plot for ENSMEAN-SURFACE-UPWARD-FLUX

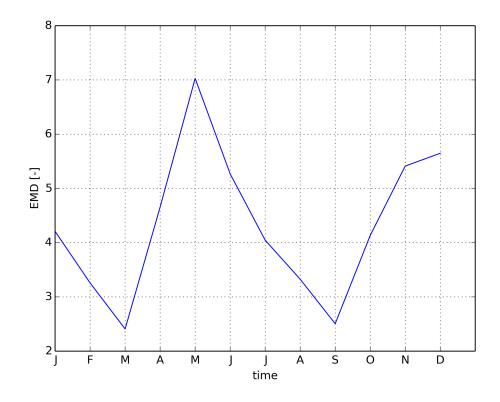
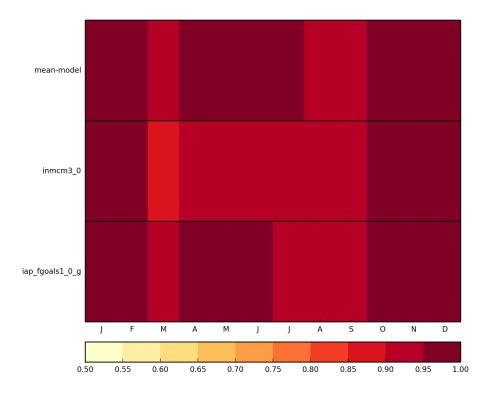


Figure 106: Timeseries of EMD



Pattern correlation: CERES2.7

Figure 107: Pattern correlation for CERES2.7

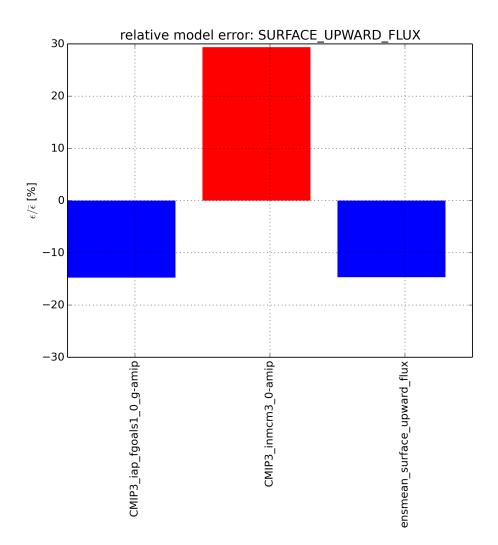


Figure 108: Relative model performance for SURFACE-UPWARD-FLUX

2.3 SRBv3.0

SRBv3.0 MAR mean: 20.89±17.06 JAN mean: 23.86 ±40.21 FEB mean: 21.6 ±24.84 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ APR mean: 22.36 ±22.61 MAY mean: 24.0 ±32.54 JUN mean: 22.99 ±32.47 $[W/m^2]$ $[W/m^2]$ $[W/m^2$ SEP mean: 19.0±15.6 AUG mean: 19.2±19.12 JUL mean: 20.78±25.87 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ OCT mean: 20.51 ±21.0 NOV mean: 24.26 ±37.99 DEC mean: 25.82 ±48.25 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ 100 0 100 200 100 200 0 200 0

Figure 109: Monthly mean SRBv3.0

2.3.1 CMIP3 iap fgoals1 0 g-amip

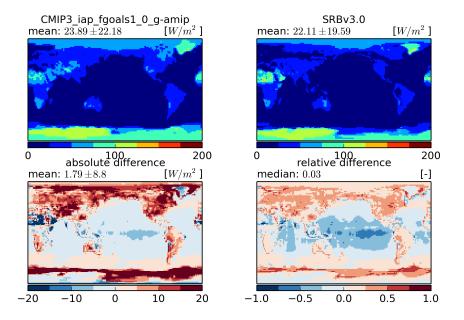


Figure 110: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip

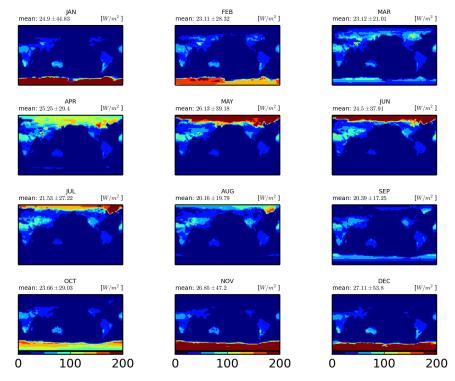


Figure 111: Monthly mean climatology for iap-fgoals1-0-g

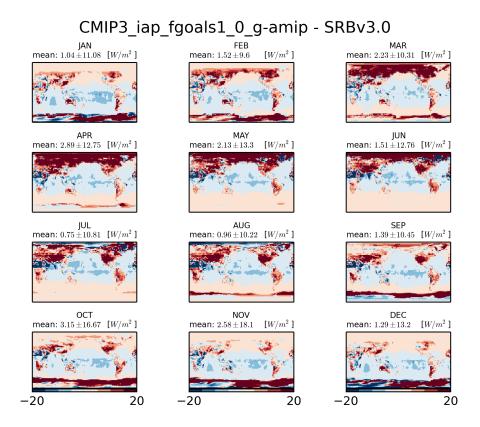


Figure 112: Monthly mean climatology of difference between IAP-FGOALS1-0-G and SRBV3.0 $\,$

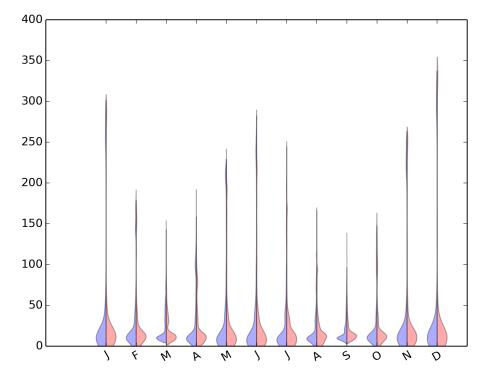


Figure 113: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

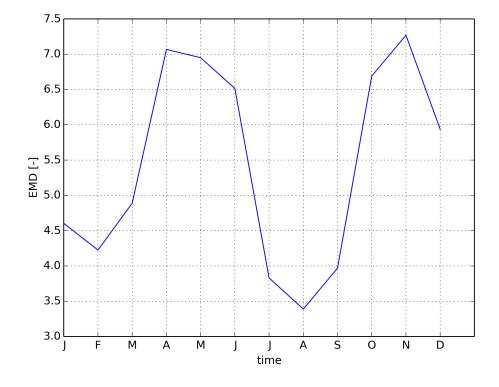


Figure 114: Timeseries of EMD

2.3.2 CMIP3 inmcm3 0-amip

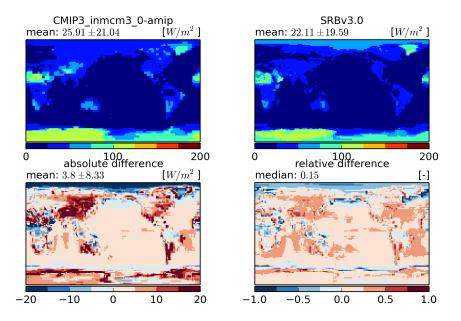


Figure 115: Temporal mean fields (top) and absolute and relative differences (bottom)

FEB mean: 26.91 ±29.47 MAR mean: 26.85 ±22.36 JAN mean: 27.58 ±42.9 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ APR mean: 26.96 ± 26.42 MAY mean: 25.09 ±27.64 JUN mean: 24.14±27.55 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ AUG mean: 22.47 ±20.02 SEP mean: 23.48 ±17.81 JUL mean: 23.27 ± 24.45 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ OCT mean: 26.45 ±27.35 NOV mean: 29.09 ±43.6 DEC mean: 28.63 ±49.22 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ 0 200 100 0 100 200 0 100 200

CMIP3_inmcm3_0-amip

Figure 116: Monthly mean climatology for inmcm3-0

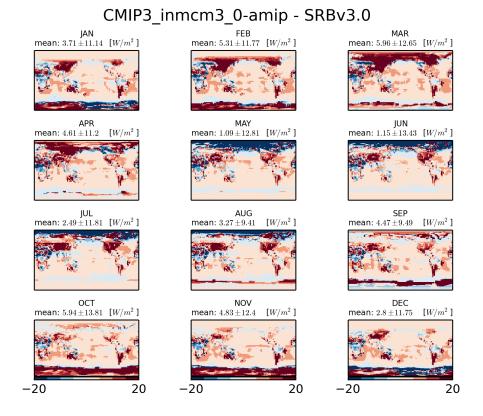


Figure 117: Monthly mean climatology of difference between INMCM3-0 and SRBV3.0 $\,$

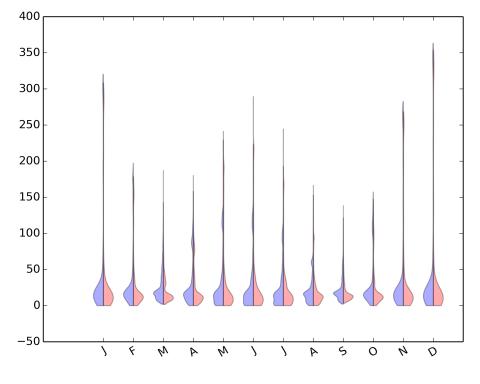


Figure 118: Violin plot for CMIP3-INMCM3-0-AMIP

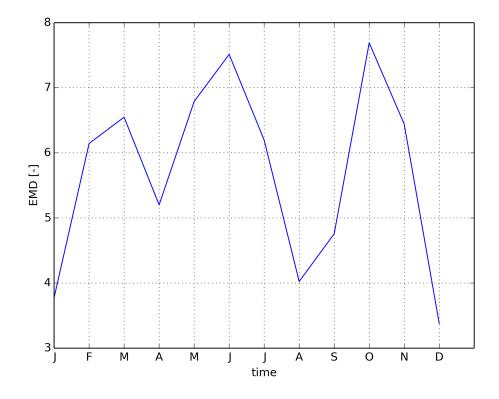


Figure 119: Timeseries of EMD

2.3.3 model mean

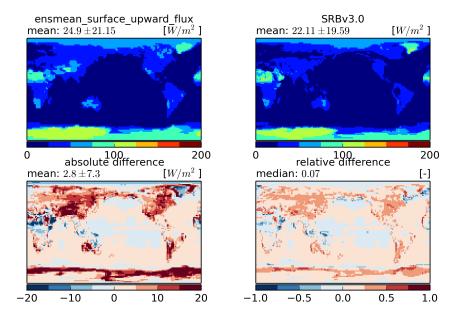


Figure 120: Temporal mean fields (top) and absolute and relative differences (bottom)

ensmean_surface_upward_flux

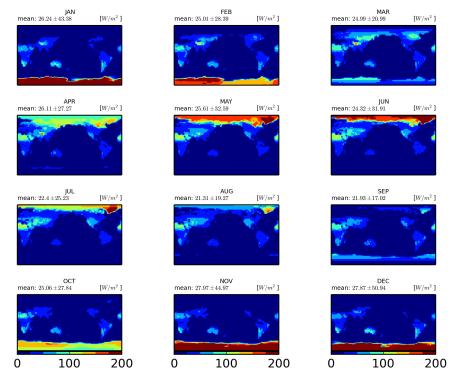


Figure 121: Monthly mean climatology for mean-model

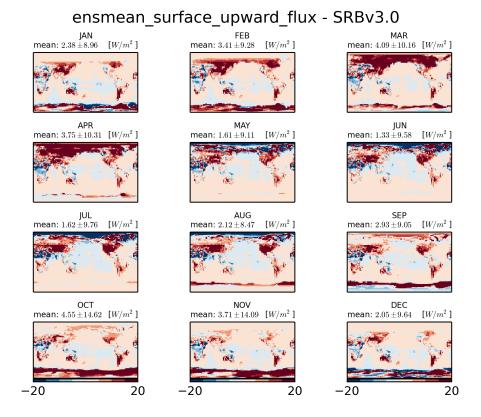


Figure 122: Monthly mean climatology of difference between MEAN-MODEL and SRBV3.0

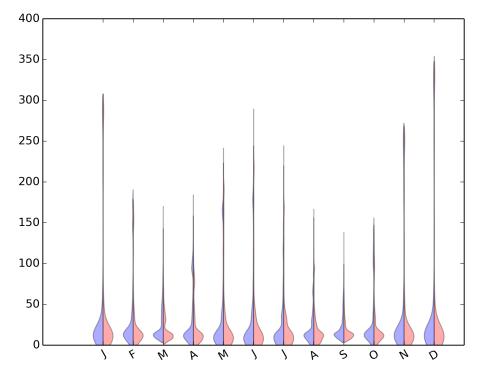


Figure 123: Violin plot for ENSMEAN-SURFACE-UPWARD-FLUX

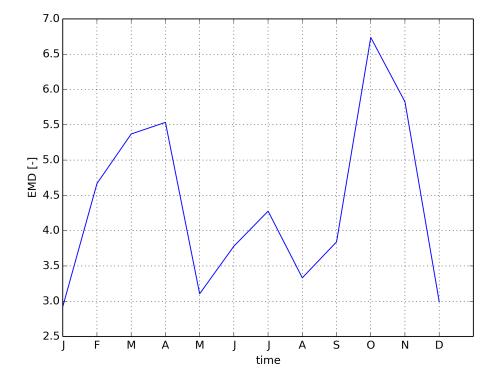
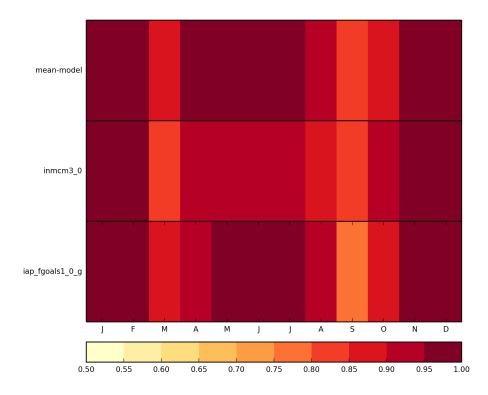


Figure 124: Timeseries of EMD



Pattern correlation: SRBV3.0

Figure 125: Pattern correlation for SRBV3.0 $\,$

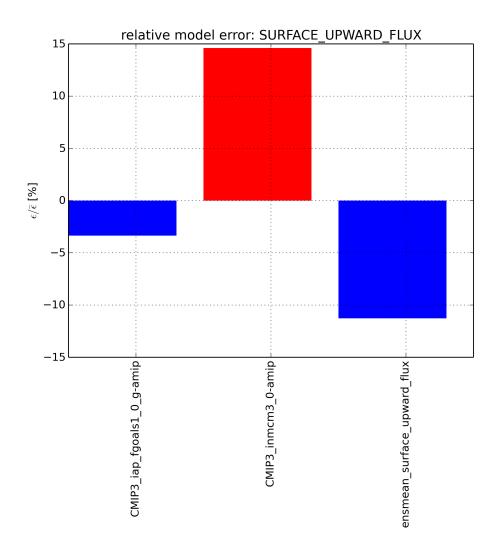


Figure 126: Relative model performance for SURFACE-UPWARD-FLUX

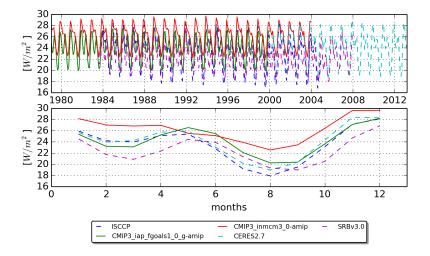


Figure 127: Global means for SHORTWAVE UPWARD RADIATION FLUX IN AIR

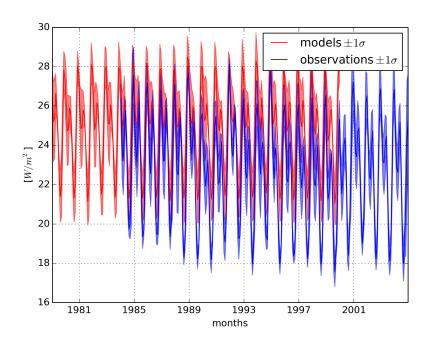


Figure 128: Global means for SHORTWAVE UPWARD RADIATION FLUX IN AIR (summary); areas indicate $\pm 1\sigma$ as derived from the ensemble of models or observations

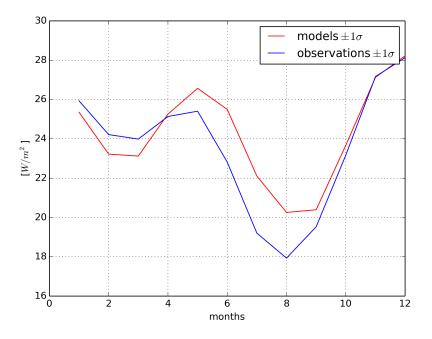


Figure 129: Global means for SHORTWAVE UPWARD RADIATION FLUX IN AIR (summary climatology)

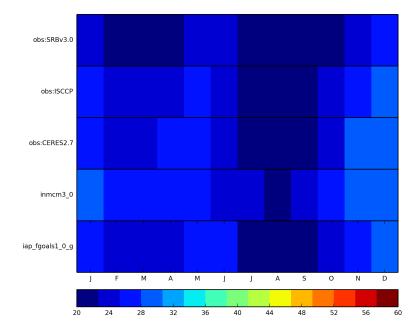


Figure 130: Global means climatology for SHORTWAVE UPWARD RADIATION FLUX IN AIR

3 NET SURFACE SOLAR RADIATION FLUX IN AIR

3.1 ISCCP

ISCCP JAN mean: 170.43±91.65 FEB mean: 171.47 ±82.91 MAR mean: 169.86±76.74 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ APR mean: 165.72±77.16 MAY mean: 160.59 ±81.36 JUN mean: 158.58 ±83.83 $[W/m^2]$ $[W/m^2$ $[W/m^2]$ JUL mean: 160.72±81.68 AUG mean: 163.88±74.2 SEP mean: 167.62±71.22 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ OCT mean: 168.11±76.82 NOV mean: 166.64±86.58 DEC mean: 167.43±92.94 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ 0 50100150200250 0 50 100150200250 0 50100150200250

Figure 131: Monthly mean ISCCP

3.1.1 CMIP3 iap fgoals1 0 g-amip

3 NET SURFACE SOLAR RADIATION FLUX IN AIR

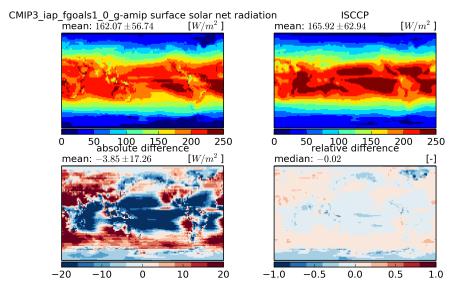


Figure 132: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation

JAN mean: 165.25 ± 85.22 [W/m ²]	FEB mean: 166.37 ±75.62	[W/m ²]	MAR mean: 165.24±68.82	[W/m ²]
APR mean: 161.55 ± 71.09 [W/m ²]	MAY mean: 157.6±78.46	[W/m ²]	JUN mean: 155.12 ± 82.55	[W/m ²]
JUL mean: 156.1±78.82 [W/m ²]	AUG mean: 159.29±70.13	[W/m ²]	SEP mean: 163.82±66.92	[W/m ²]
OCT mean: 165.75 ± 73.48 [W/m ²]	NOV mean: 164.55 ±83.9	$[W/m^2]$	DEC mean: 164.15±89.32	$[W/m^2]$
0 50 10015020	00250 () 50 1001502	00250	0 50 1001502	200250

Figure 133: Monthly mean climatology for iap-fgoals1-0-g

3 NET SURFACE SOLAR RADIATION FLUX IN AIR

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation - ISCCP

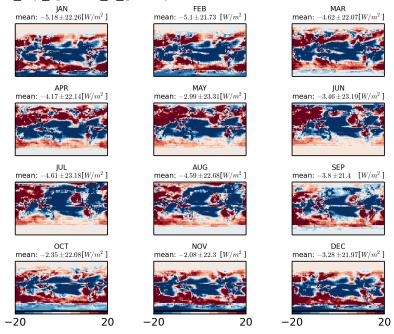


Figure 134: Monthly mean climatology of difference between IAP-FGOALS1-0-G and ISCCP

3.1.2 CMIP3 inmcm3 0-amip

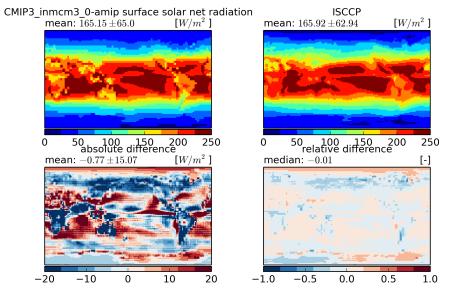


Figure 135: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip surface solar net radiation

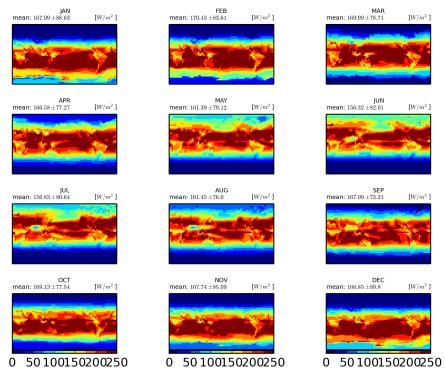


Figure 136: Monthly mean climatology for inmcm3-0

CMIP3_inmcm3_0-amip surface solar net radiation - ISCCP JAN mean: $-2.44 \pm 21.33 [W/m^2]$ MAR mean: 0.13 ± 20.16 [W/m^2] FEB mean: -1.04 ± 20.4 [W/m^2] APR mean: 0.86 ± 18.49 [W/m^2] $\begin{array}{c} {\sf MAY} \\ {\sf mean:} \ 0.8 \pm 20.97 \quad \ \left[W\!/m^2 \ \right] \end{array}$ JUN mean: $-2.26\pm22.69[W/m^2]$ 1000 SEP mean: $-0.54 \pm 20.32 [W/m^2]$ JUL mean: -3.88 ± 24.94 [W/m^2] AUG mean: $-2.42 \pm 23.51 [W/m^2]$ OCT mean: 1.02 ± 18.56 [W/m^2] $\begin{array}{c} \text{NOV} \\ \text{mean: } 1.1 \pm 19.58 \end{array}$ $\begin{array}{c} {\sf DEC} \\ {\sf mean:} \ -0.58 \pm 20.41 [W/m^2 \] \end{array}$ $[W/m^2]$ 20 ·20 20 ·20 20 ·20

Figure 137: Monthly mean climatology of difference between INMCM3-0 and ISCCP $\,$

3.1.3 model mean

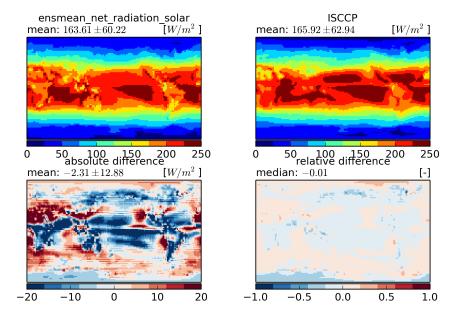


Figure 138: Temporal mean fields (top) and absolute and relative differences (bottom)

3 NET SURFACE SOLAR RADIATION FLUX IN AIR

ensmean_net_radiation_solar

JAN mean: 166.62 ± 85.85 [W/m^2]	FEB mean: 168.4±78.71 [W/m ²]	MAR mean: 167.61±72.95 [W/m ²]
	CANES MADE	
APR mean: 164.07 ±73.34 [W/m ²]	MAY mean: 159.49 ±77.72 [W/m ²]	JUN mean: 155.72 ± 81.11 [W/m^2]
JUL	AUG	SEP
mean: 156.47 ±78.6 [W/m ²]	mean: 160.37 ± 72.05 [W/m ²]	mean: 165.45 ± 69.32 [W/m ²]
OCT mean: 167.44±74.73 [<i>W</i> /m ²]	NOV mean: 166.15 ± 83.55 [W/m^2]	DEC mean: 165.5 ± 88.48 [W/m ²]
	States of the second	
0 50 100150200250	0 50 100150200250	0 50100150200250

Figure 139: Monthly mean climatology for mean-model

3 NET SURFACE SOLAR RADIATION FLUX IN AIR

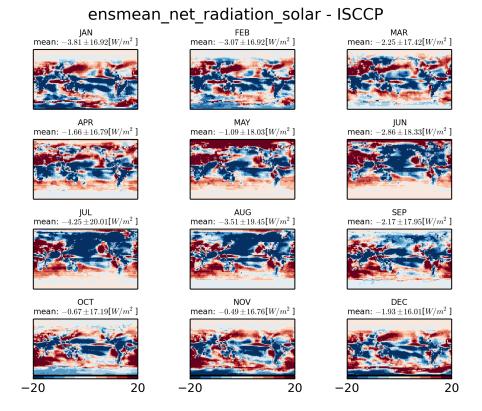


Figure 140: Monthly mean climatology of difference between MEAN-MODEL and ISCCP

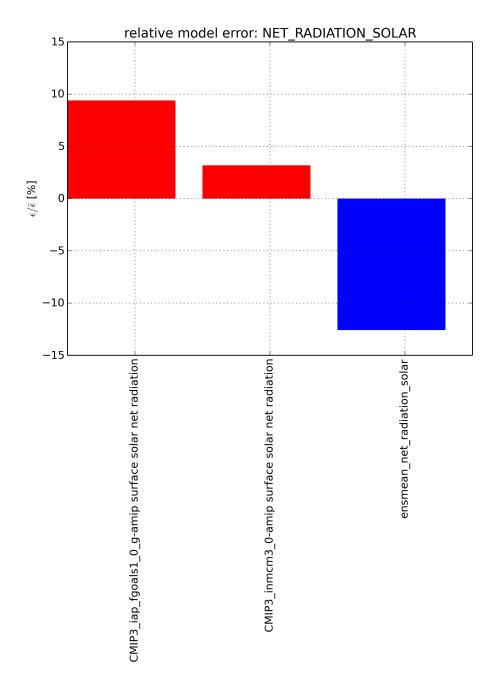


Figure 141: Relative model performance for NET-RADIATION-SOLAR

July 22, 2015

3.2 CERES2.7

CERES2.7 FEB mean: 167.81 ±80.7 JAN mean: 166.73±88.28 MAR mean: 166.98±74.68 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ APR mean: 163.16 ±74.67 JUN mean: 155.66±81.27 MAY mean: 158.11 ±79.11 [W/m] $[W/m^2]$ $[W/m^2$ AUG mean: 160.46±72.14 SEP mean: 163.77±69.42 JUL mean: 157.03±78.38 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ OCT mean: 164.26±74.76 DEC mean: 164.67±90.18 NOV mean: 164.01 ±84.07 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ 0 50100150200250 0 50100150200250 0 50100150200250

Figure 142: Monthly mean CERES2.7

3.2.1 CMIP3 iap fgoals1 0 g-amip

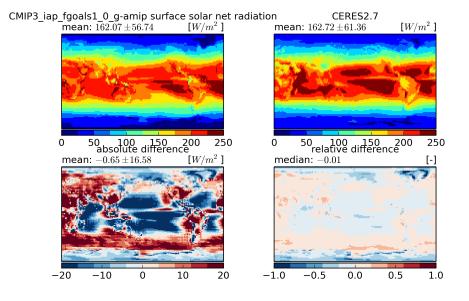


Figure 143: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation

JAN mean: 165.25 ± 85.22 [W/m ²]	FEB mean: 166.37 ±75.62	[W/m ²]	MAR mean: 165.24±68.82	[W/m ²]
APR mean: 161.55 ± 71.09 [W/m ²]	MAY mean: 157.6±78.46	[W/m ²]	JUN mean: 155.12 ± 82.55	[W/m ²]
JUL mean: 156.1±78.82 [W/m ²]	AUG mean: 159.29±70.13	[W/m ²]	SEP mean: 163.82±66.92	[W/m ²]
OCT mean: 165.75 ± 73.48 [W/m ²]	NOV mean: 164.55 ±83.9	$[W/m^2]$	DEC mean: 164.15±89.32	$[W/m^2]$
0 50 10015020	00250 () 50 1001502	00250	0 50 1001502	200250

Figure 144: Monthly mean climatology for iap-fgoals1-0-g

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation - CERES2.7

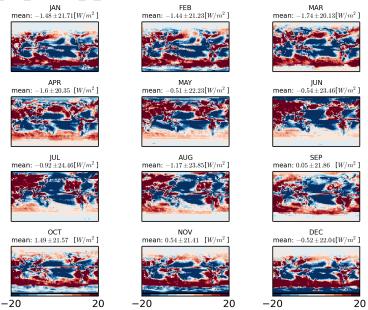


Figure 145: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CERES2.7

3.2.2 CMIP3 inmcm3 0-amip

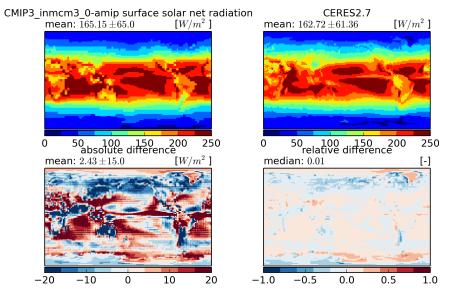


Figure 146: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip surface solar net radiation

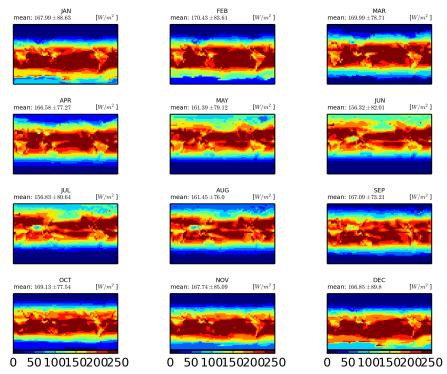


Figure 147: Monthly mean climatology for inmcm3-0

CMIP3_inmcm3_0-amip surface solar net radiation - CERES2.7 FEB mean: 2.62 ± 20.05 [W/m^2] $\begin{array}{c} {\rm MAR} \\ {\rm mean:} \ 3.01 \pm 20.59 \quad [W/m^2 \] \end{array}$ JAN mean: 1.26 ± 20.48 [W/m^2] MAY mean: 3.28 ± 20.07 [W/m^2] APR mean: $3.42 \pm 19.11 \quad [W/m^2]$ JUN mean: 0.66 ± 21.84 [W/m^2] or or it. $$JUL$ mean: <math display="inline">-0.19\pm24.7~$ [$W\!/m^2$] $\begin{array}{c} \text{AUG} \\ \text{mean: } 1.0 \pm 23.76 \end{array}$ $\begin{array}{c} {\rm SEP} \\ {\rm mean:} \; 3.31 \pm 21.06 \quad {\rm [W/m^2]} \end{array}$ $[W/m^2]$ OCT mean: 4.87 ± 18.43 [W/m^2] NOV mean: 3.73 ± 18.88 [W/m^2] $\begin{array}{c} {\sf DEC} \\ {\sf mean:} \ 2.18 \pm 19.65 \quad [W/m^2 \] \end{array}$ -20 20 -20 20 -20 20

Figure 148: Monthly mean climatology of difference between INMCM3-0 and CERES2.7 $\,$

3.2.3 model mean

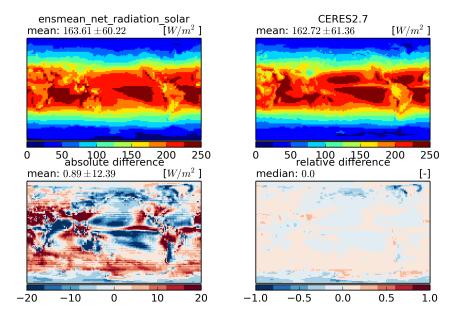


Figure 149: Temporal mean fields (top) and absolute and relative differences (bottom)

ensmean_net_radiation_solar

JAN mean: 166.62 ± 85.85 [W/m^2]	FEB mean: 168.4±78.71 [W/m ²]	MAR mean: 167.61±72.95 [W/m ²]
	CANES MADE	
APR mean: 164.07 ±73.34 [W/m ²]	MAY mean: 159.49 ±77.72 [W/m ²]	JUN mean: 155.72 ± 81.11 [W/m^2]
JUL	AUG	SEP
mean: 156.47 ±78.6 [W/m ²]	mean: 160.37 ± 72.05 [W/m ²]	mean: 165.45 ± 69.32 [W/m ²]
OCT mean: 167.44±74.73 [<i>W</i> /m ²]	NOV mean: 166.15 ± 83.55 [W/m^2]	DEC mean: 165.5 ± 88.48 [W/m ²]
	States of the second	
0 50 100150200250	0 50 100150200250	0 50100150200250

Figure 150: Monthly mean climatology for mean-model

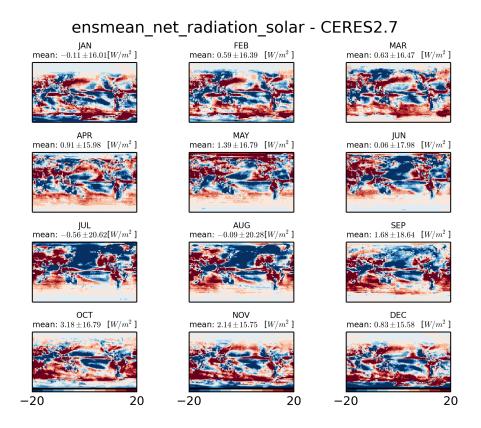


Figure 151: Monthly mean climatology of difference between MEAN-MODEL and CERES2.7

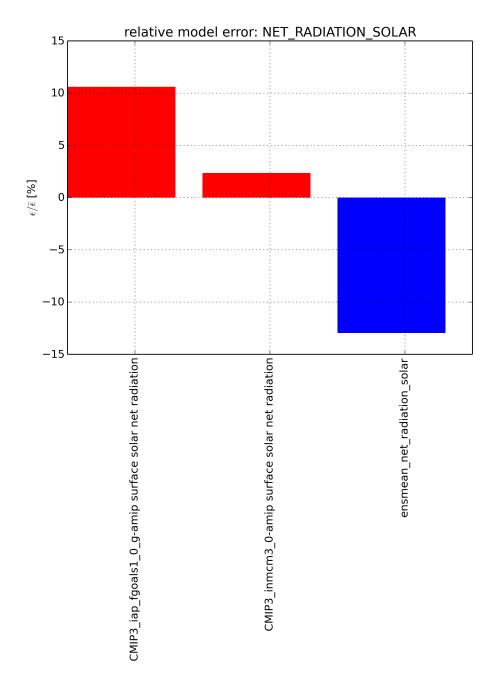


Figure 152: Relative model performance for NET-RADIATION-SOLAR

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3.3 SRBv3.0

SRBv3.0 MAR mean: 171.18±73.06 JAN mean: 170.23 ±87.87 FEB mean: 172.24±78.92 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ APR mean: 167.65±74.44 $$J\!U\!N$$ mean: $159.13\pm\!82.15$ MAY mean: 162.17 ±79.43 $[W/m^2$ $[W/m^2]$ $[W/m^2$ AUG mean: 164.11±71.56 SEP mean: 168.03 ±68.05 JUL mean: 160.94±79.42 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ OCT mean: 168.74±73.41 DEC mean: 167.14±89.89 NOV mean: 167.19 ±83.57 $[W/m^2]$ $[W/m^2]$ $[W/m^2]$ 0 50100150200250 0 50100150200250 0 50100150200250

Figure 153: Monthly mean SRBv3.0

3.3.1 CMIP3 iap fgoals1 0 g-amip

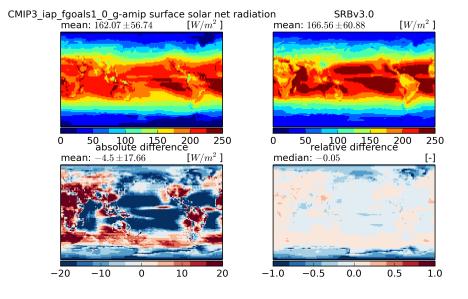


Figure 154: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation

JAN mean: 165.25 ± 85.22 [W/m ²]	FEB mean: 166.37 ±75.62	[W/m ²]	MAR mean: 165.24±68.82	[W/m ²]
APR mean: 161.55 ± 71.09 [W/m ²]	MAY mean: 157.6±78.46	[W/m ²]	JUN mean: 155.12 ± 82.55	[W/m ²]
JUL mean: 156.1±78.82 [W/m ²]	AUG mean: 159.29±70.13	[W/m ²]	SEP mean: 163.82±66.92	[W/m ²]
OCT mean: 165.75 ± 73.48 [W/m ²]	NOV mean: 164.55 ±83.9	$[W/m^2]$	DEC mean: 164.15±89.32	$[W/m^2]$
0 50 10015020	00250 () 50 1001502	00250	0 50 1001502	200250

Figure 155: Monthly mean climatology for iap-fgoals1-0-g

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation - SRBv3.0

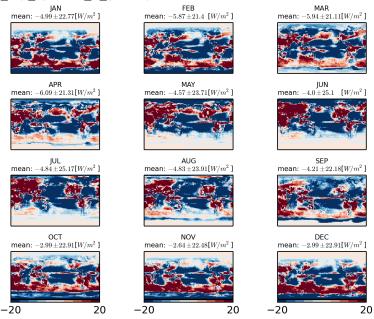


Figure 156: Monthly mean climatology of difference between IAP-FGOALS1-0-G and SRBV3.0 $\,$

3.3.2 CMIP3 inmcm3 0-amip

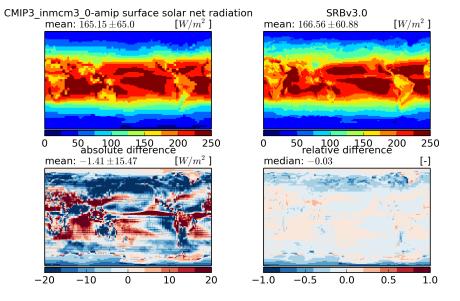


Figure 157: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip surface solar net radiation

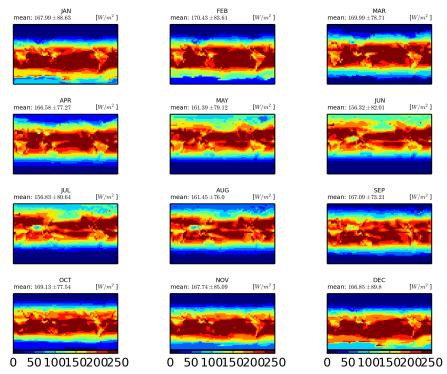


Figure 158: Monthly mean climatology for inmcm3-0

CMIP3_inmcm3_0-amip surface solar net radiation - SRBv3.0

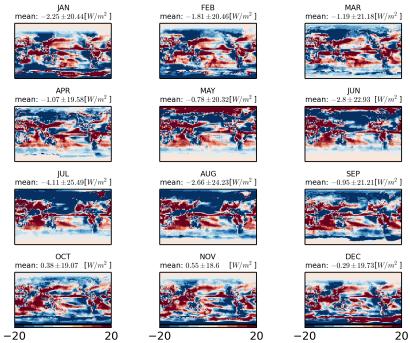


Figure 159: Monthly mean climatology of difference between INMCM3-0 and SRBV3.0 $\,$

3.3.3 model mean

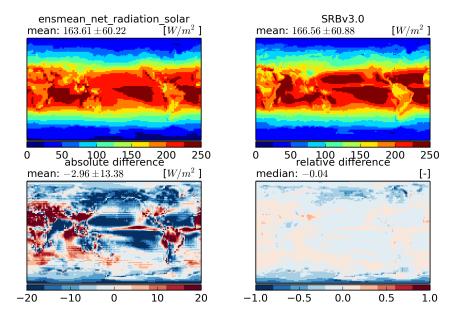


Figure 160: Temporal mean fields (top) and absolute and relative differences (bottom)

ensmean_net_radiation_solar

JAN mean: 166.62 ± 85.85 [W/m^2]	FEB mean: 168.4±78.71 [W/m ²]	MAR mean: 167.61±72.95 [W/m ²]
	CANES MADE	
APR mean: 164.07 ±73.34 [W/m ²]	MAY mean: 159.49 ±77.72 [W/m ²]	JUN mean: 155.72 ± 81.11 [W/m^2]
JUL	AUG	SEP
mean: 156.47 ±78.6 [W/m ²]	mean: 160.37 ± 72.05 [W/m ²]	mean: 165.45 ± 69.32 [W/m ²]
OCT mean: 167.44±74.73 [<i>W</i> /m ²]	NOV mean: 166.15 ± 83.55 [W/m^2]	DEC mean: 165.5 ± 88.48 [W/m ²]
	States of the second	
0 50 100150200250	0 50 100150200250	0 50100150200250

Figure 161: Monthly mean climatology for mean-model

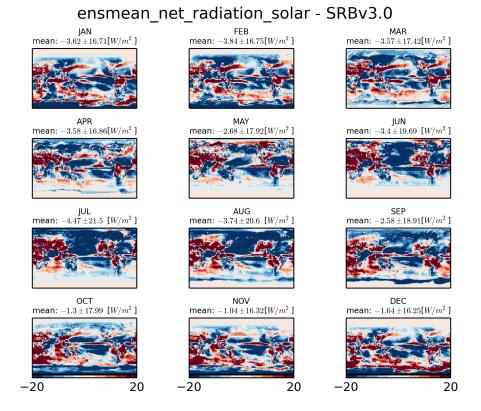


Figure 162: Monthly mean climatology of difference between MEAN-MODEL and SRBV3.0 $\,$

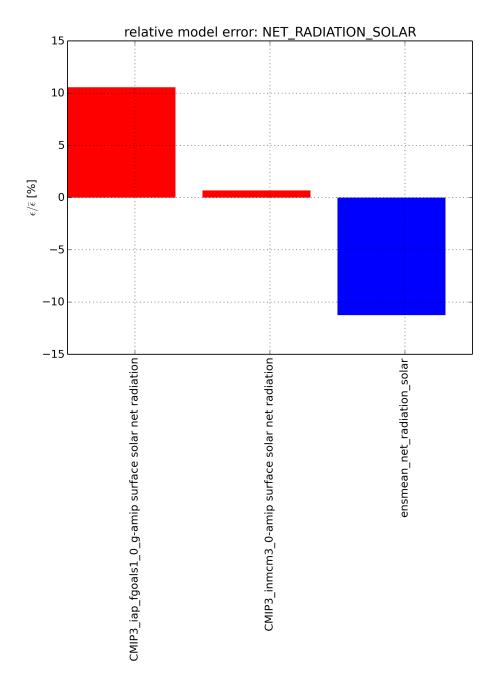


Figure 163: Relative model performance for NET-RADIATION-SOLAR

July 22, 2015

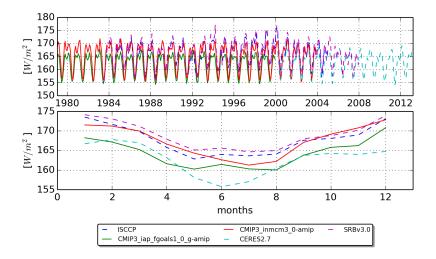


Figure 164: Global means for NET SURFACE SOLAR RADIATION FLUX IN AIR

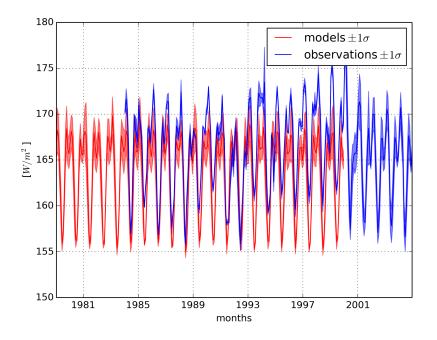


Figure 165: Global means for NET SURFACE SOLAR RADIATION FLUX IN AIR (summary); areas indicate $\pm 1\sigma$ as derived from the ensemble of models or observations

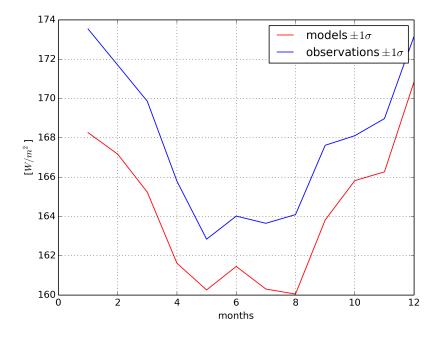


Figure 166: Global means for NET SURFACE SOLAR RADIATION FLUX IN AIR (summary climatology)

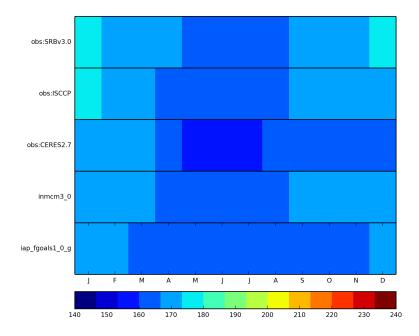


Figure 167: Global means climatology for NET SURFACE SOLAR RADIATION FLUX IN AIR

4 Summary error statistics

4.1 Gleckler metric

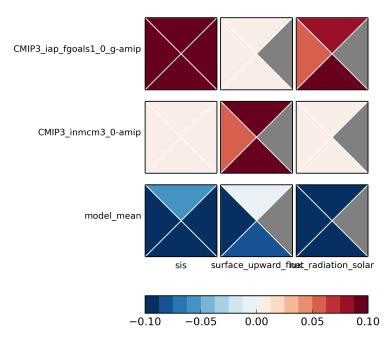
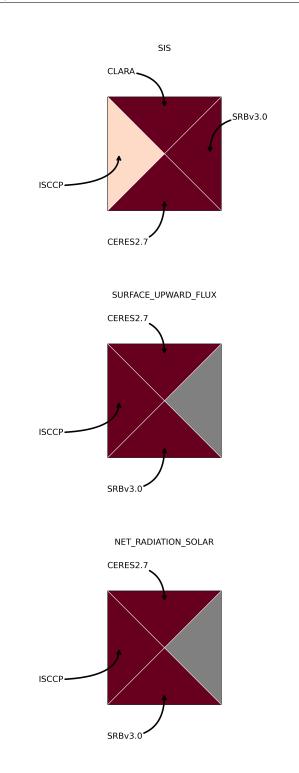


Figure 168: Gleckler et al. (2008) model performance index

4 Summary error statistics



4.2 Model ranking consistency

4.2.1 SIS

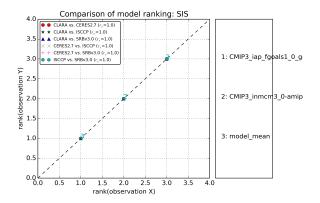


Figure 169: Model RANKING for different observational datasets: SIS

model	CLARA	CERES2.7	ISCCP	SRBv3.0
CMIP3-iap-fgoals1-0-g-amip	3	3	3	3
CMIP3-inmcm3-0-amip	2	2	2	2
model-mean	1	1	1	1

Table 1: Model rankings for variable SIS

4 Summary error statistics

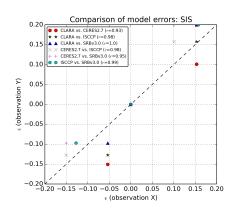


Figure 170: Model ERROR for different observational datasets: SIS

4.2.2 SURFACE UPWARD FLUX

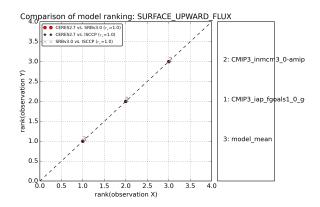


Figure 171: Model RANKING for different observational datasets: SURFACE-UPWARD-FLUX

model	CERES2.7	SRBv3.0	ISCCP
CMIP3-iap-fgoals1-0-g-amip	2	2	2
CMIP3-inmcm3-0-amip	3	3	3
model-mean	1	1	1

Table 2: Model rankings for variable SURFACE-UPWARD-FLUX

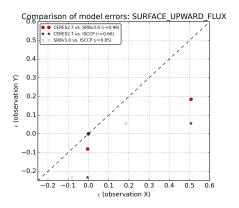


Figure 172: Model ERROR for different observational datasets: SURFACE-UPWARD-FLUX

4.2.3 NET RADIATION SOLAR

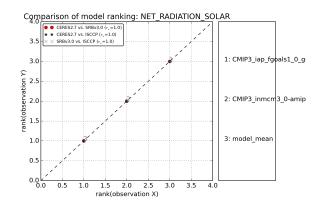


Figure 173: Model RANKING for different observational datasets: NET-RADIATION-SOLAR

model	CERES2.7	SRBv3.0	ISCCP
CMIP3-iap-fgoals1-0-g-amip	3	3	3
CMIP3-inmcm3-0-amip	2	2	2
model-mean	1	1	1

Table 3: Model rankings for variable NET-RADIATION-SOLAR

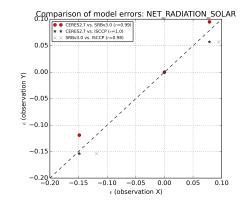


Figure 174: Model ERROR for different observational datasets: NET-RADIATION-SOLAR