

Analysis of CMIP3 AMIP simulations

Digital supplement tot he following paper:

"Assessing surface solar radiation fluxes in the CMIP ensembles"
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Author: Alexander Loew

alexander.loew@lmu.de

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1 SHORTWAVE DOWNWARD RADIATION FLUX IN AIR

1.1 ISCCP

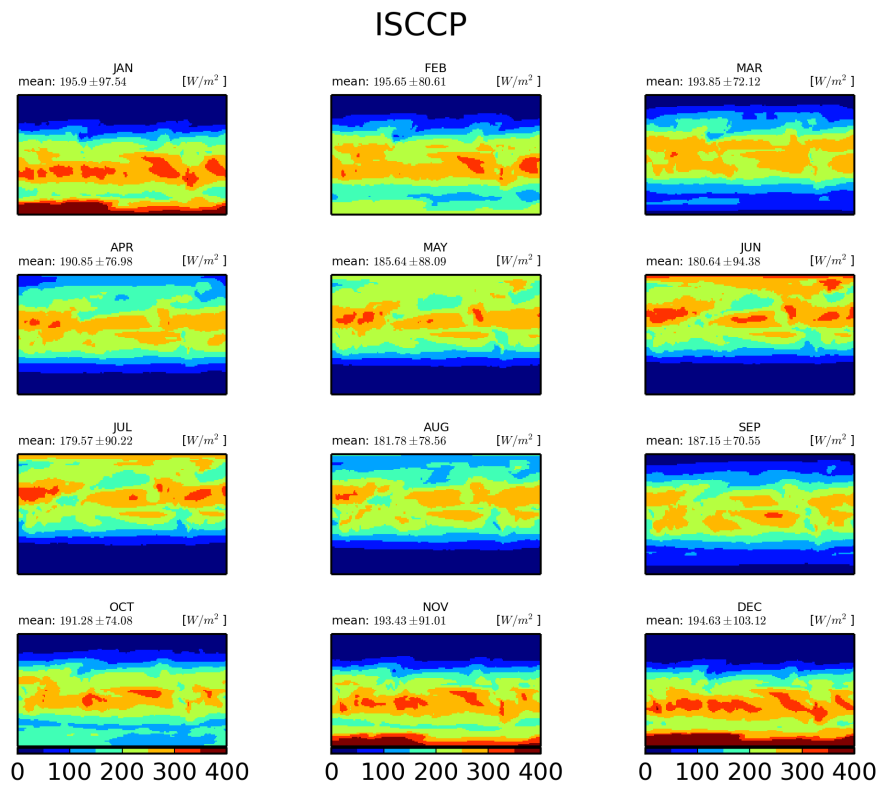


Figure 1: Monthly mean ISCCP

1.1.1 CMIP3 iap fgoals1 0 g-amip

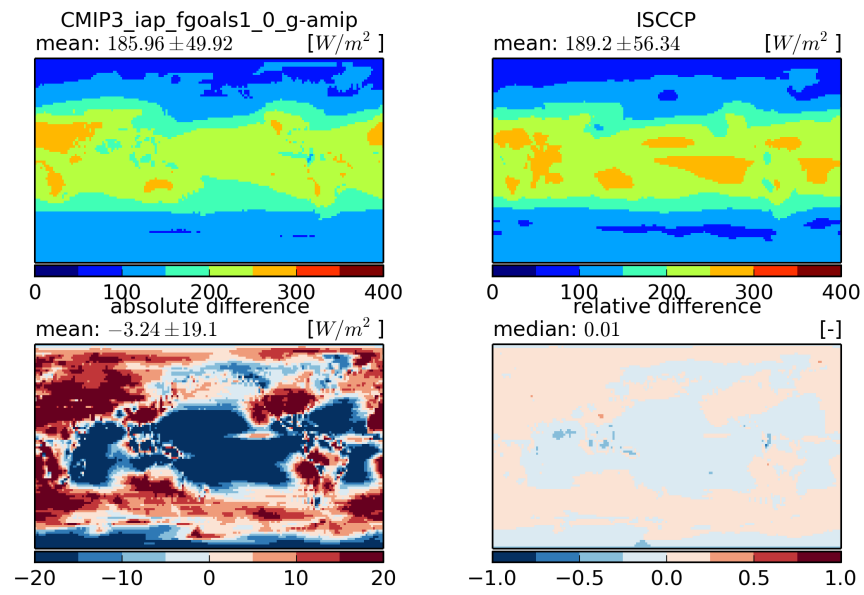


Figure 2: Temporal mean fields (top) and absolute and relative differences (bottom)

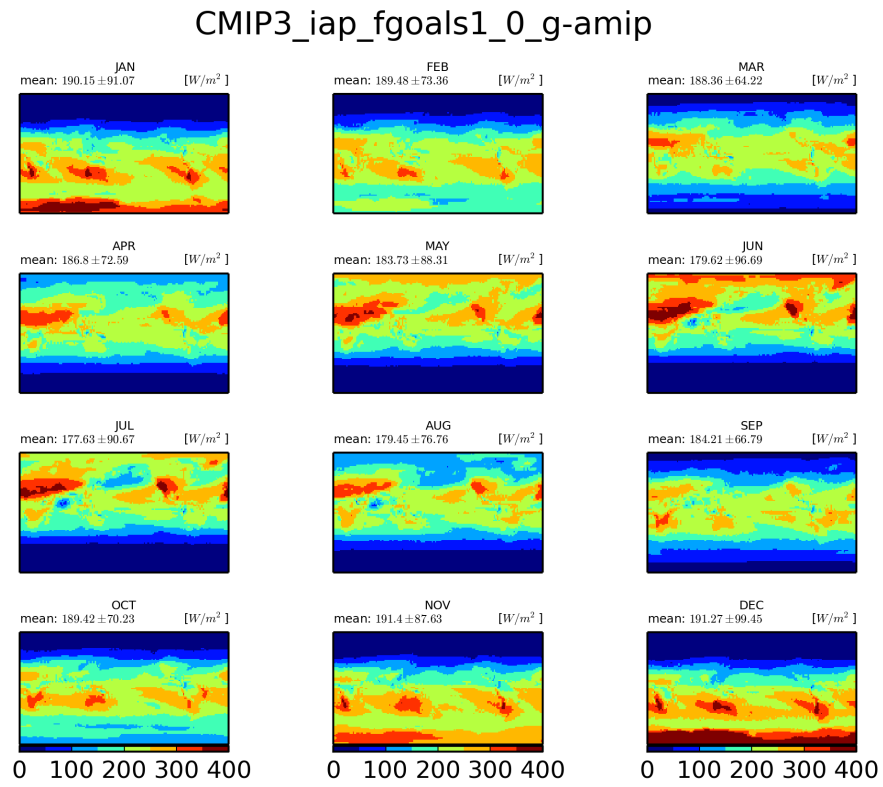


Figure 3: Monthly mean climatology for iap-fgoals1-0-g

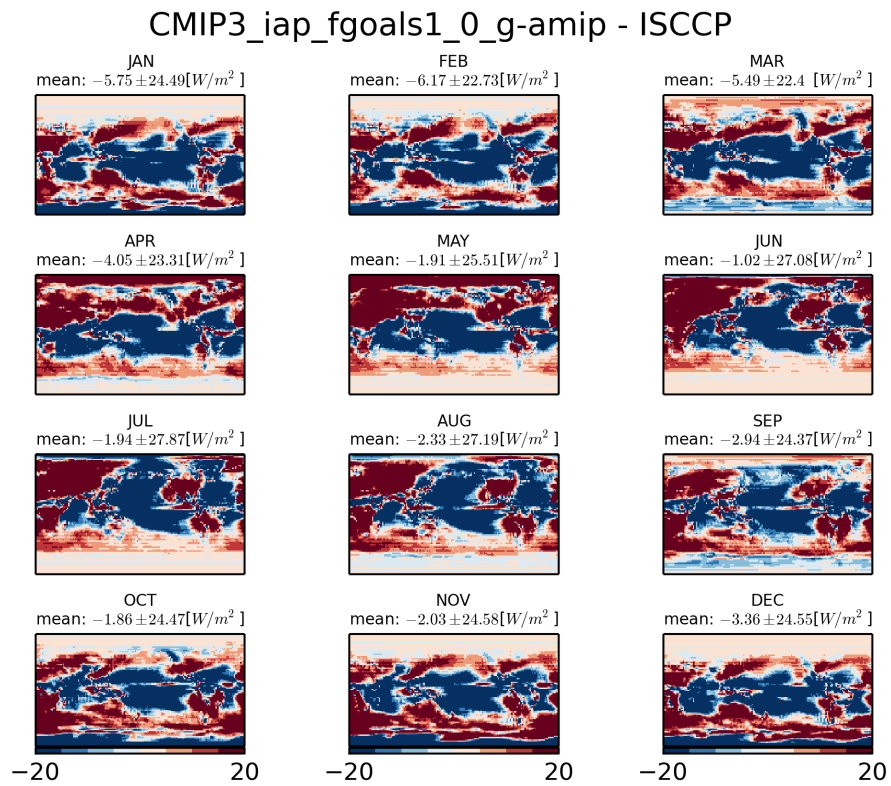


Figure 4: Monthly mean climatology of difference between IAP-FGOALS1-0-G and ISCCP

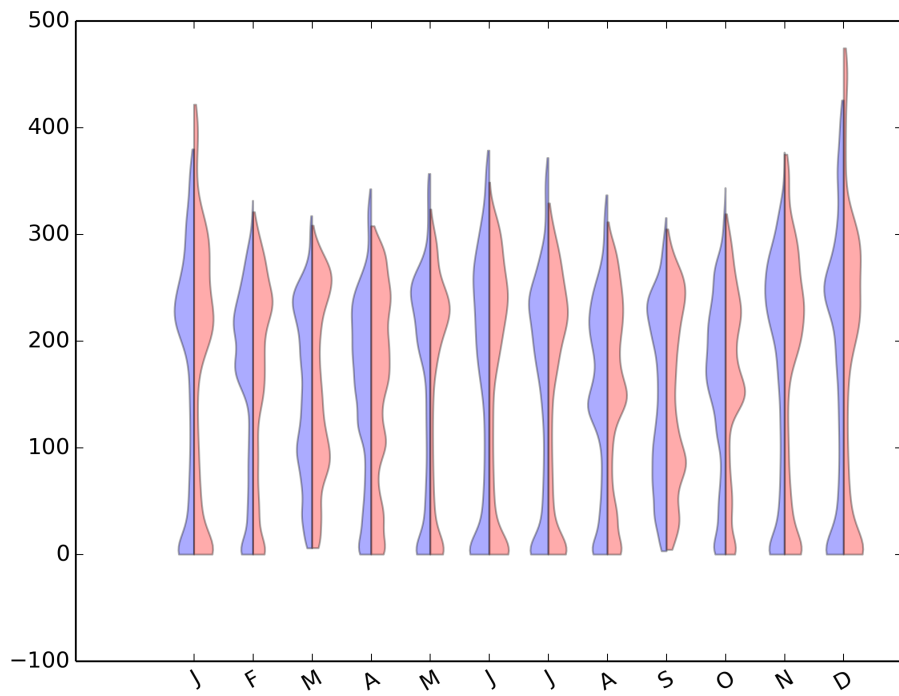


Figure 5: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

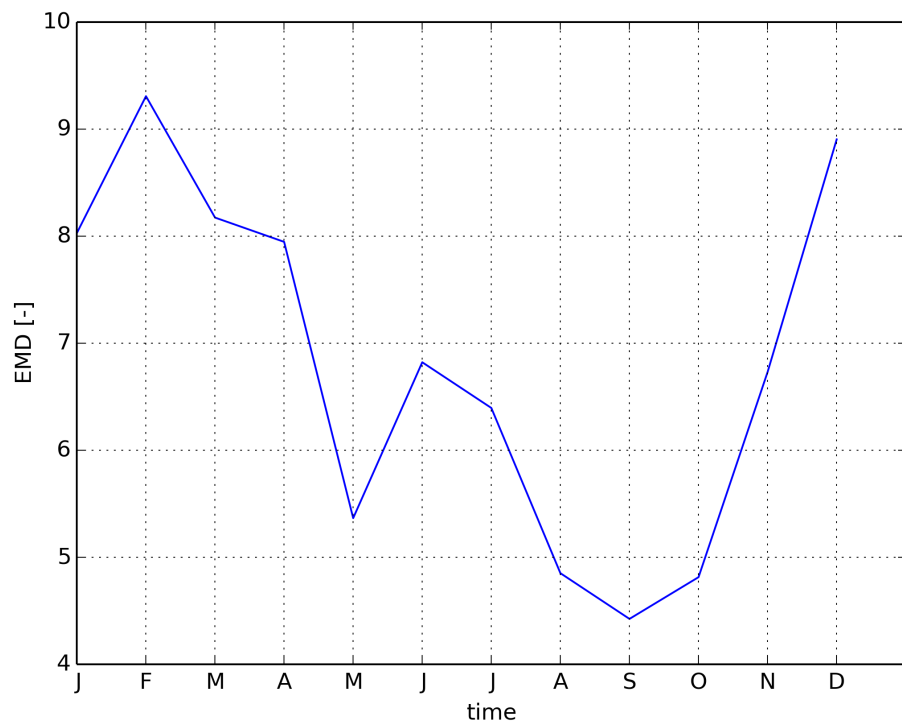


Figure 6: Timeseries of EMD

1.1.2 CMIP3 inmcm3 0-amip

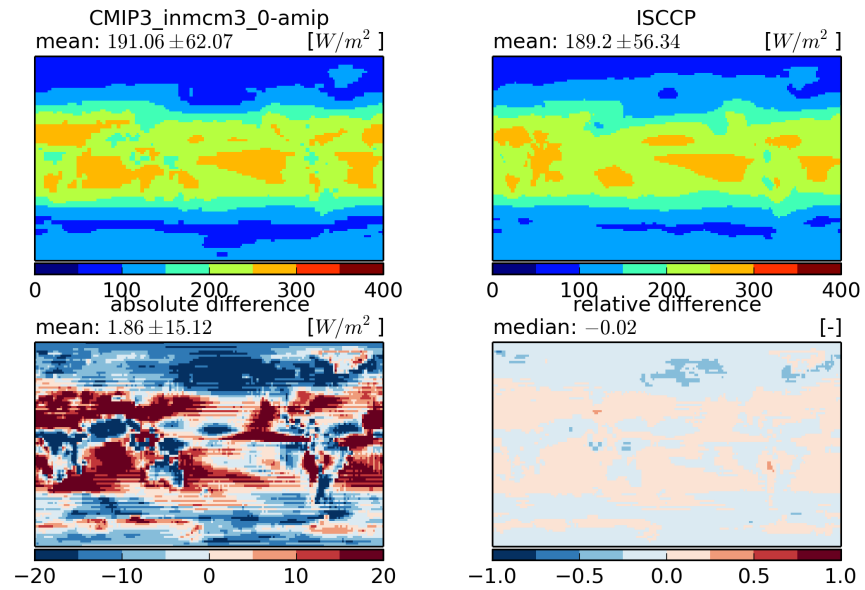


Figure 7: Temporal mean fields (top) and absolute and relative differences (bottom)

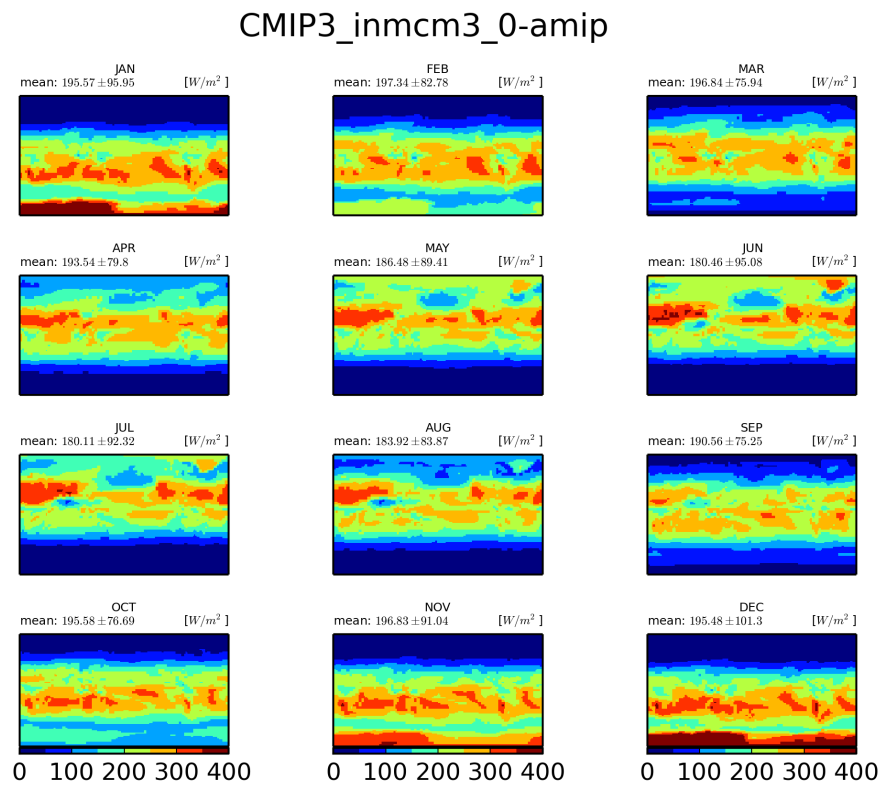


Figure 8: Monthly mean climatology for inmcm3-0

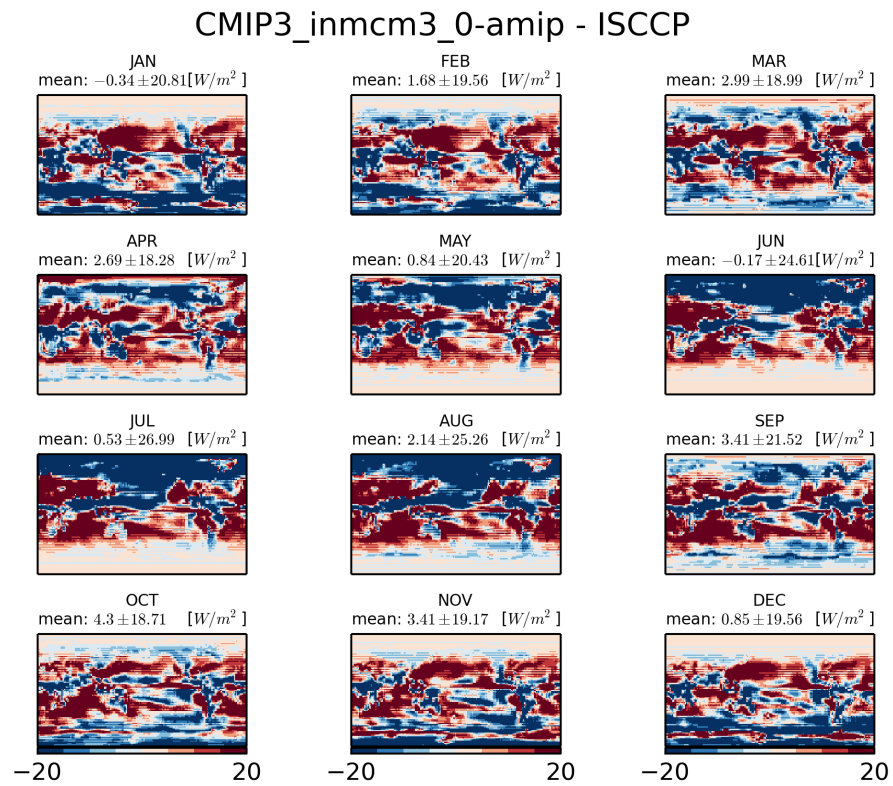


Figure 9: Monthly mean climatology of difference between INMCM3-0 and ISCCP

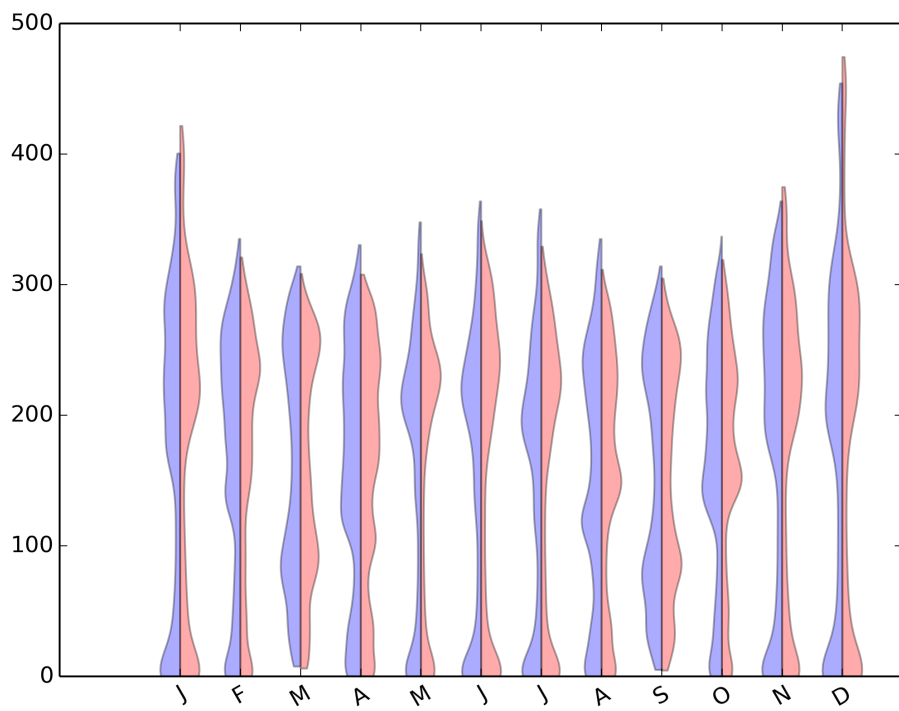


Figure 10: Violin plot for CMIP3-INMCM3-0-AMIP

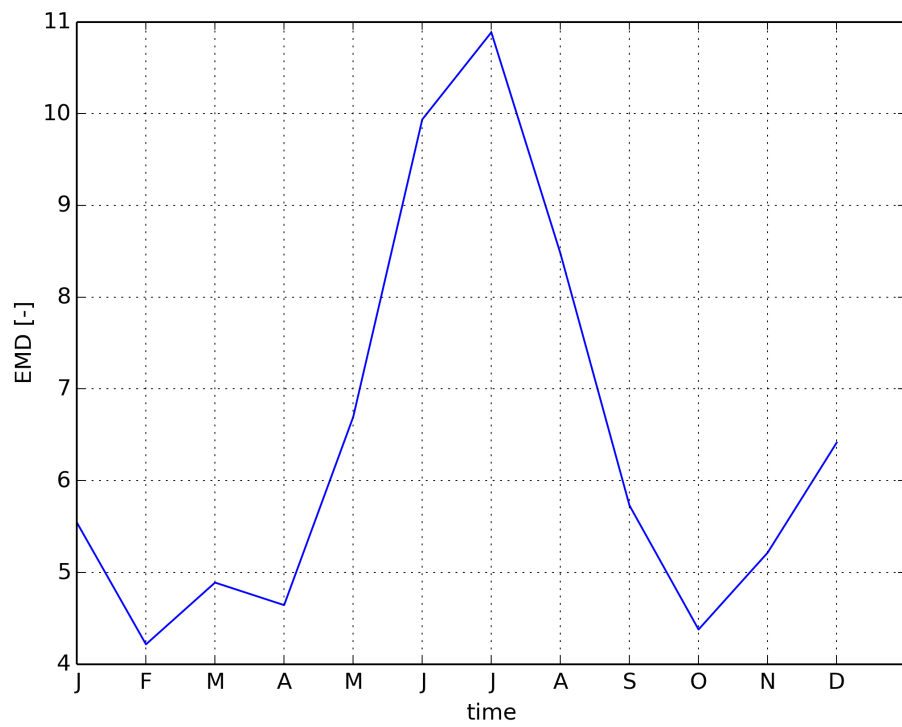


Figure 11: Timeseries of EMD

1.1.3 model mean

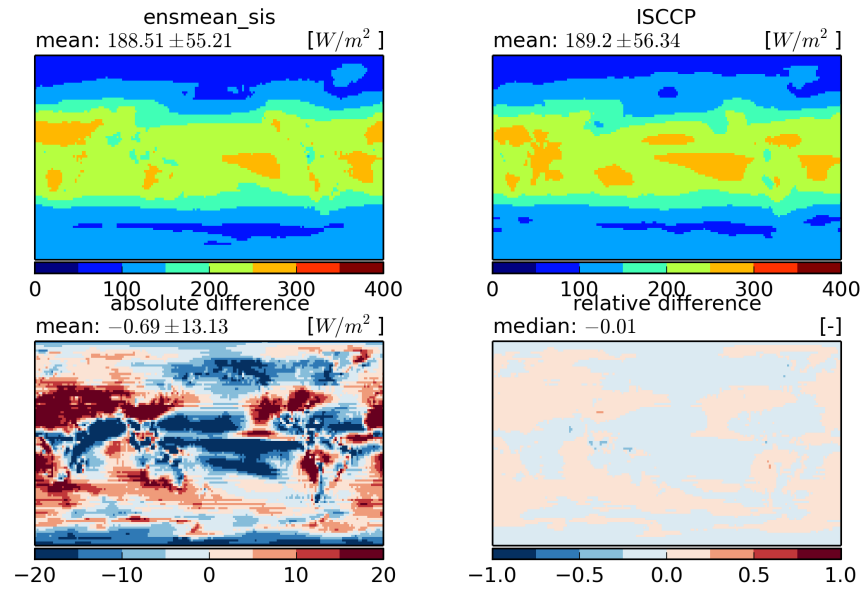


Figure 12: Temporal mean fields (top) and absolute and relative differences (bottom)

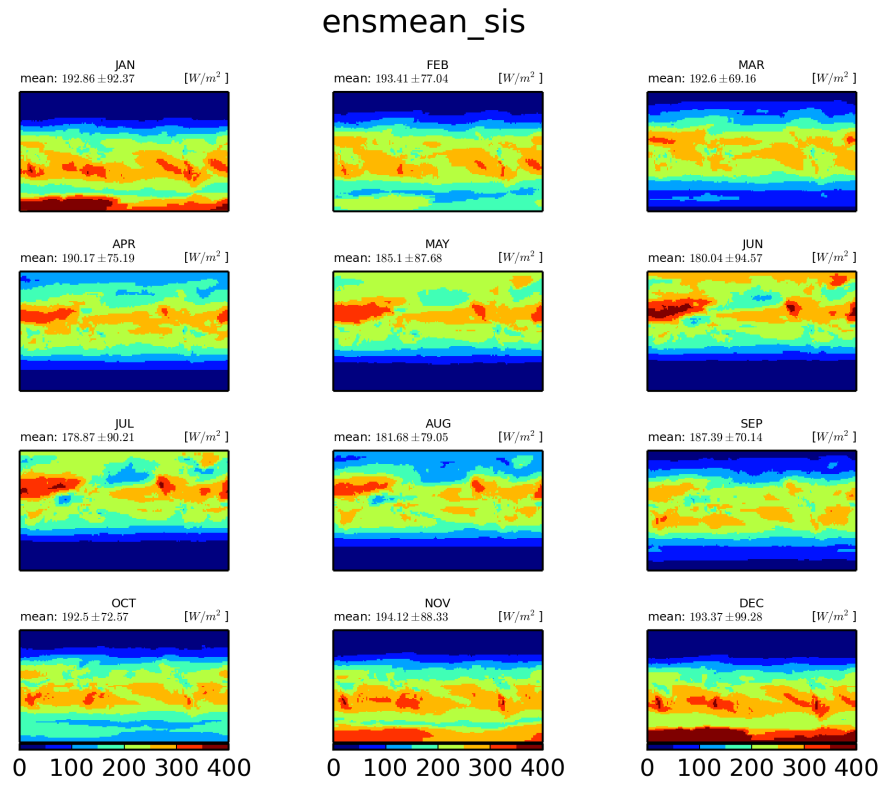


Figure 13: Monthly mean climatology for mean-model

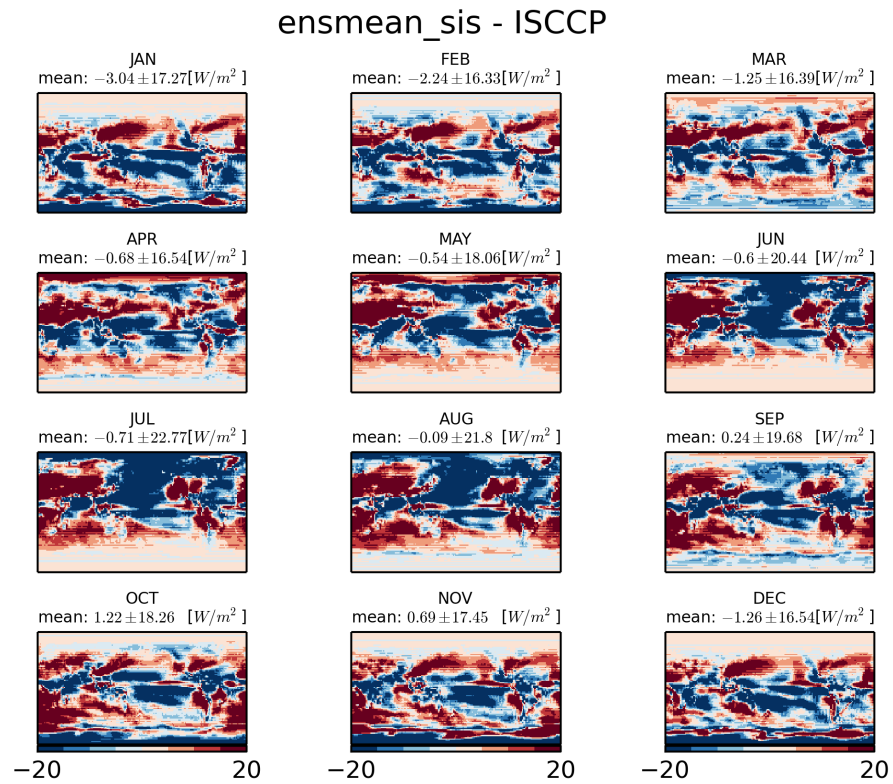


Figure 14: Monthly mean climatology of difference between MEAN-MODEL and ISCCP

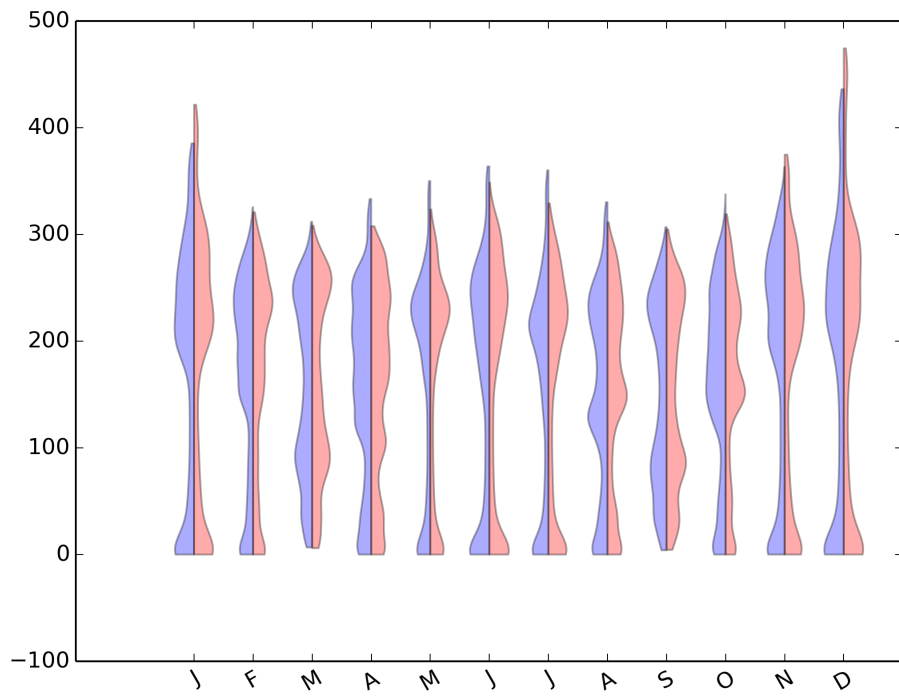


Figure 15: Violin plot for ENSMEAN-SIS

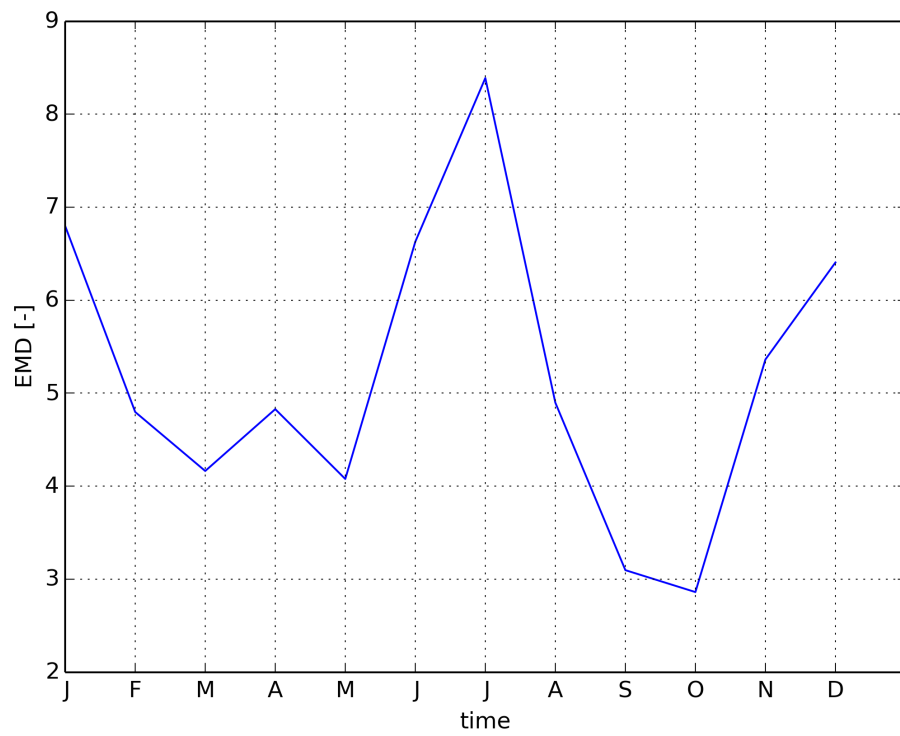


Figure 16: Timeseries of EMD

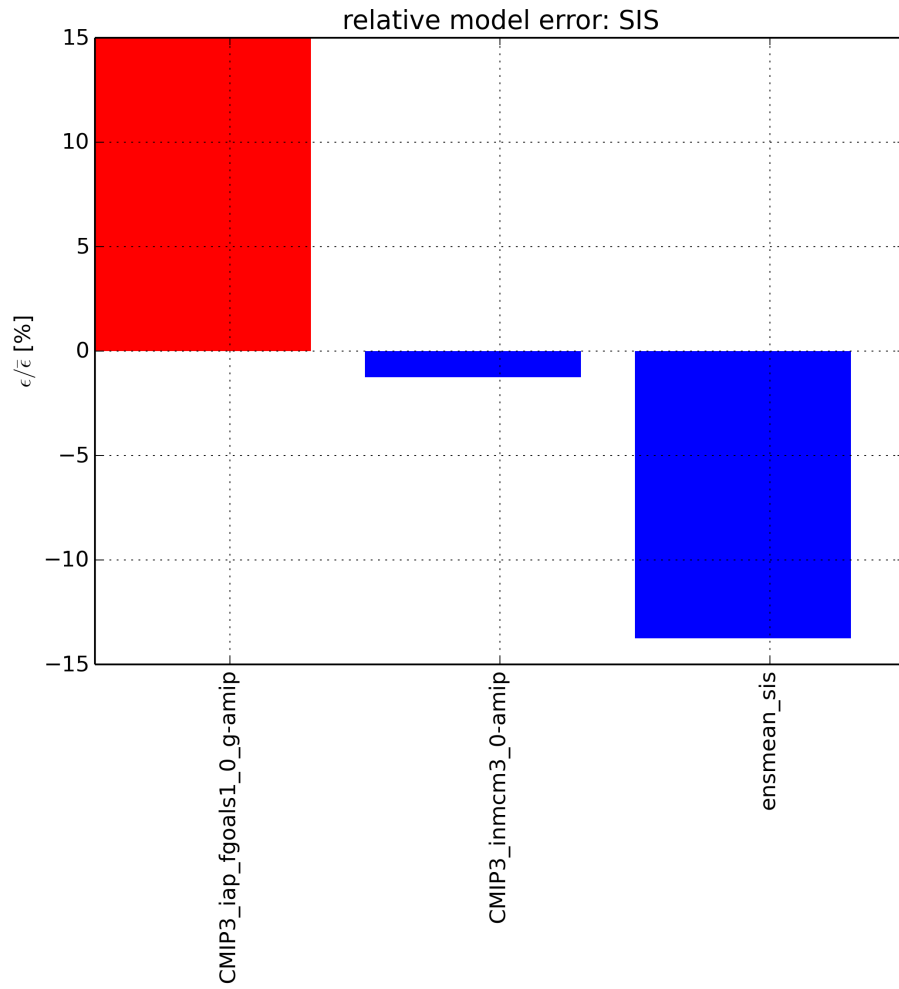


Figure 17: Relative model performance for SIS

1.2 CLARA

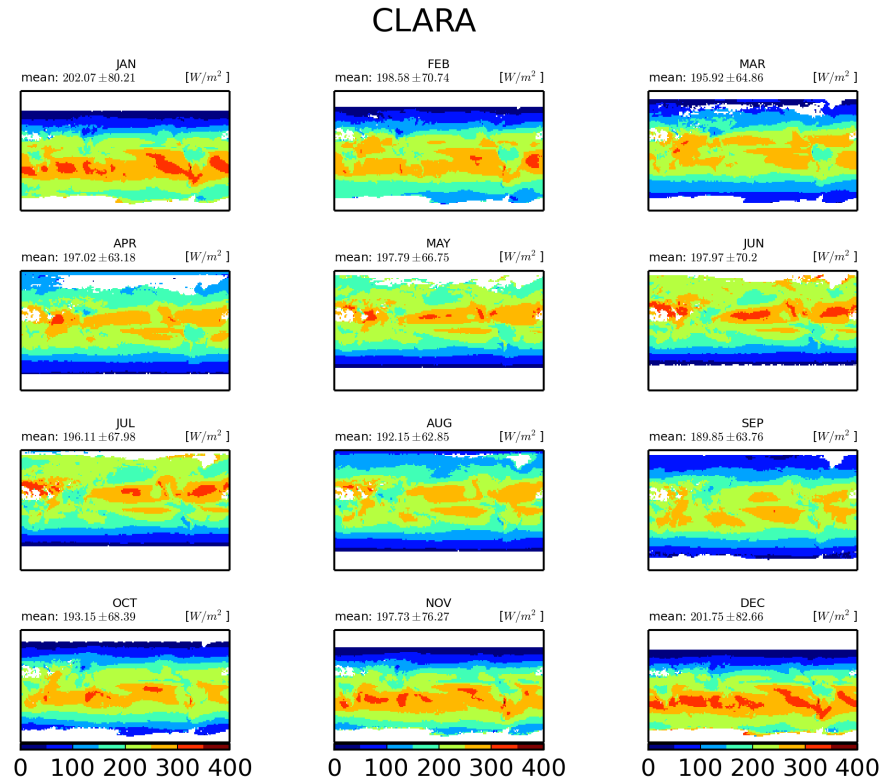


Figure 18: Monthly mean CLARA

1.2.1 CMIP3 iap fgoals1 0 g-amp

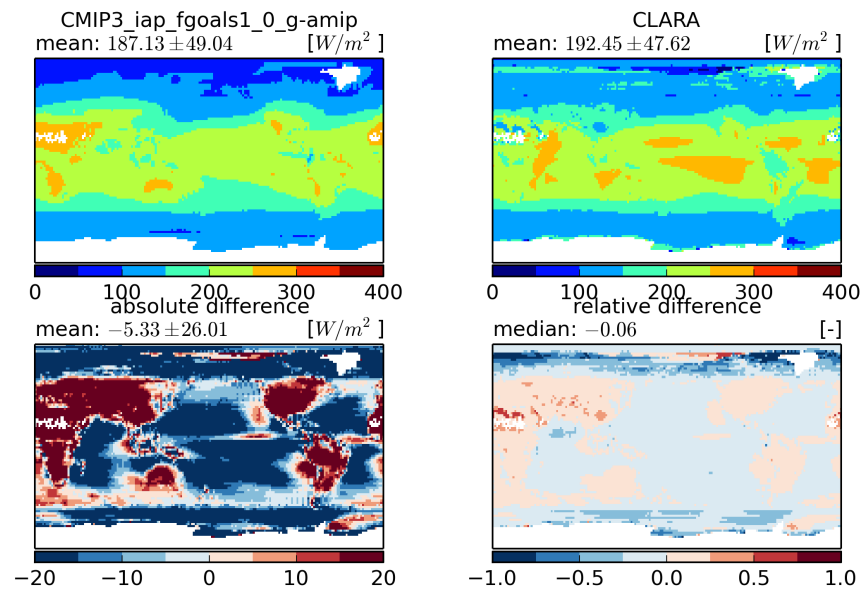


Figure 19: Temporal mean fields (top) and absolute and relative differences (bottom)

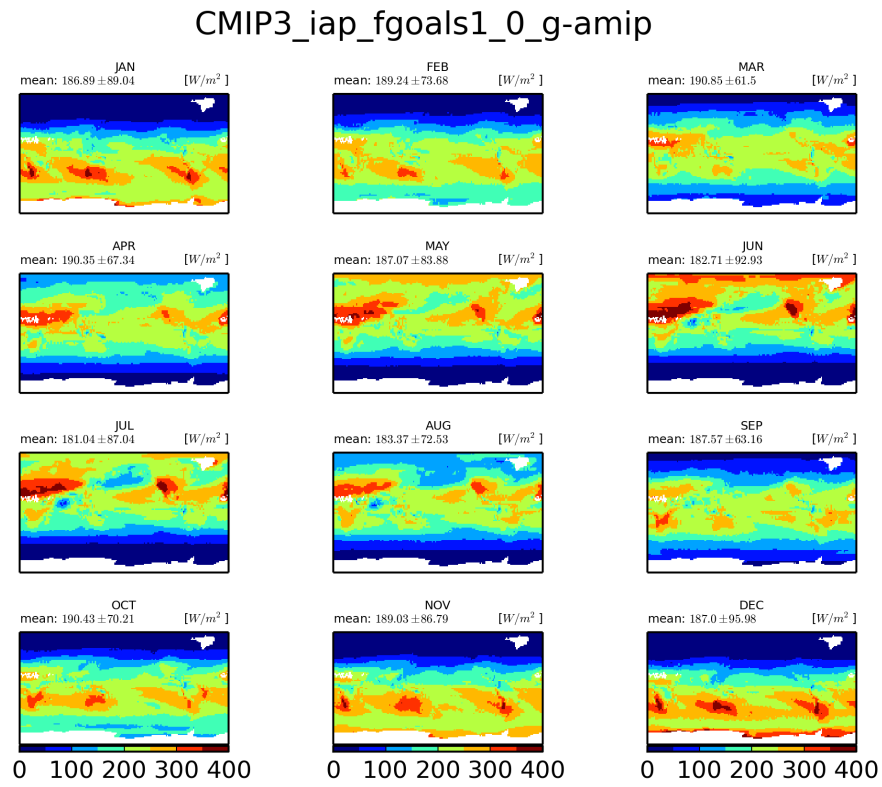


Figure 20: Monthly mean climatology for iap-fgoals1-0-g

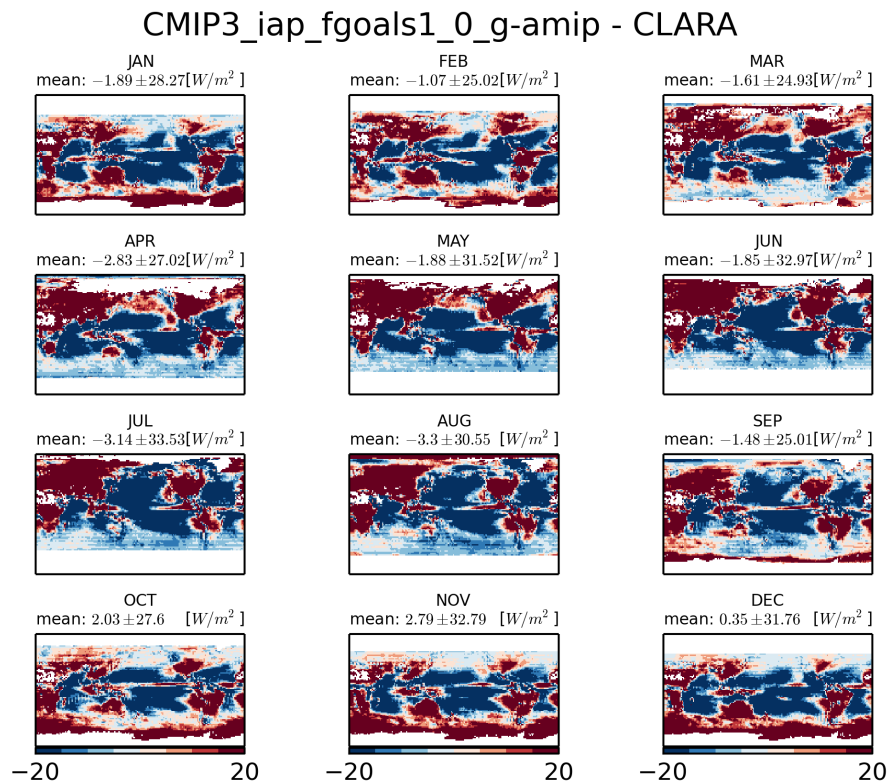


Figure 21: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CLARA

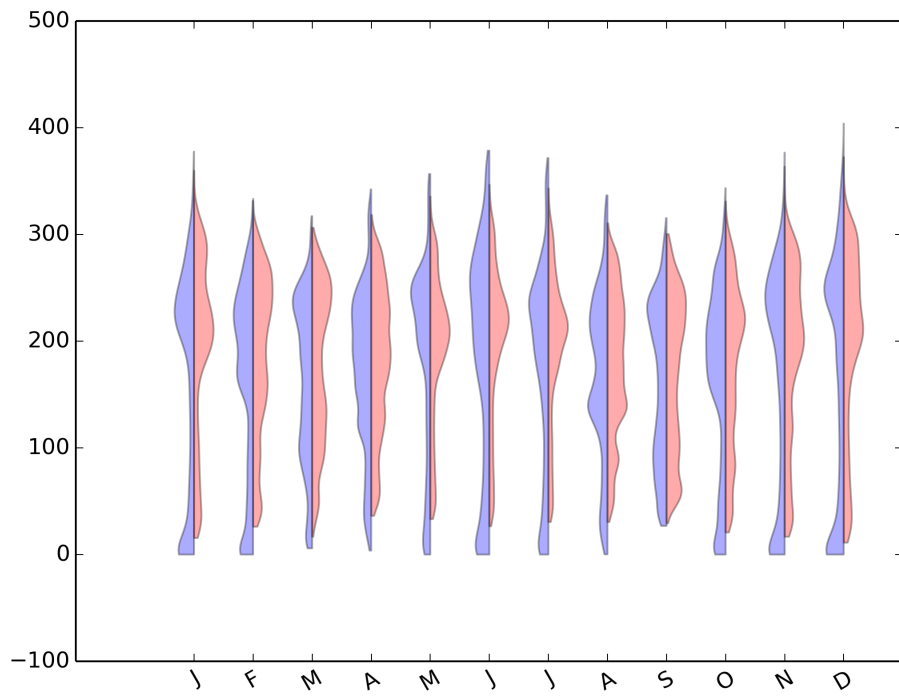


Figure 22: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

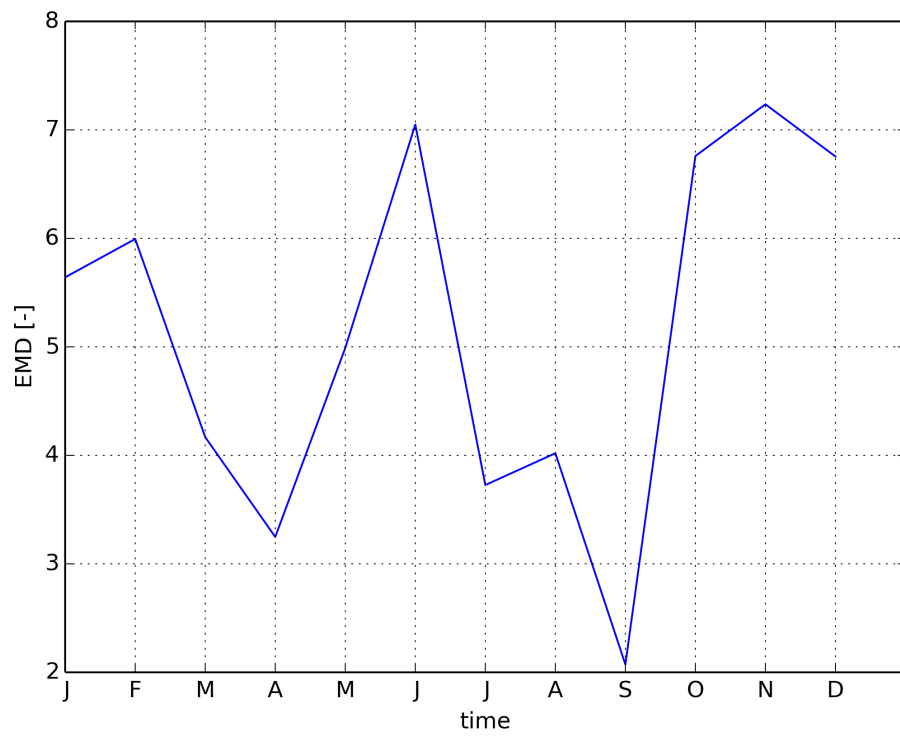


Figure 23: Timeseries of EMD

1.2.2 CMIP3 inmcm3 0-amp

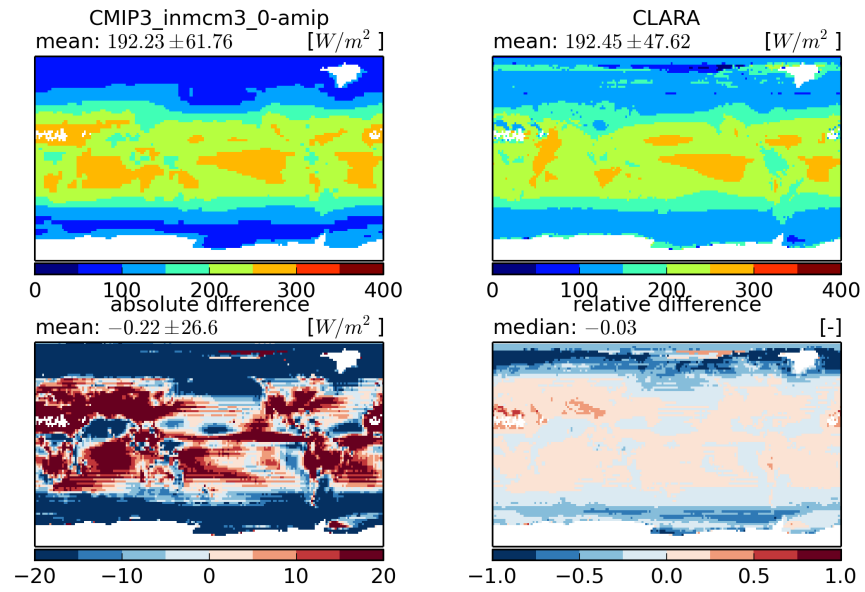


Figure 24: Temporal mean fields (top) and absolute and relative differences (bottom)

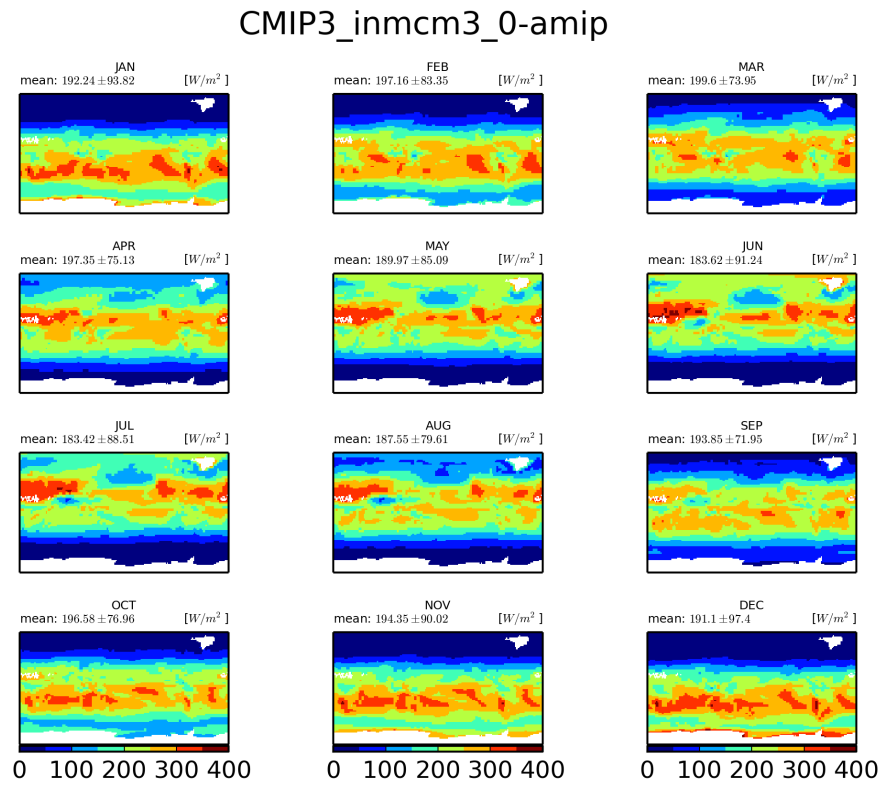


Figure 25: Monthly mean climatology for inmcm3-0

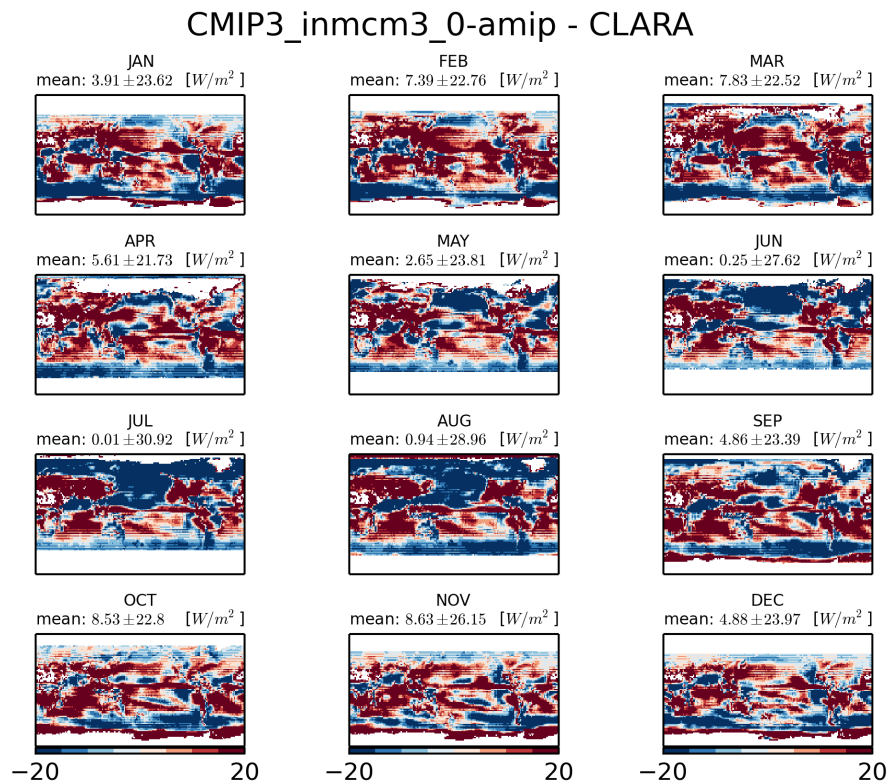


Figure 26: Monthly mean climatology of difference between INMCM3-0 and CLARA

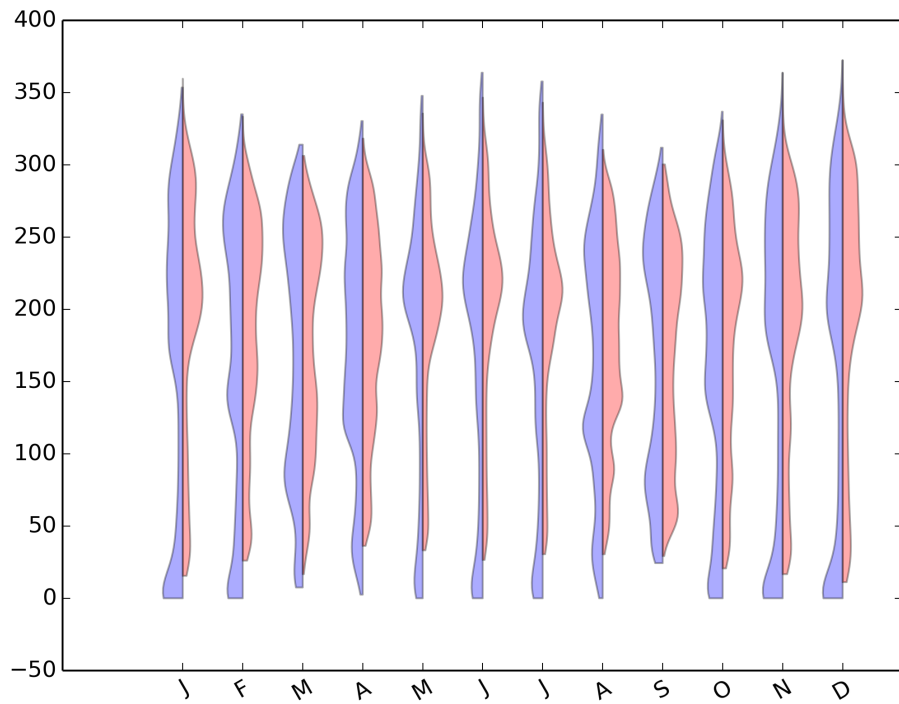


Figure 27: Violin plot for CMIP3-INMCM3-0-AMIP

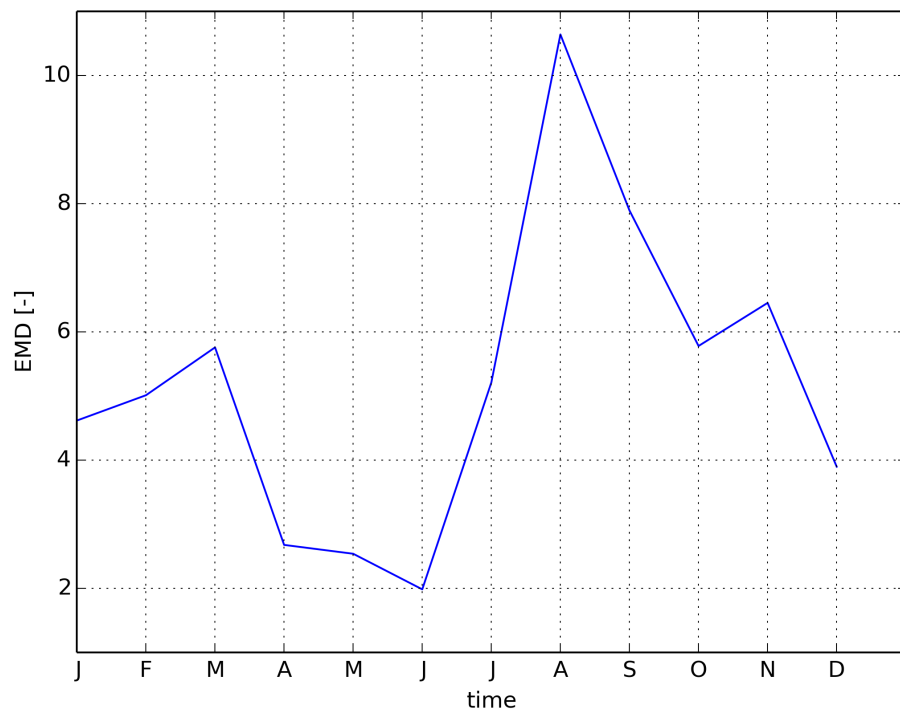


Figure 28: Timeseries of EMD

1.2.3 model mean

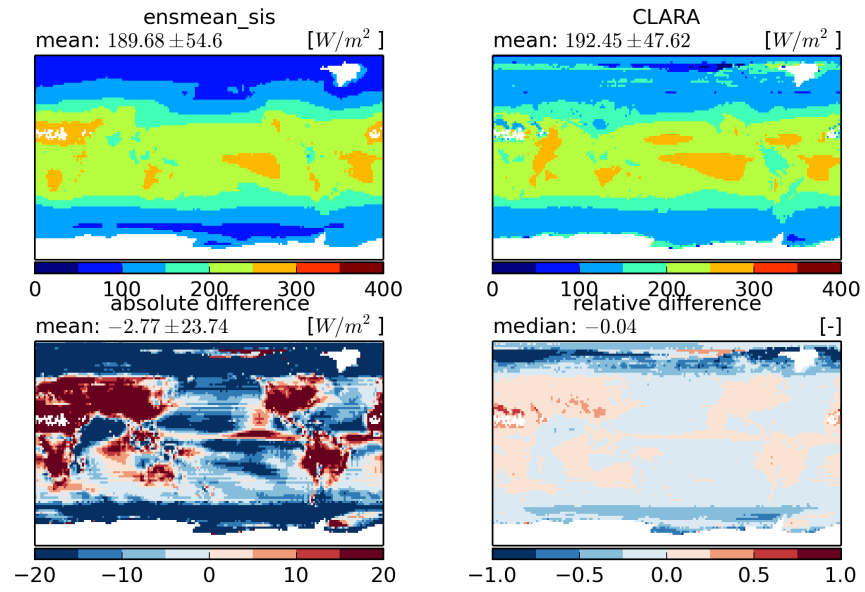


Figure 29: Temporal mean fields (top) and absolute and relative differences (bottom)

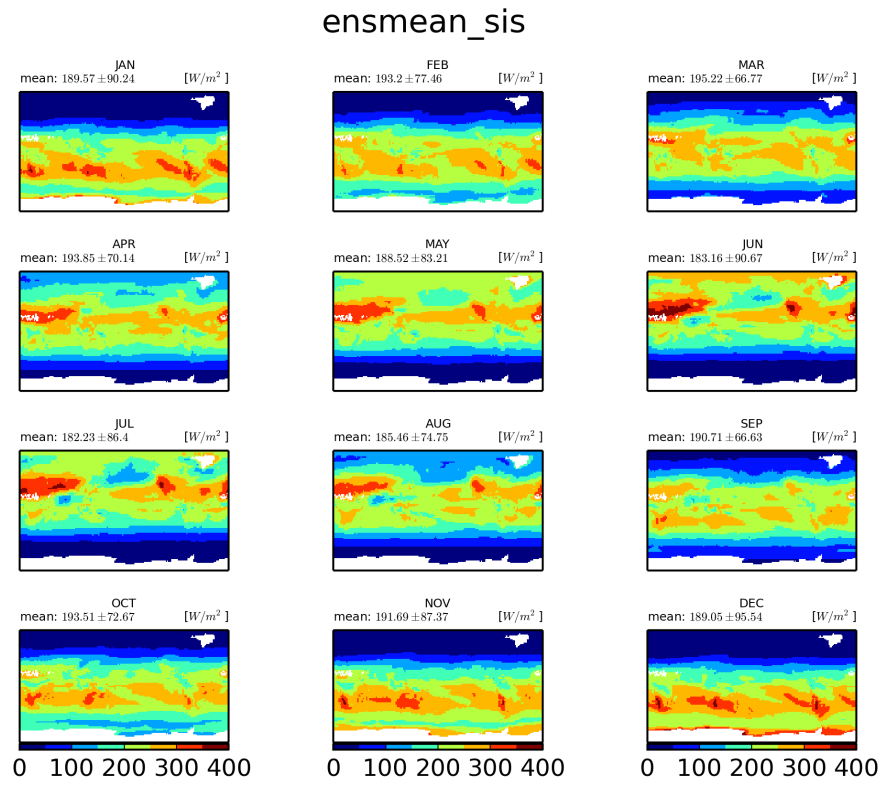


Figure 30: Monthly mean climatology for mean-model

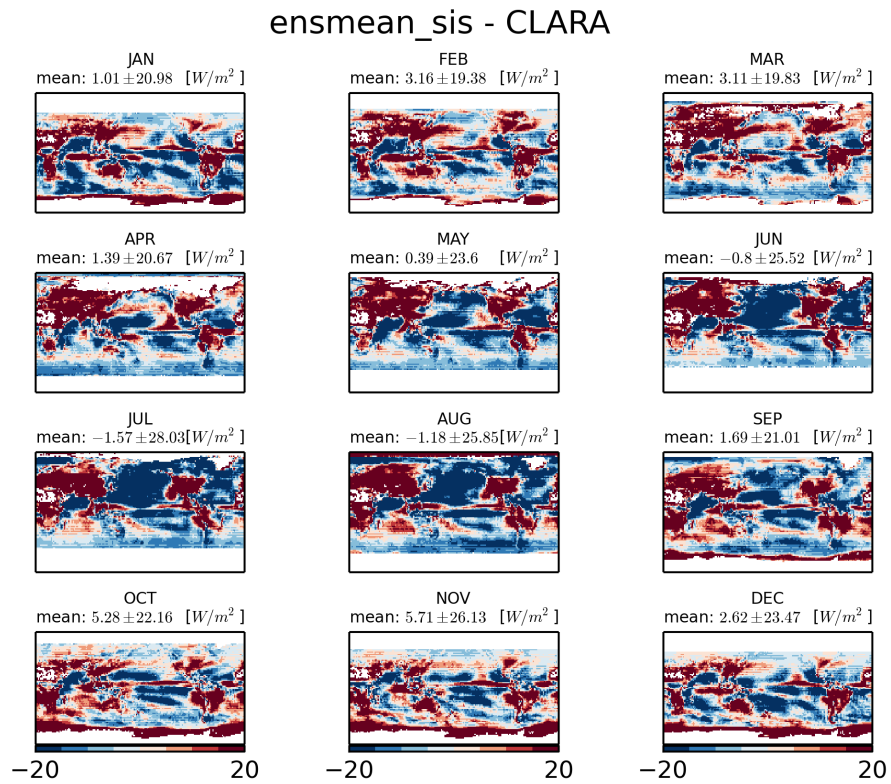


Figure 31: Monthly mean climatology of difference between MEAN-MODEL and CLARA

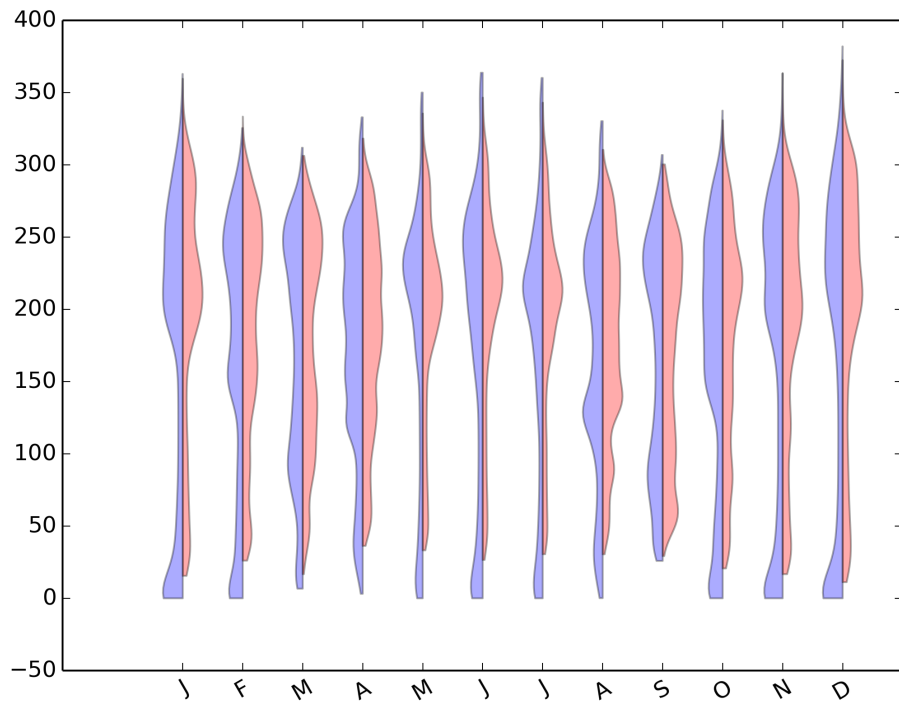


Figure 32: Violin plot for ENSMEAN-SIS

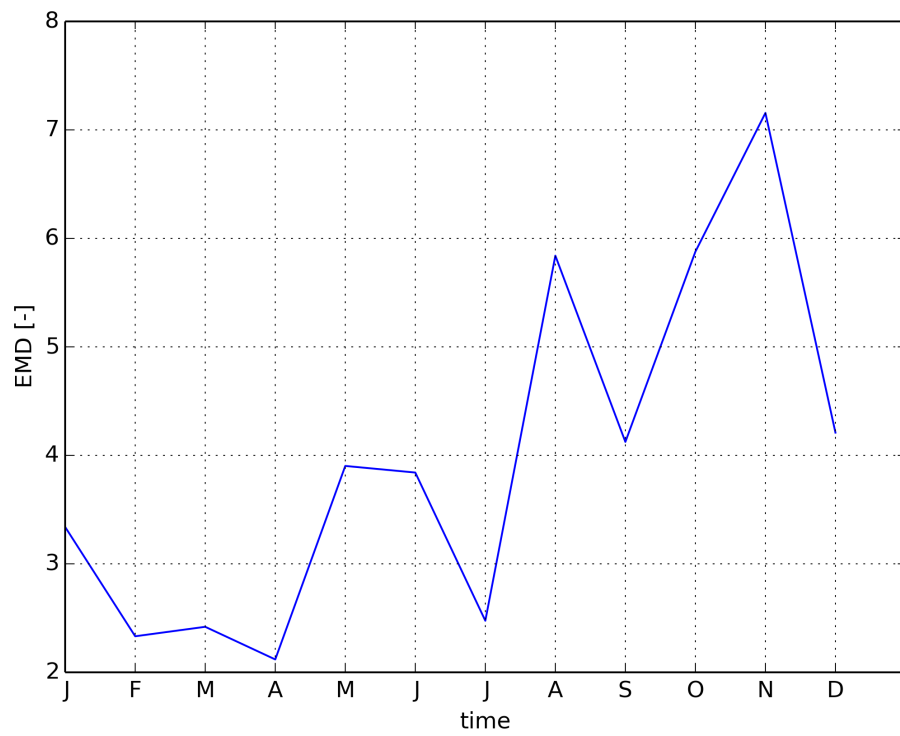


Figure 33: Timeseries of EMD

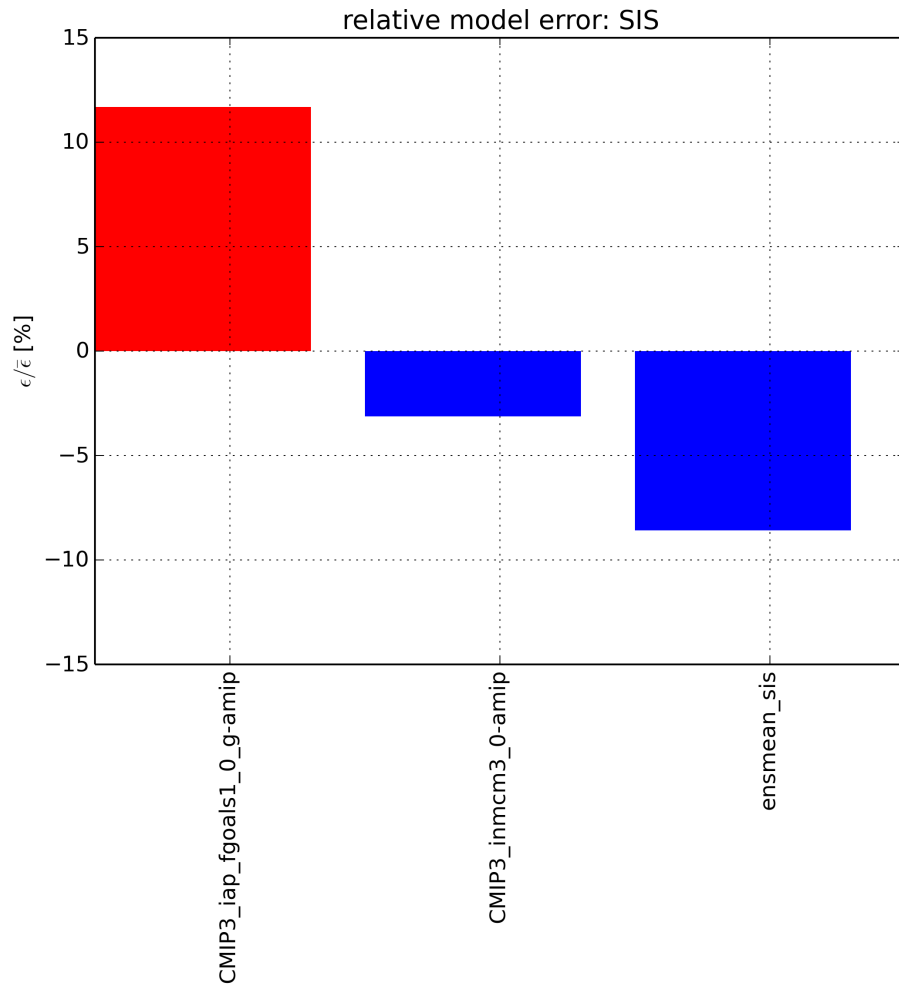


Figure 34: Relative model performance for SIS

1.3 CERES2.7

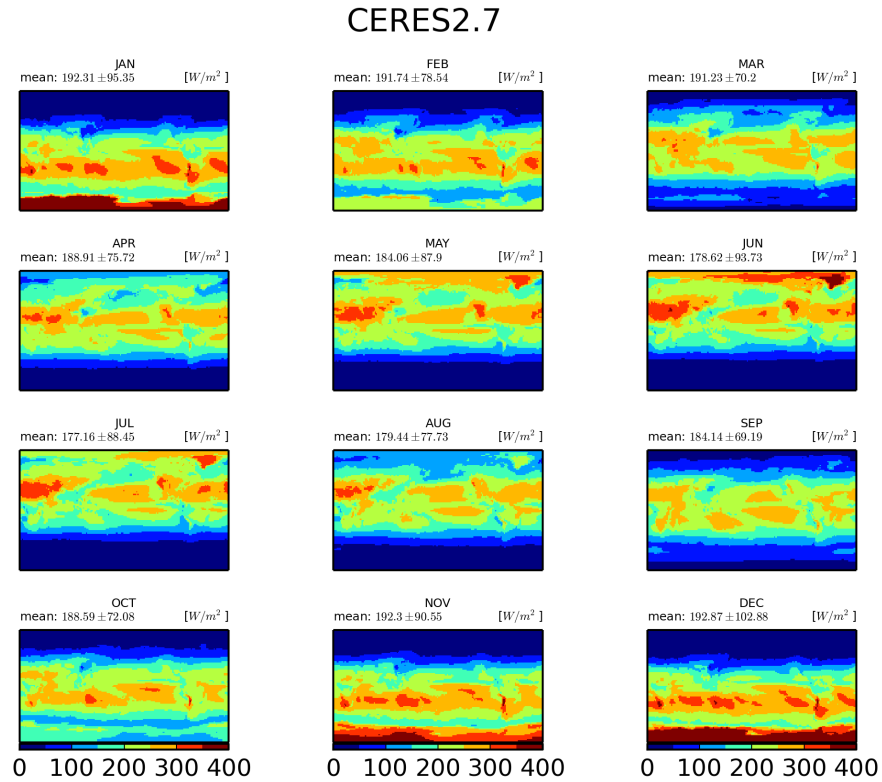


Figure 35: Monthly mean CERES2.7

1.3.1 CMIP3 iap fgoals1 0 g-amip

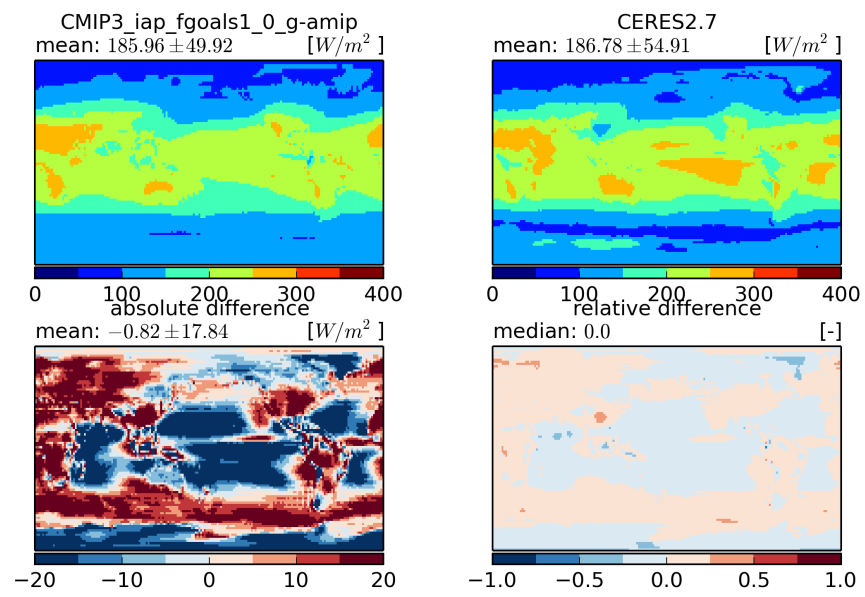


Figure 36: Temporal mean fields (top) and absolute and relative differences (bottom)

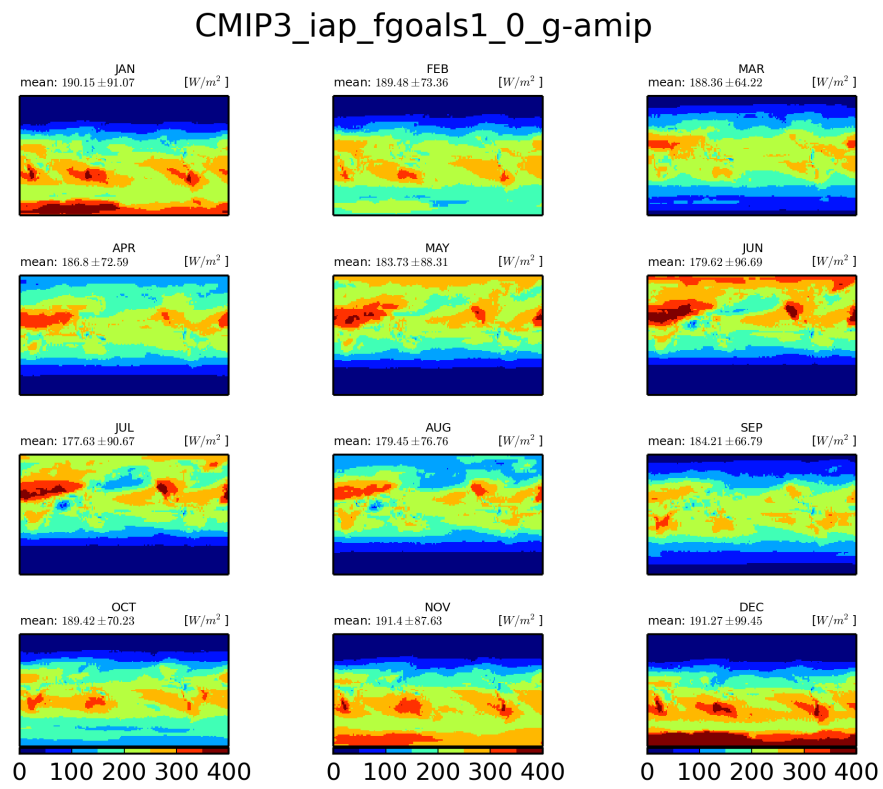


Figure 37: Monthly mean climatology for iap-fgoals1-0-g

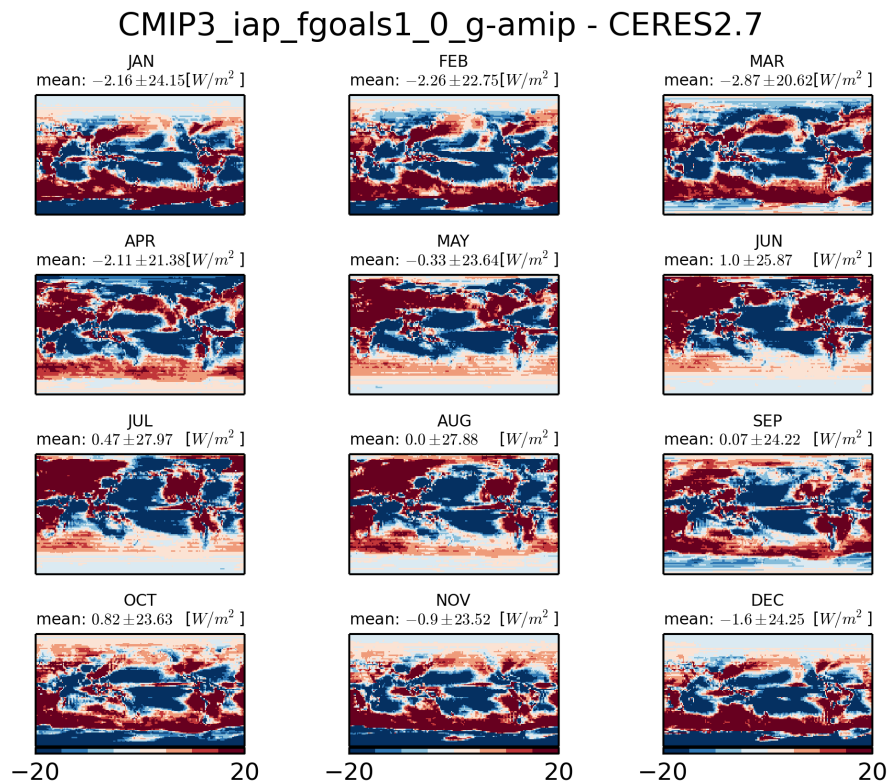


Figure 38: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CERES2.7

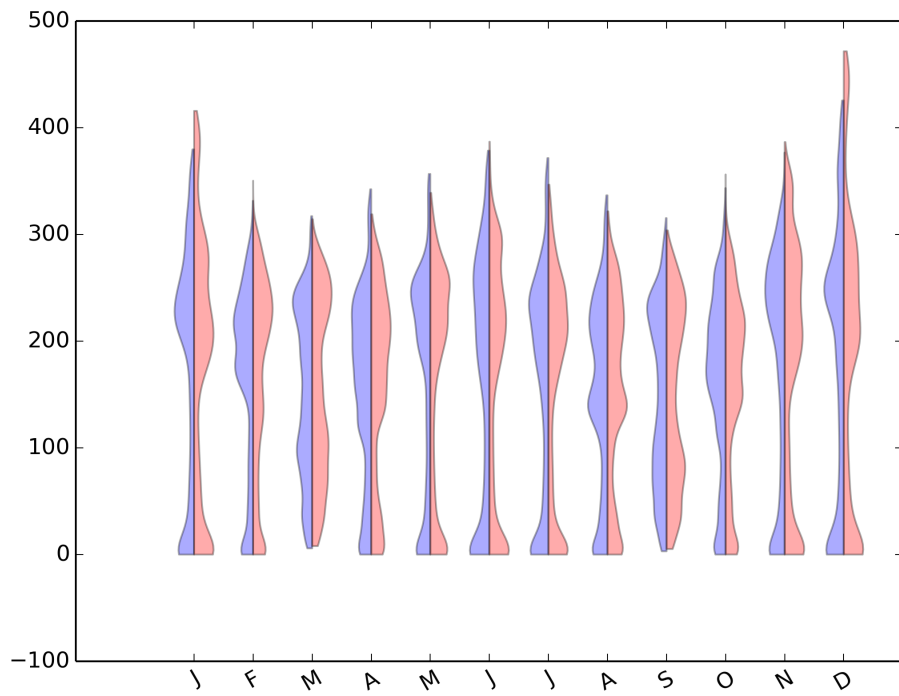


Figure 39: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

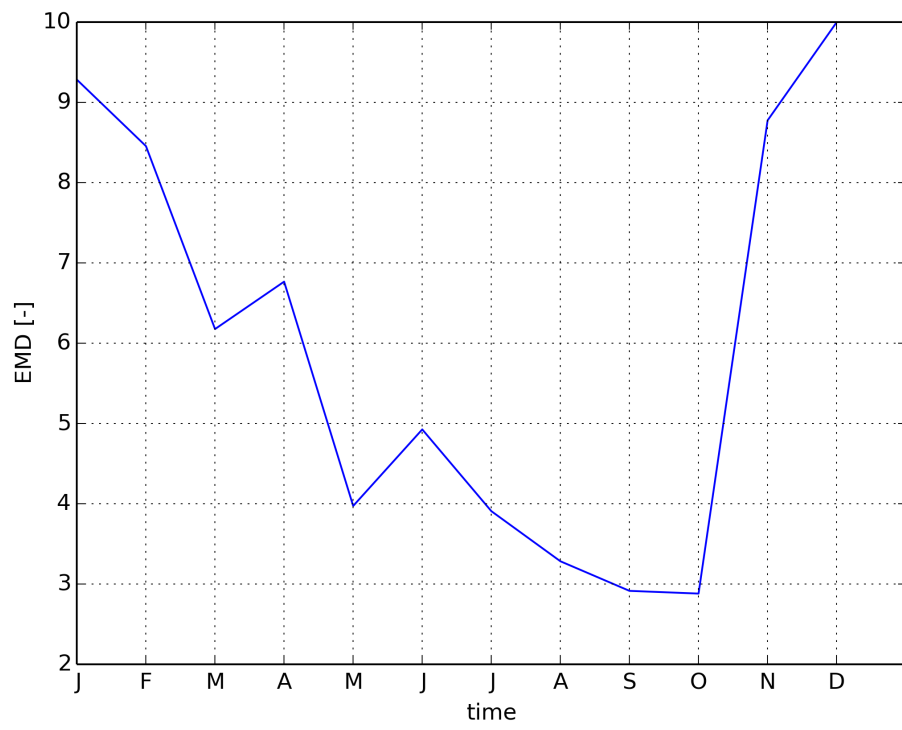


Figure 40: Timeseries of EMD

1.3.2 CMIP3 inmcm3 0-amip

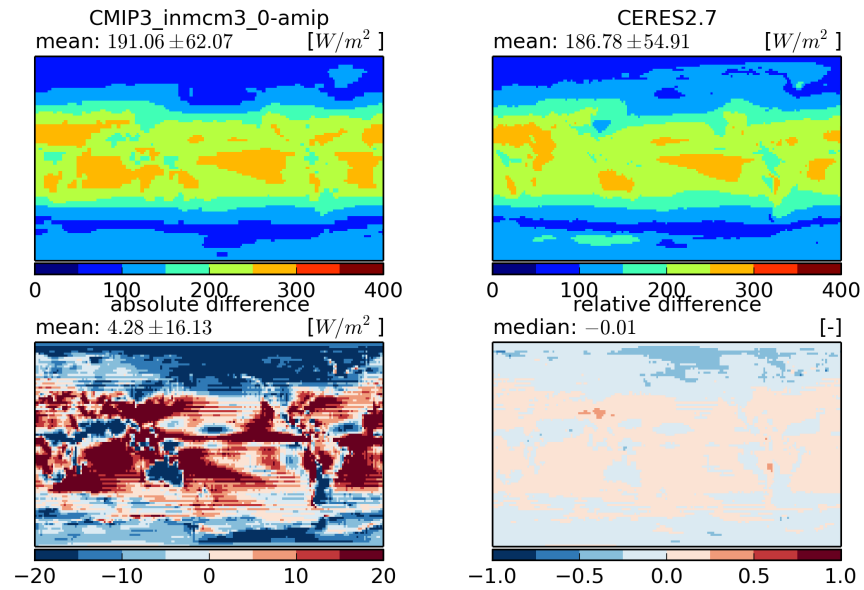


Figure 41: Temporal mean fields (top) and absolute and relative differences (bottom)

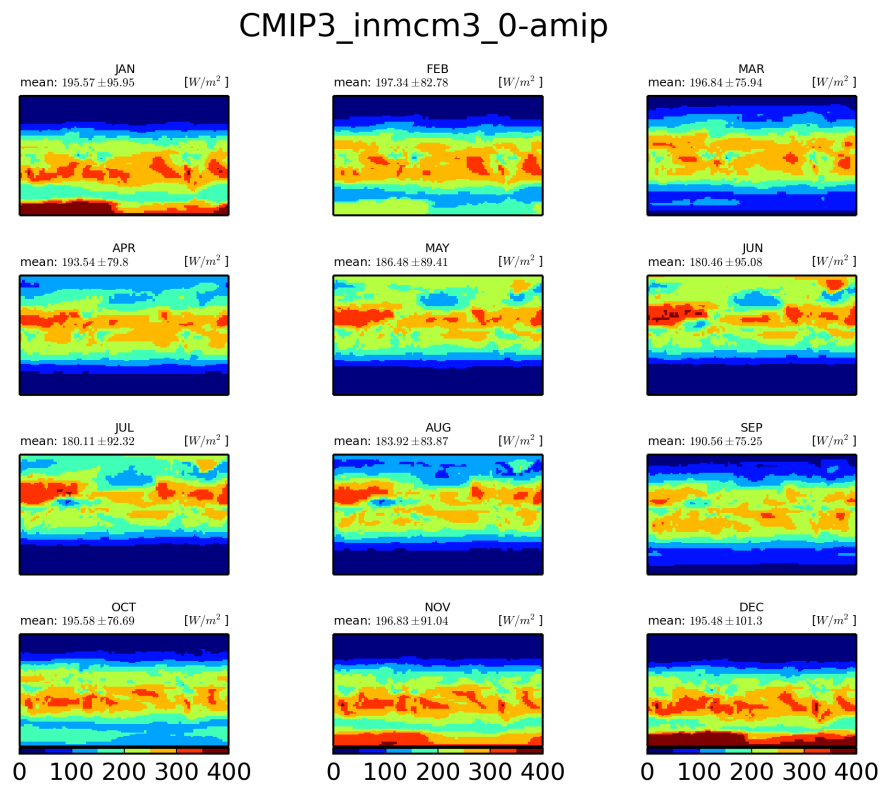


Figure 42: Monthly mean climatology for inmcm3-0

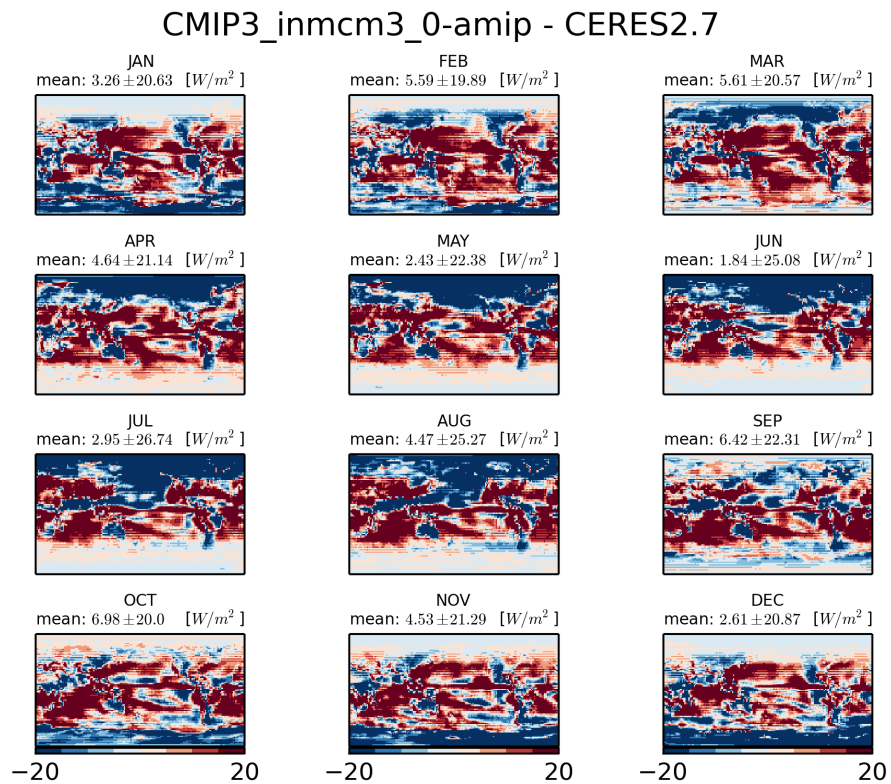


Figure 43: Monthly mean climatology of difference between INMCM3-0 and CERES2.7

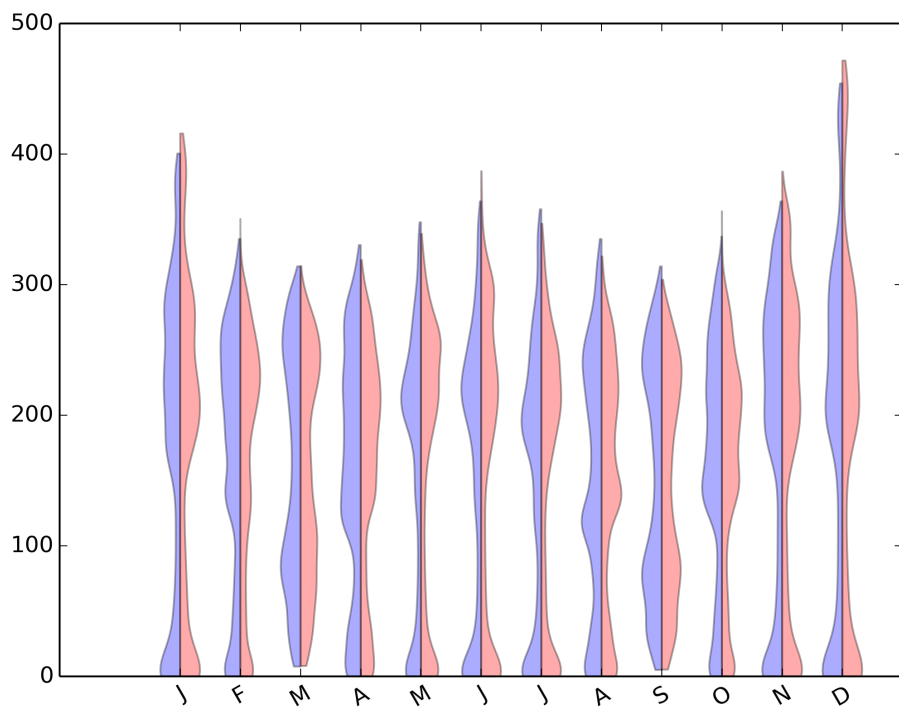


Figure 44: Violin plot for CMIP3-INMCM3-0-AMIP

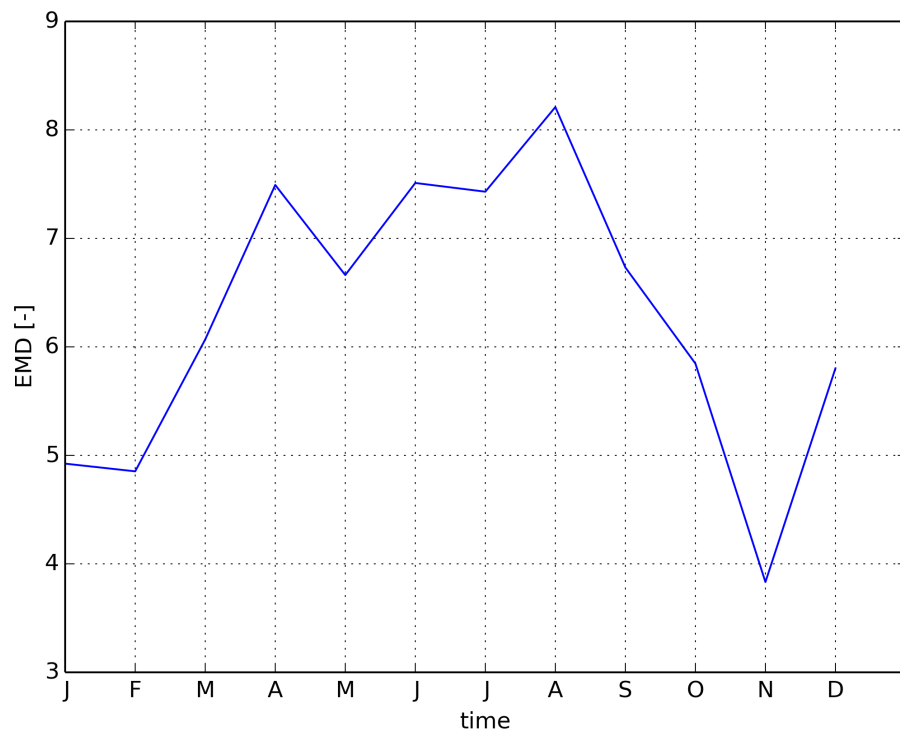


Figure 45: Timeseries of EMD

1.3.3 model mean

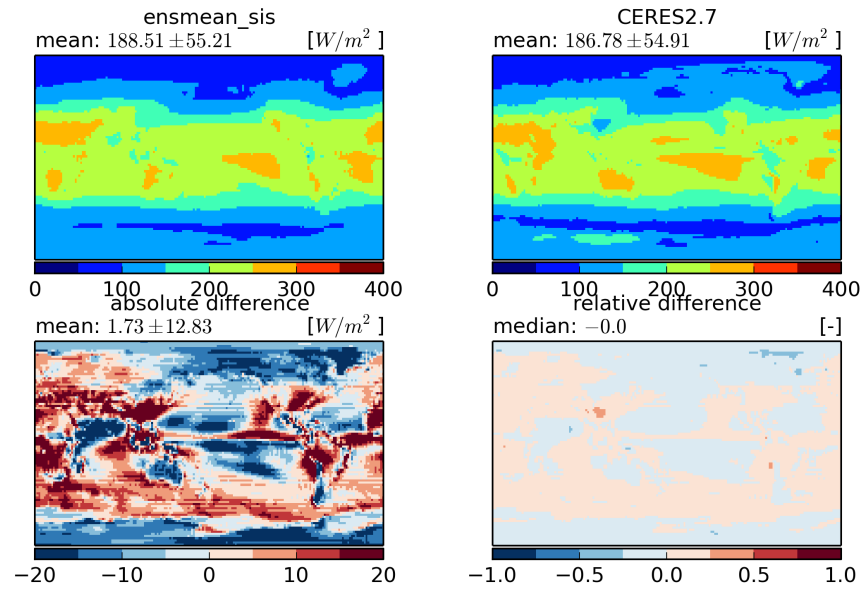


Figure 46: Temporal mean fields (top) and absolute and relative differences (bottom)

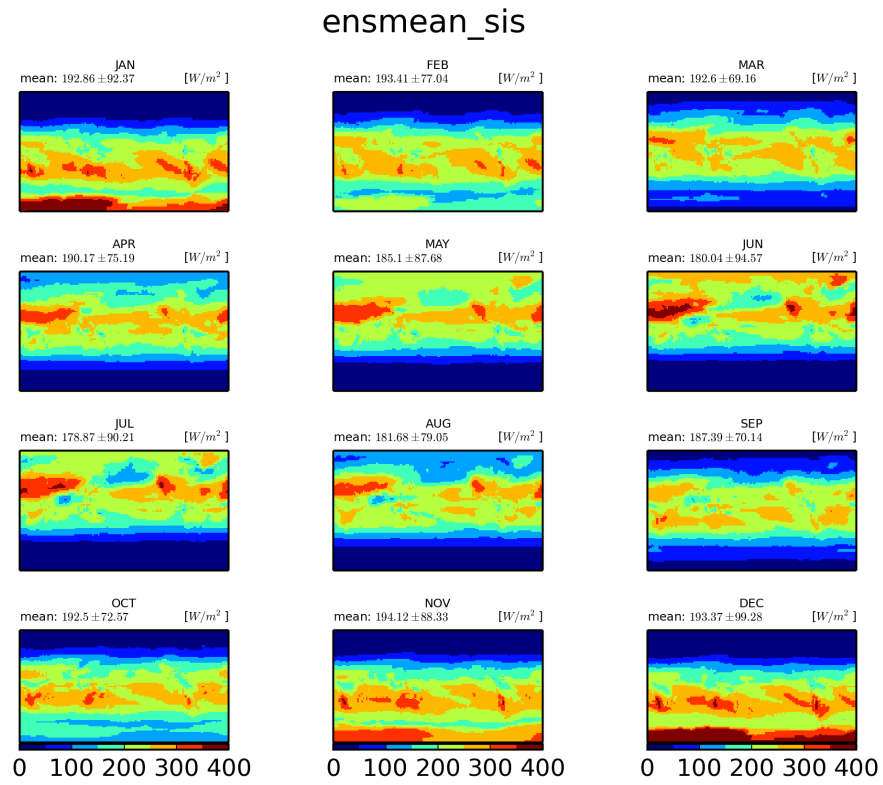


Figure 47: Monthly mean climatology for mean-model

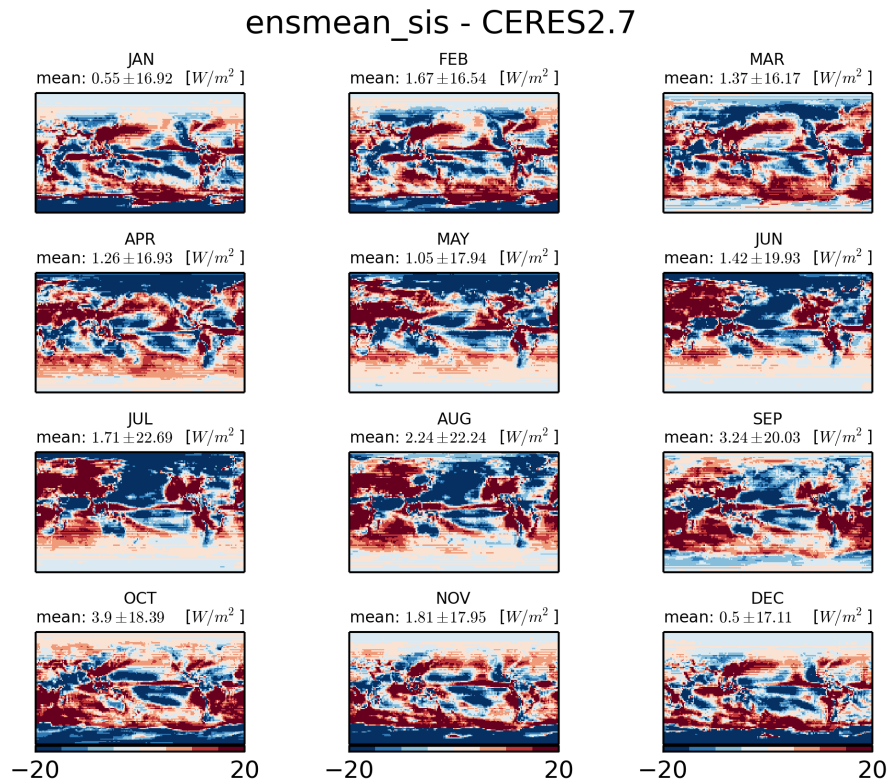


Figure 48: Monthly mean climatology of difference between MEAN-MODEL and CERES2.7

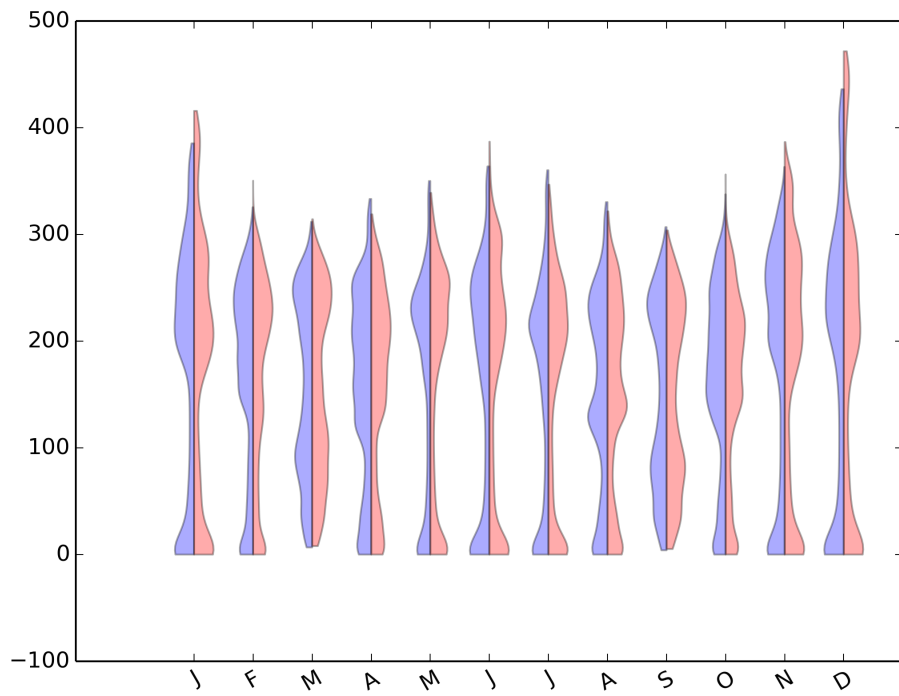


Figure 49: Violin plot for ENSMEAN-SIS

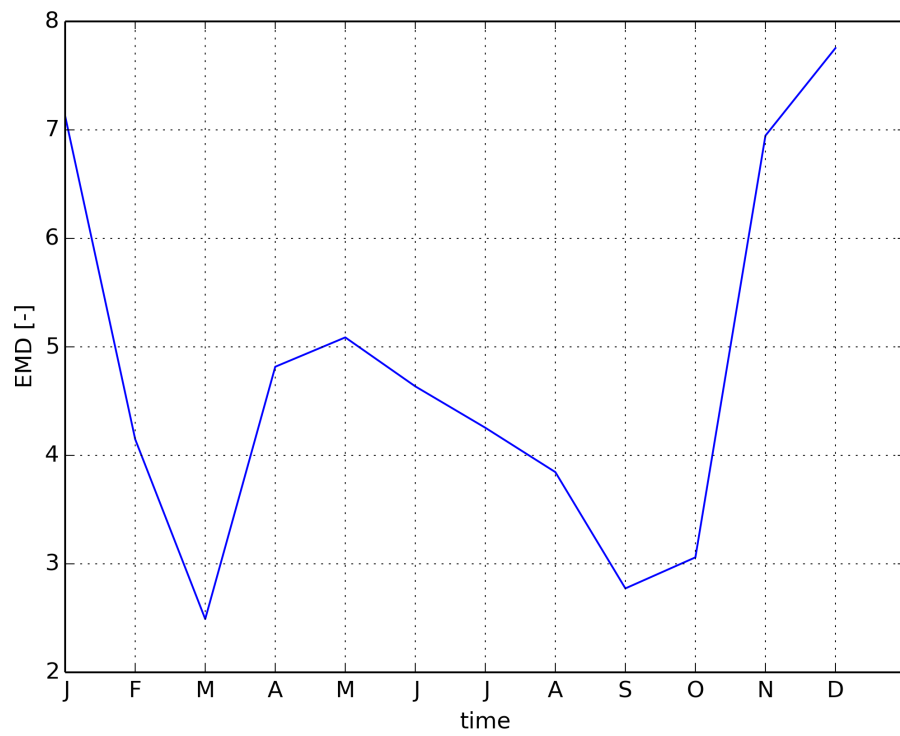


Figure 50: Timeseries of EMD

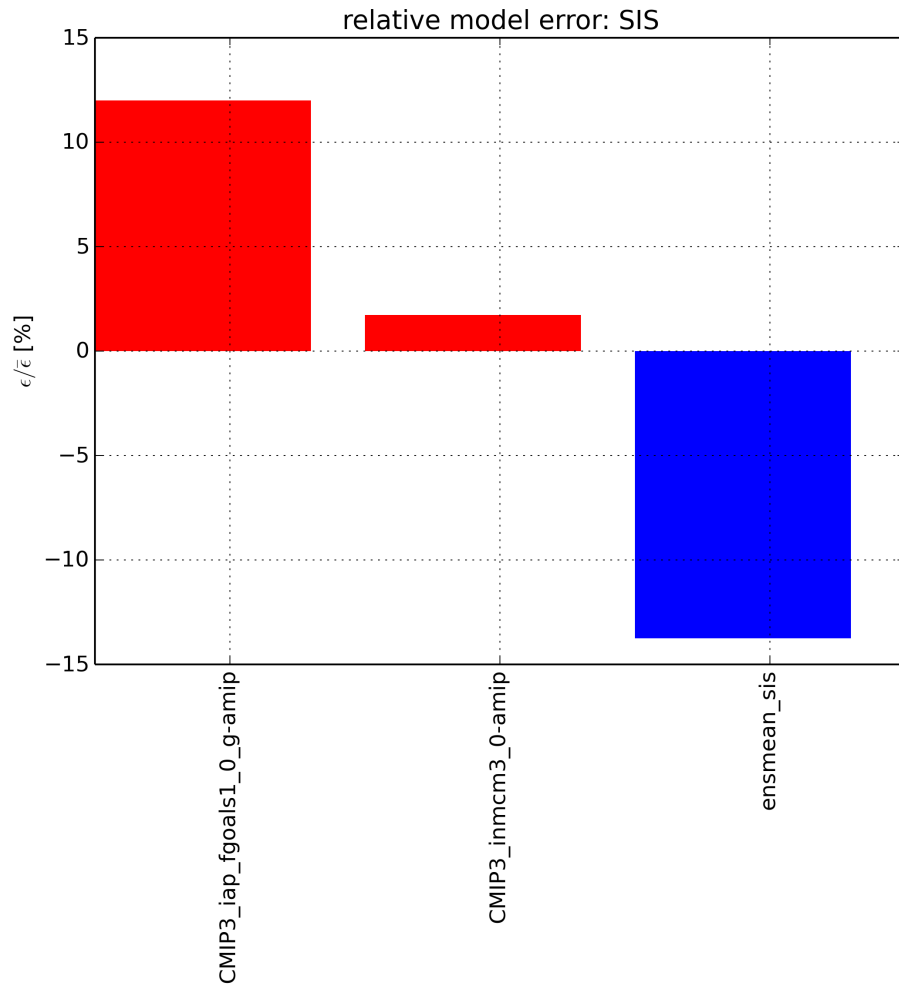


Figure 51: Relative model performance for SIS

1.4 SRBv3.0

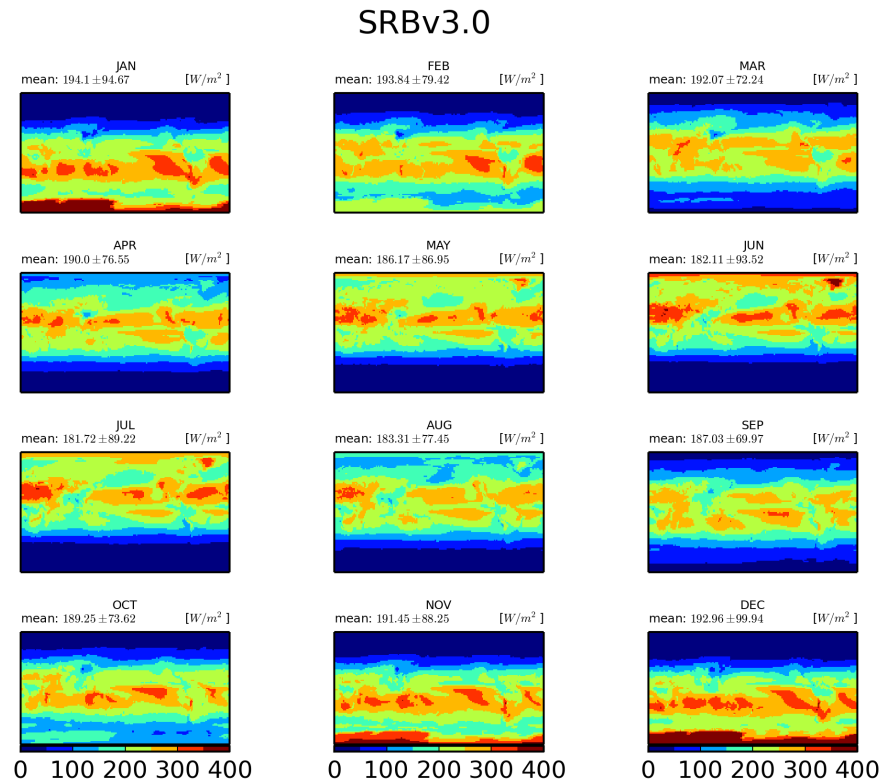


Figure 52: Monthly mean SRBv3.0

1.4.1 CMIP3 iap fgoals1 0 g-amp

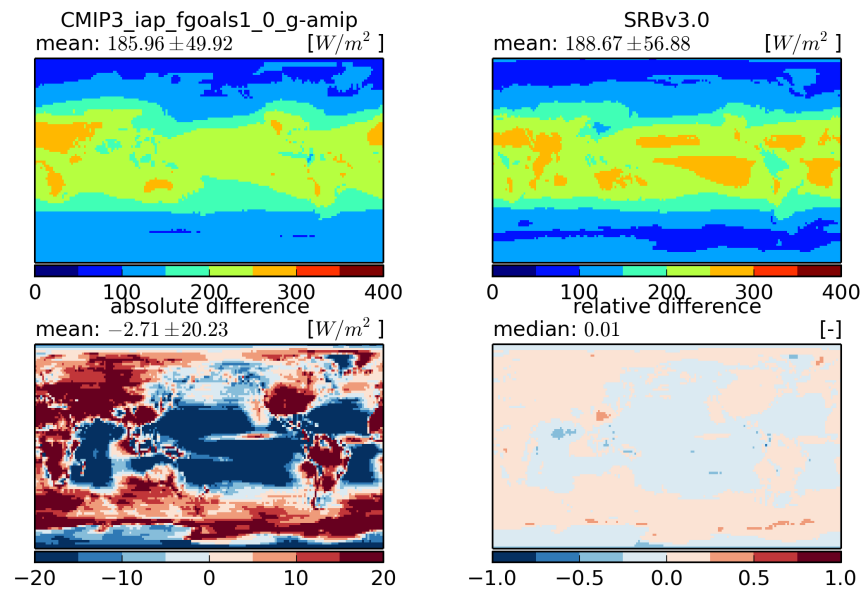


Figure 53: Temporal mean fields (top) and absolute and relative differences (bottom)

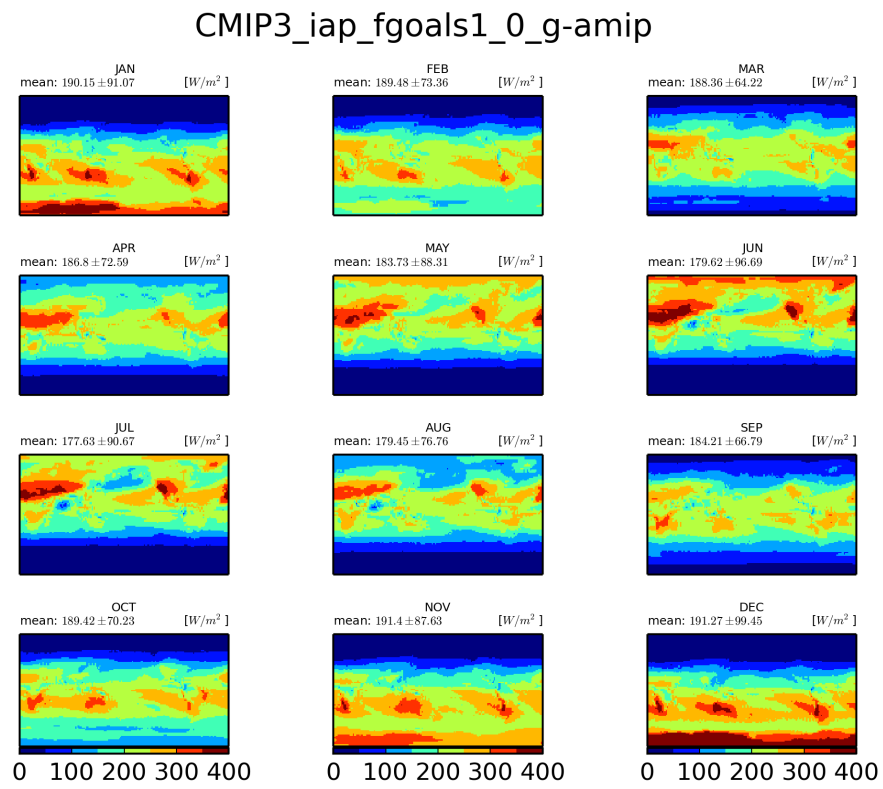


Figure 54: Monthly mean climatology for iap-fgoals1-0-g

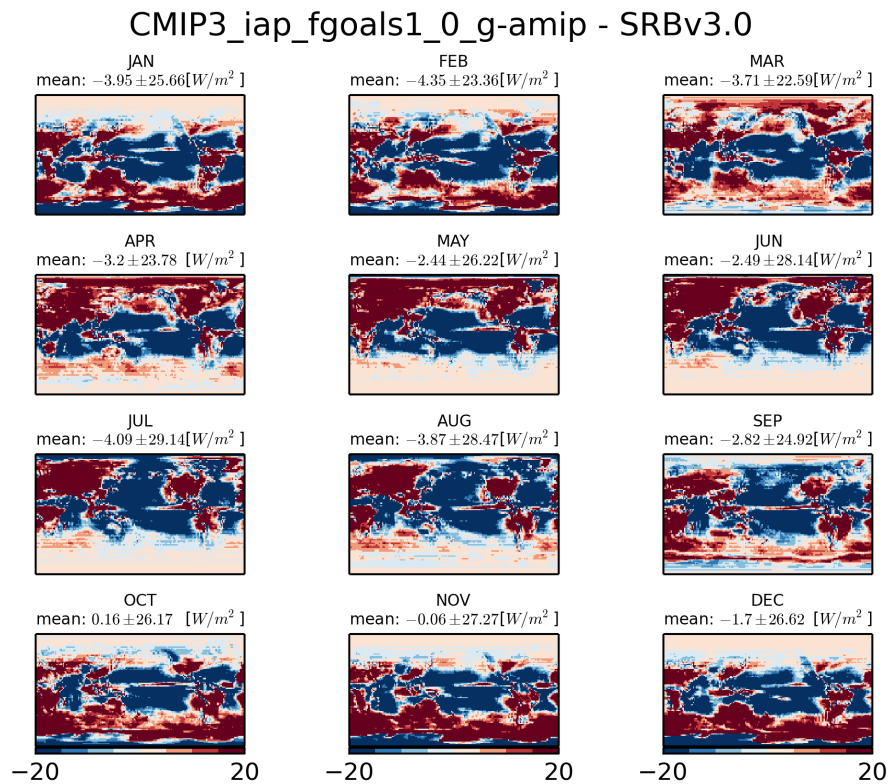


Figure 55: Monthly mean climatology of difference between IAP-FGOALS1-0-G and SRBV3.0

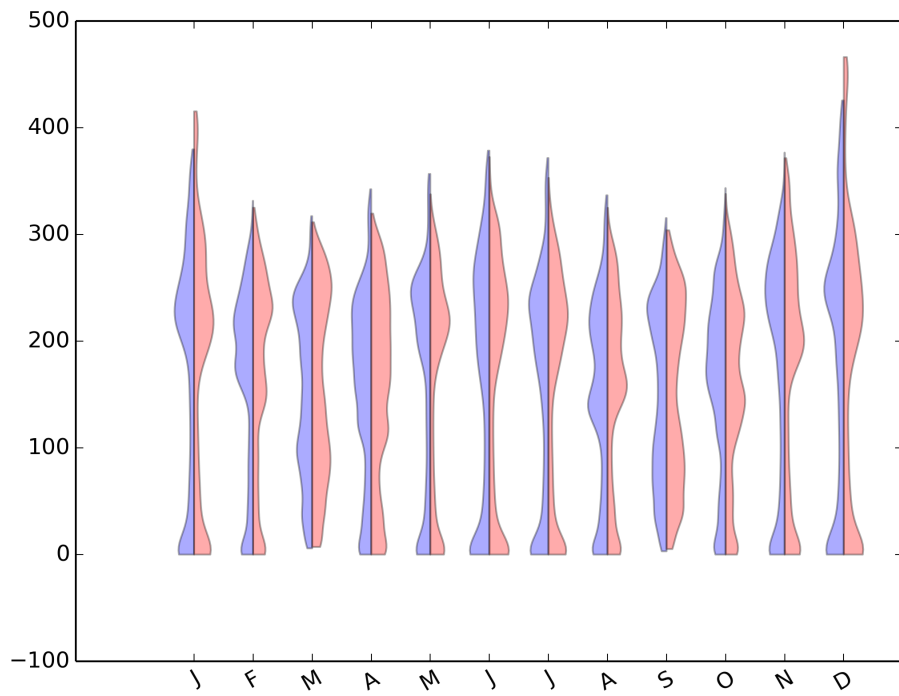


Figure 56: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

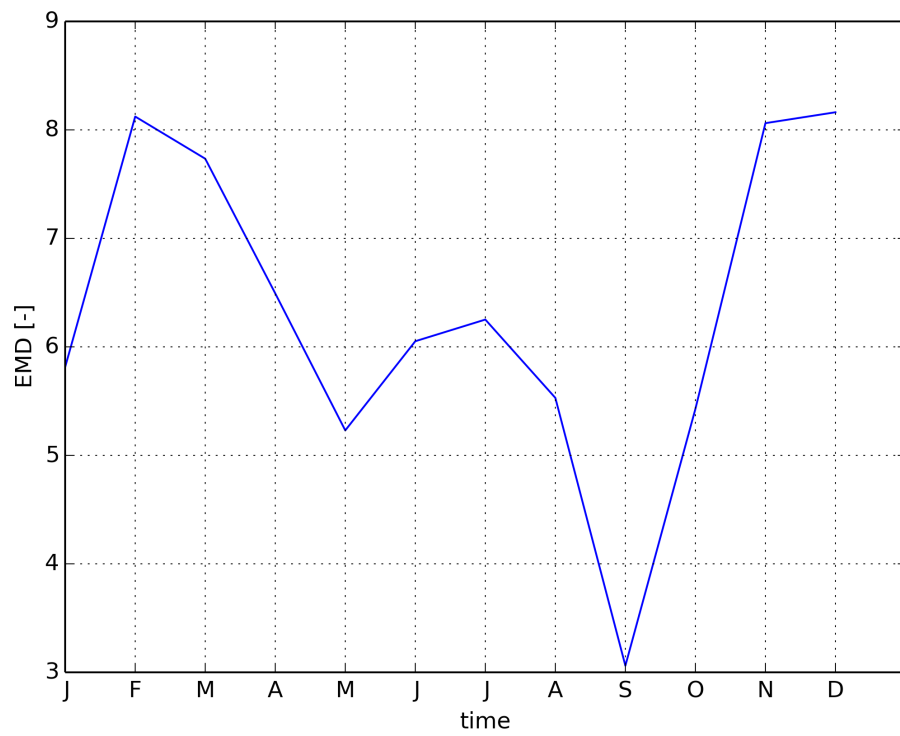


Figure 57: Timeseries of EMD

1.4.2 CMIP3 inmcm3 0-amip

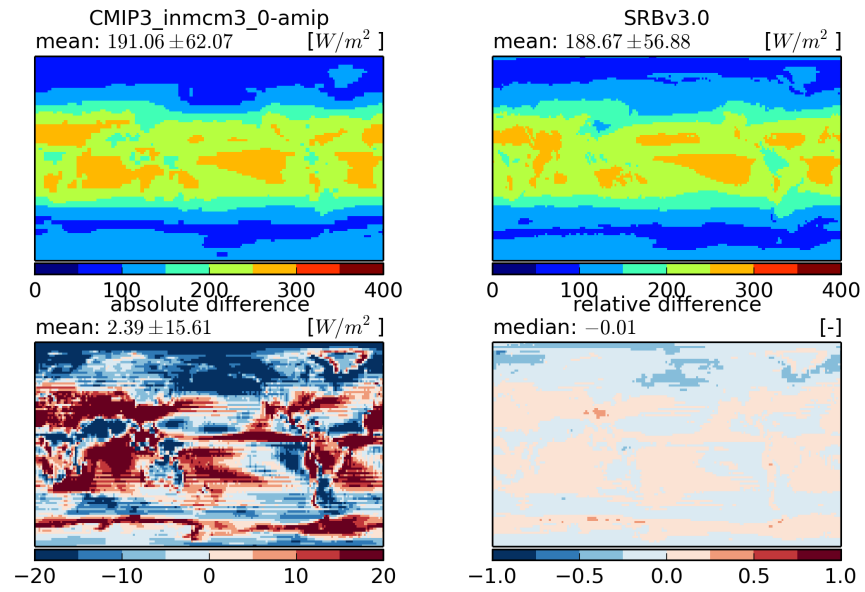


Figure 58: Temporal mean fields (top) and absolute and relative differences (bottom)

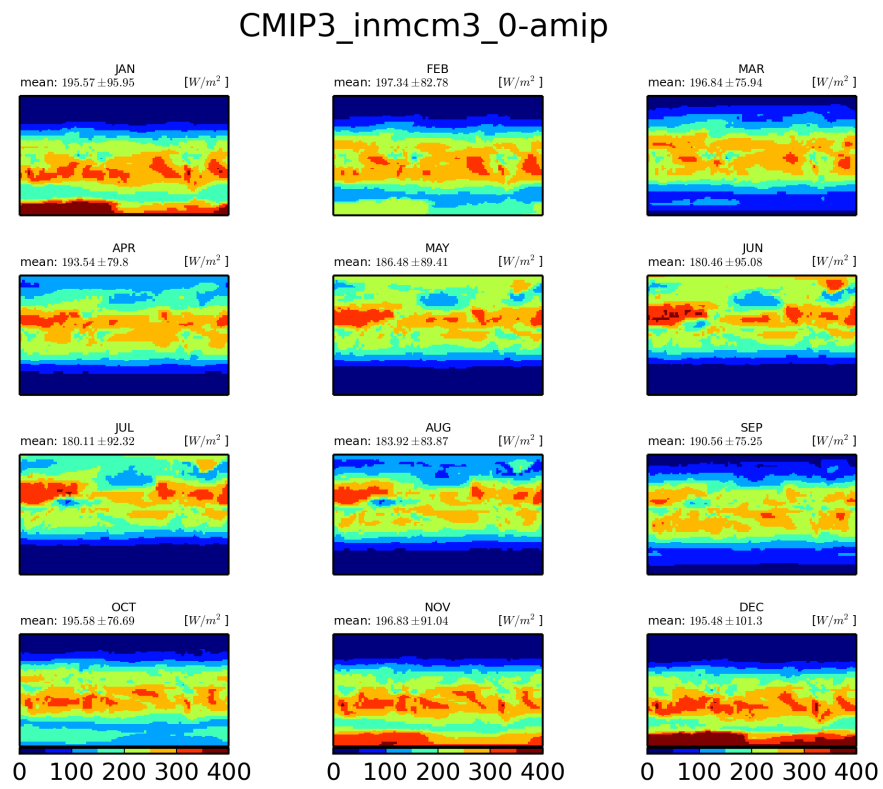


Figure 59: Monthly mean climatology for inmcm3-0

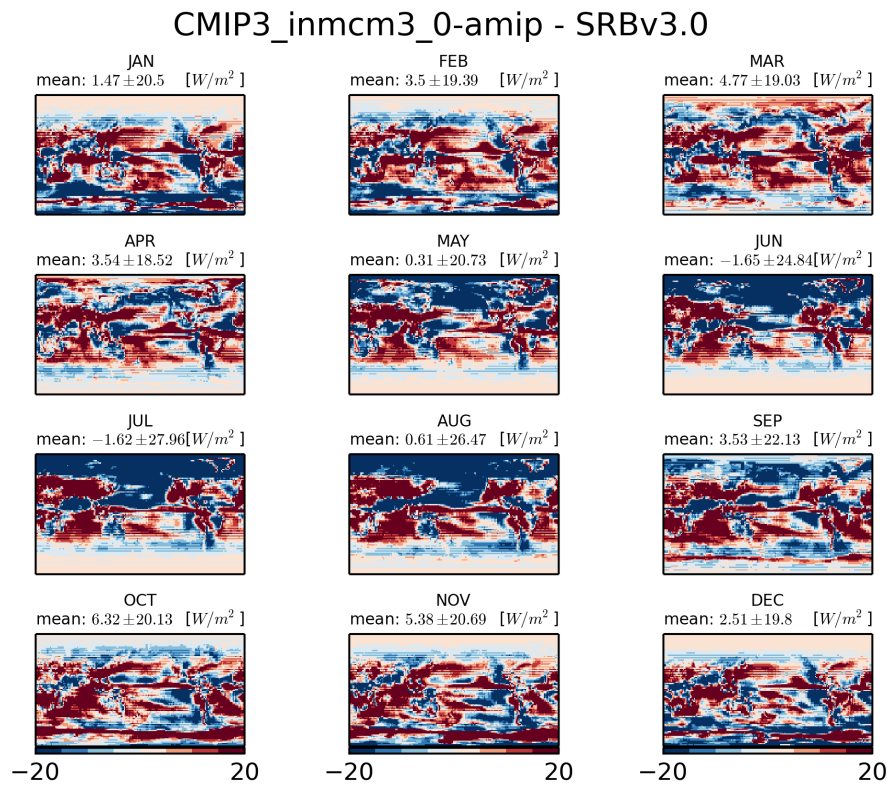


Figure 60: Monthly mean climatology of difference between INMCM3-0 and SRBV3.0

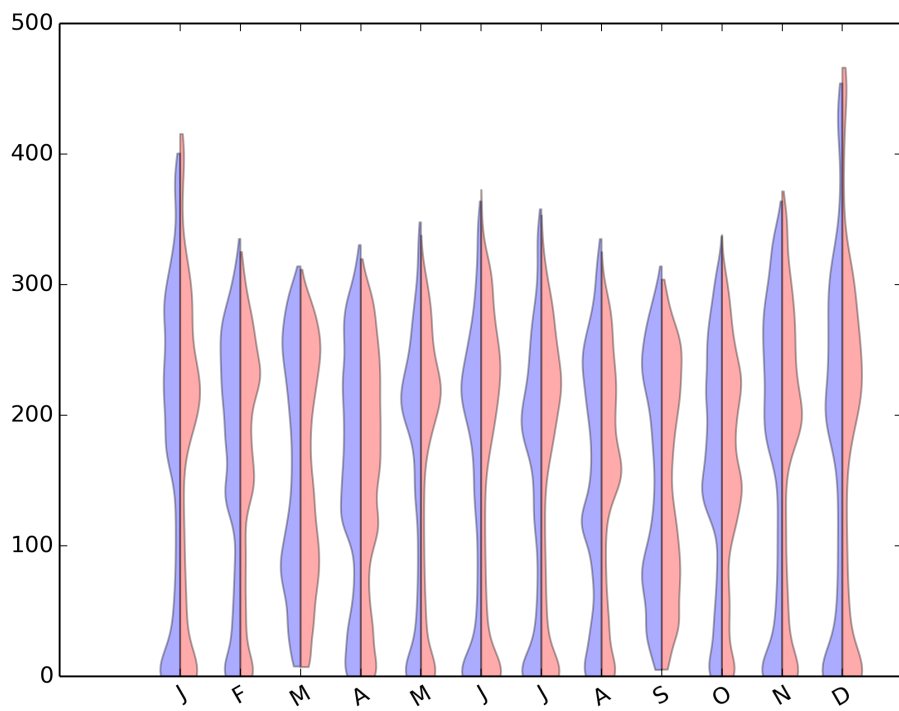


Figure 61: Violin plot for CMIP3-INMCM3-0-AMIP

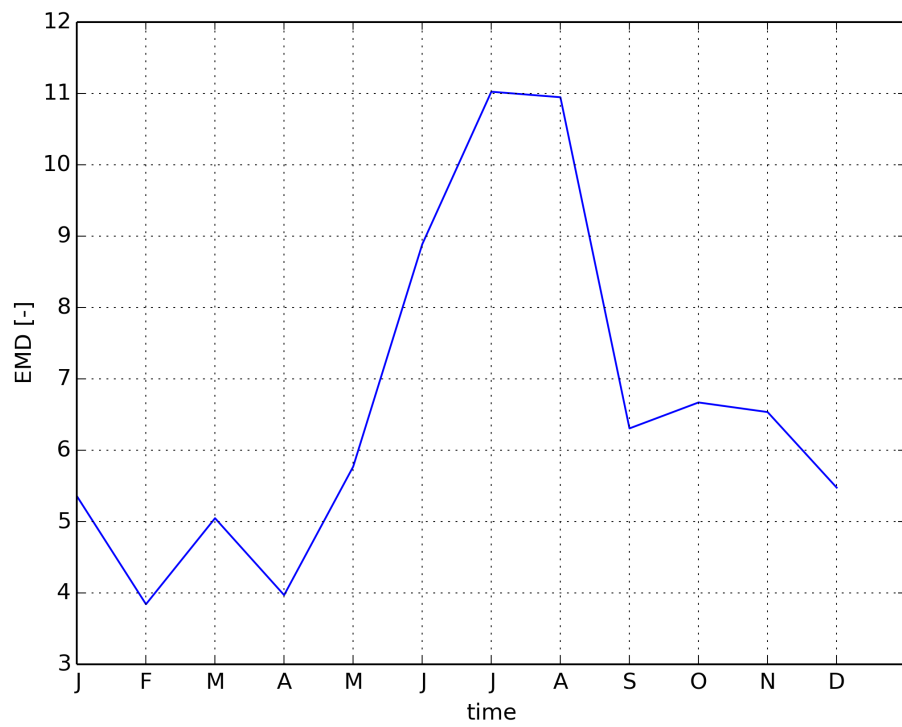


Figure 62: Timeseries of EMD

1.4.3 model mean

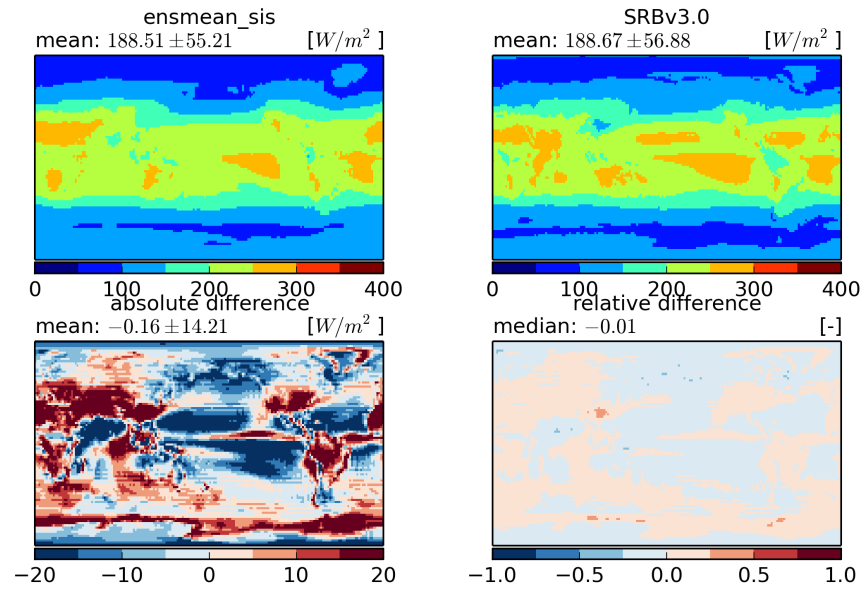


Figure 63: Temporal mean fields (top) and absolute and relative differences (bottom)

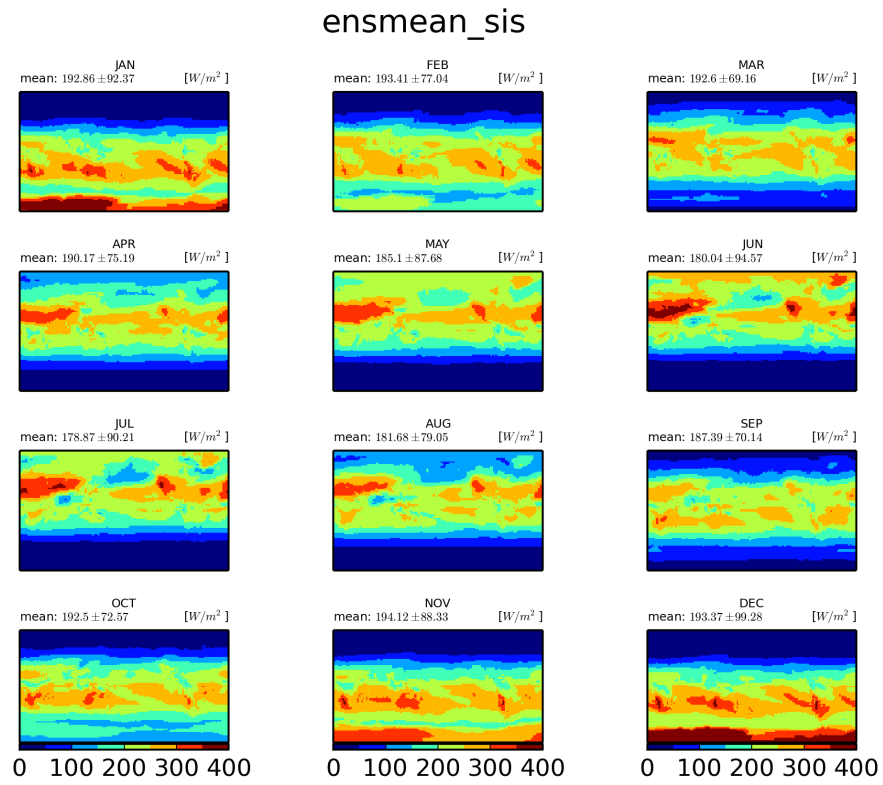


Figure 64: Monthly mean climatology for mean-model

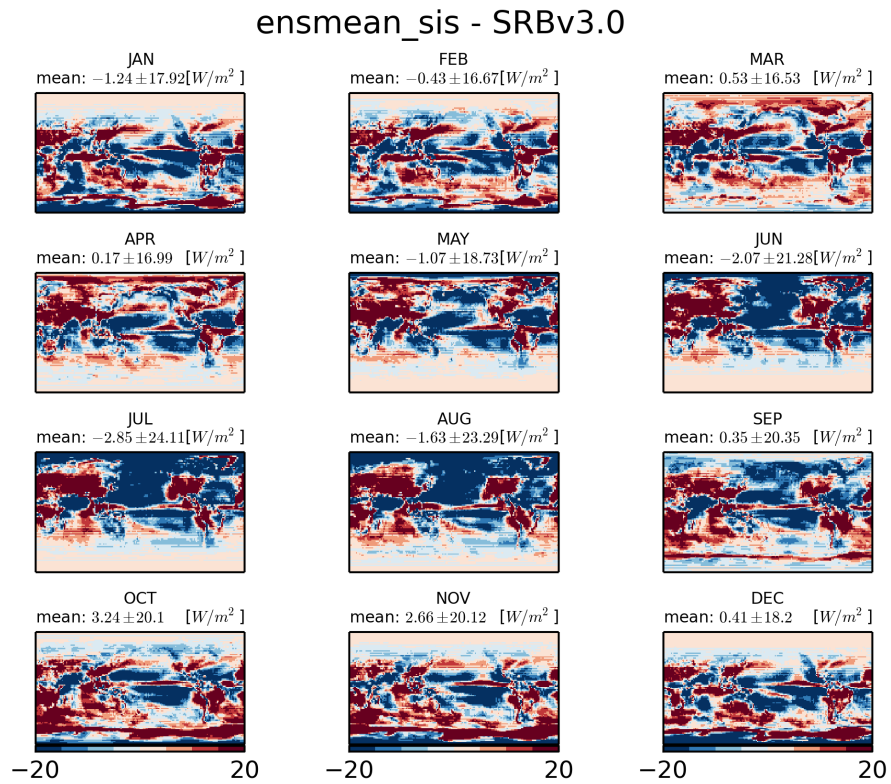


Figure 65: Monthly mean climatology of difference between MEAN-MODEL and SRBV3.0

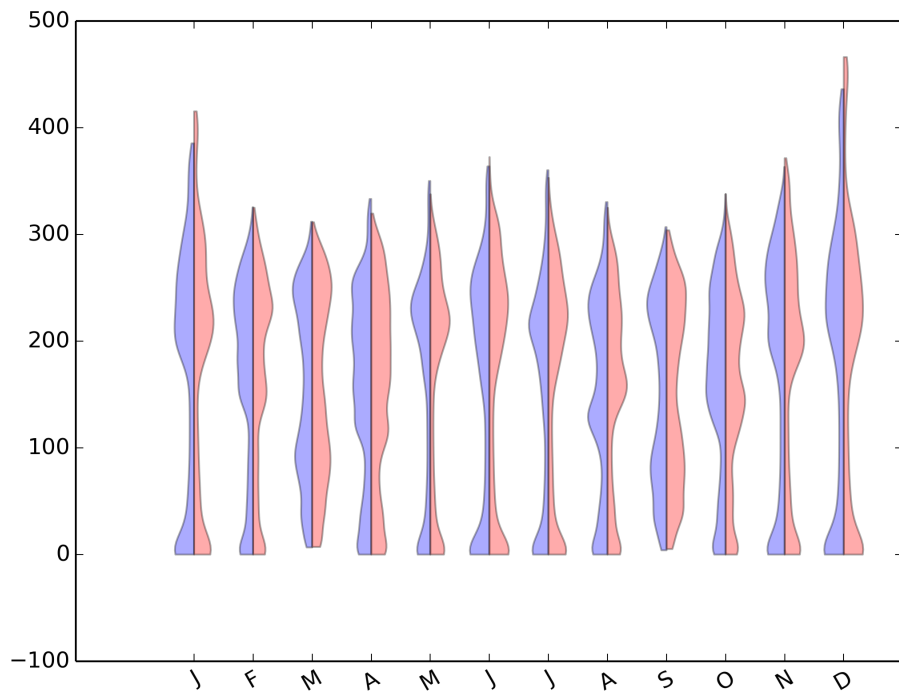


Figure 66: Violin plot for ENSMEAN-SIS

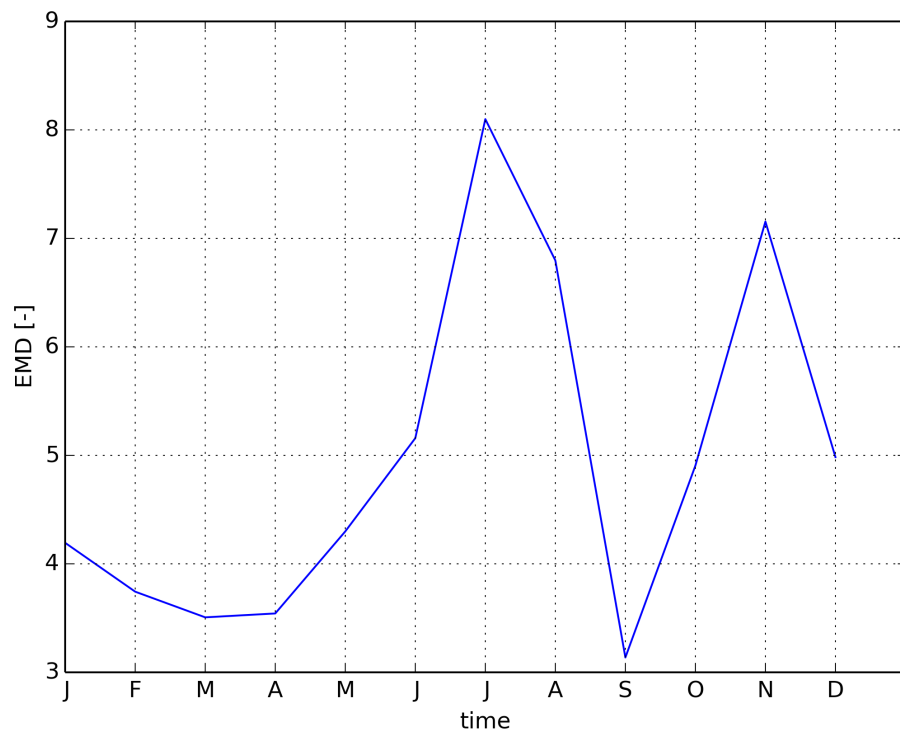


Figure 67: Timeseries of EMD

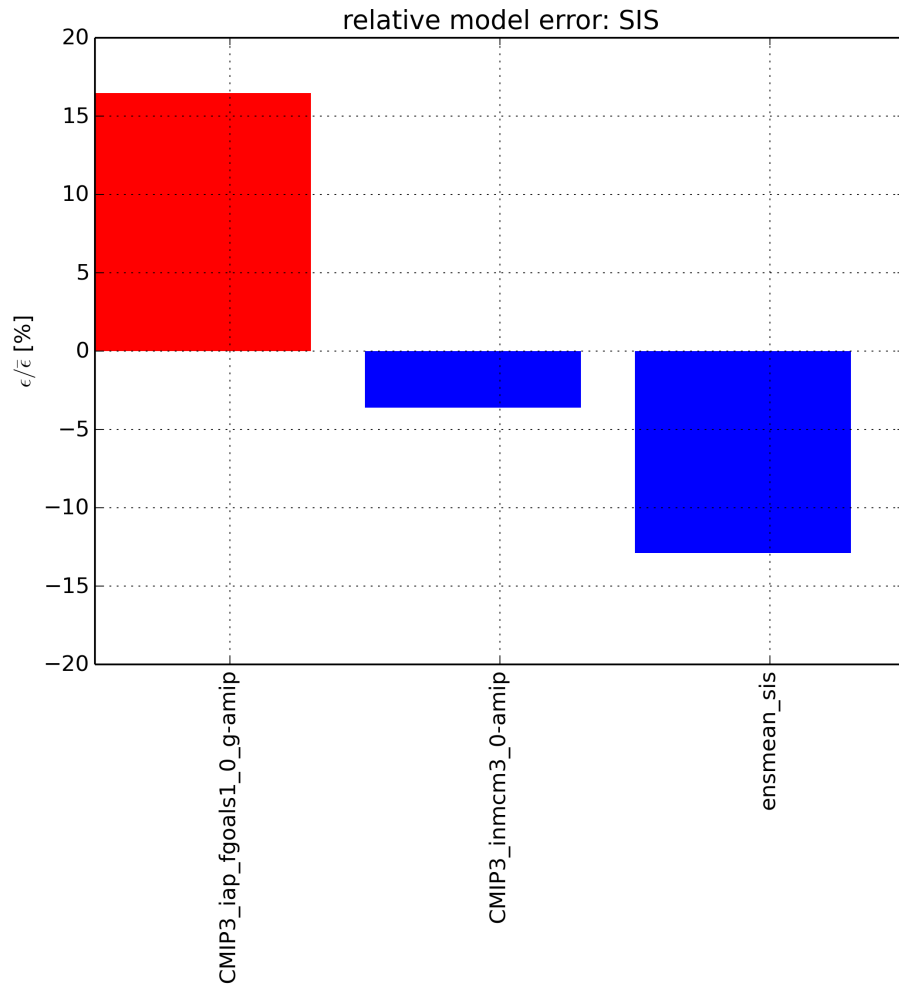


Figure 68: Relative model performance for SIS

1 SHORTWAVE DOWNWARD RADIATION FLUX IN AIR

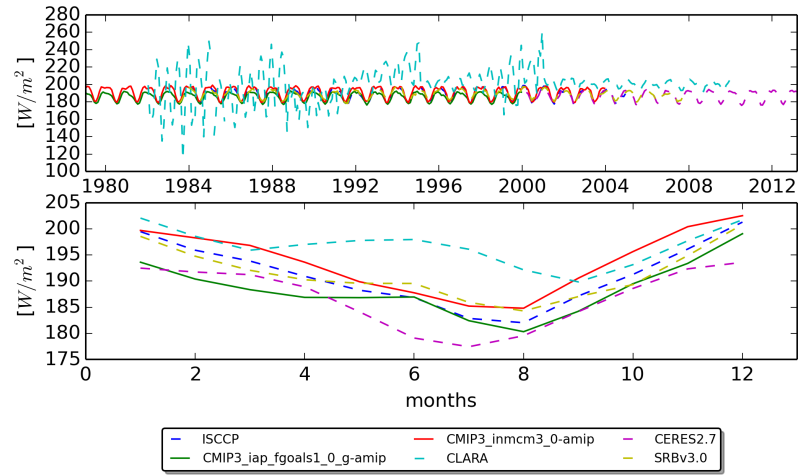


Figure 69: Global means for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR

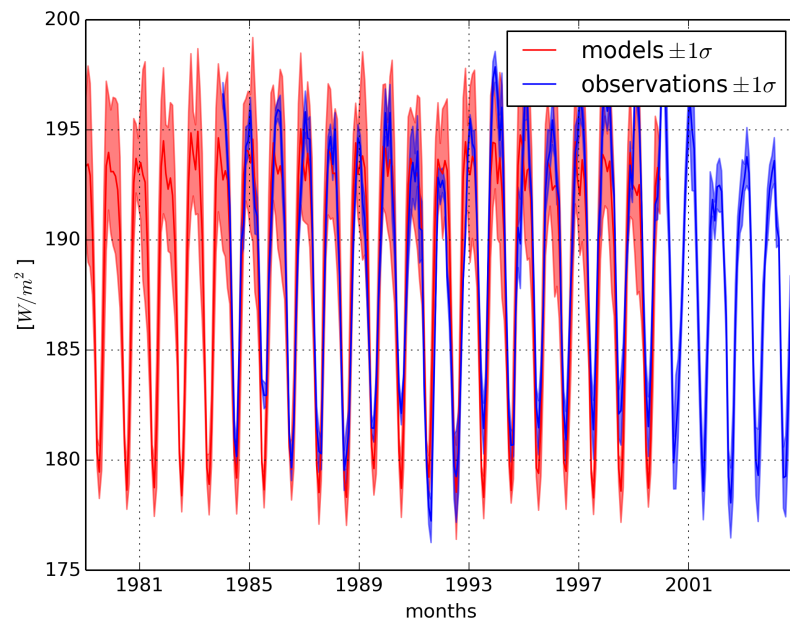


Figure 70: Global means for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR (summary); areas indicate $\pm 1\sigma$ as derived from the ensemble of models or observations

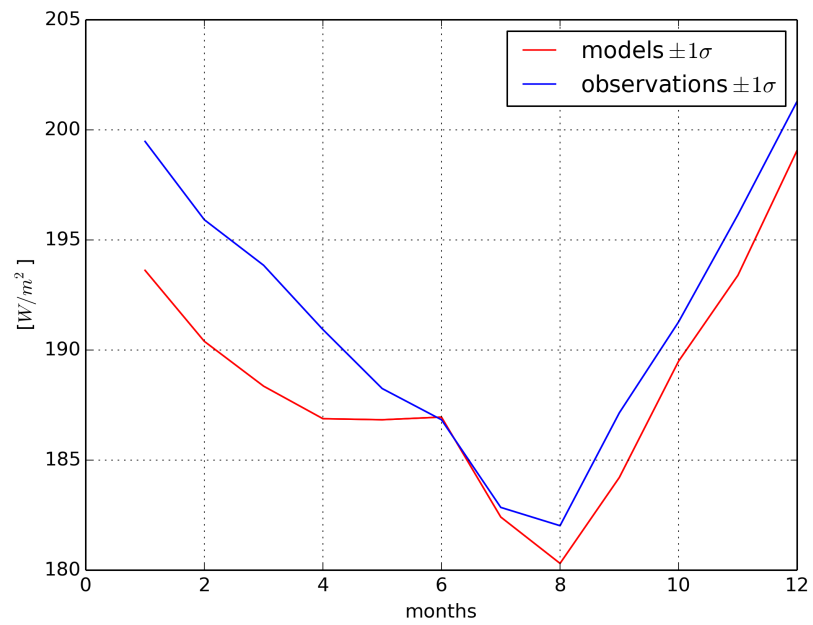


Figure 71: Global means for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR (summary climatology)

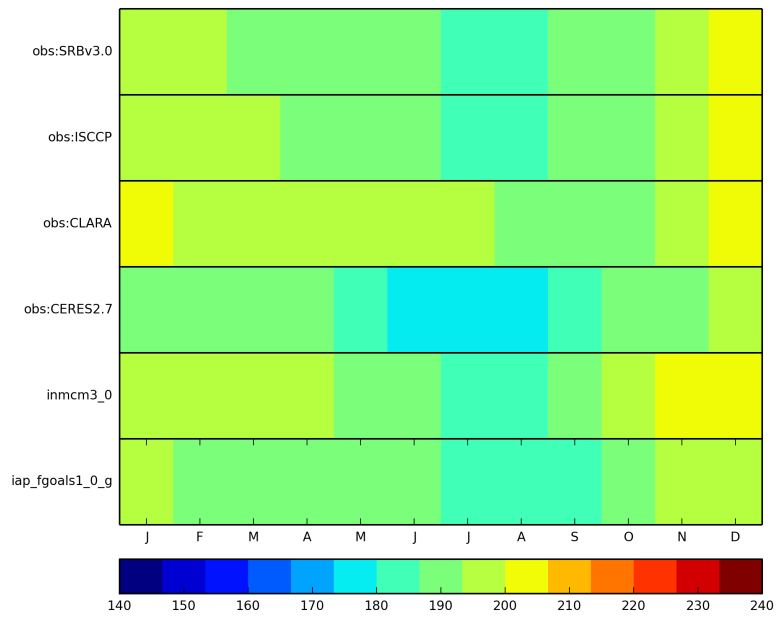


Figure 72: Global means climatology for SHORTWAVE DOWNWARD RADIATION FLUX IN AIR

2 SHORTWAVE UPWARD RADIATION FLUX IN AIR

2.1 ISCCP

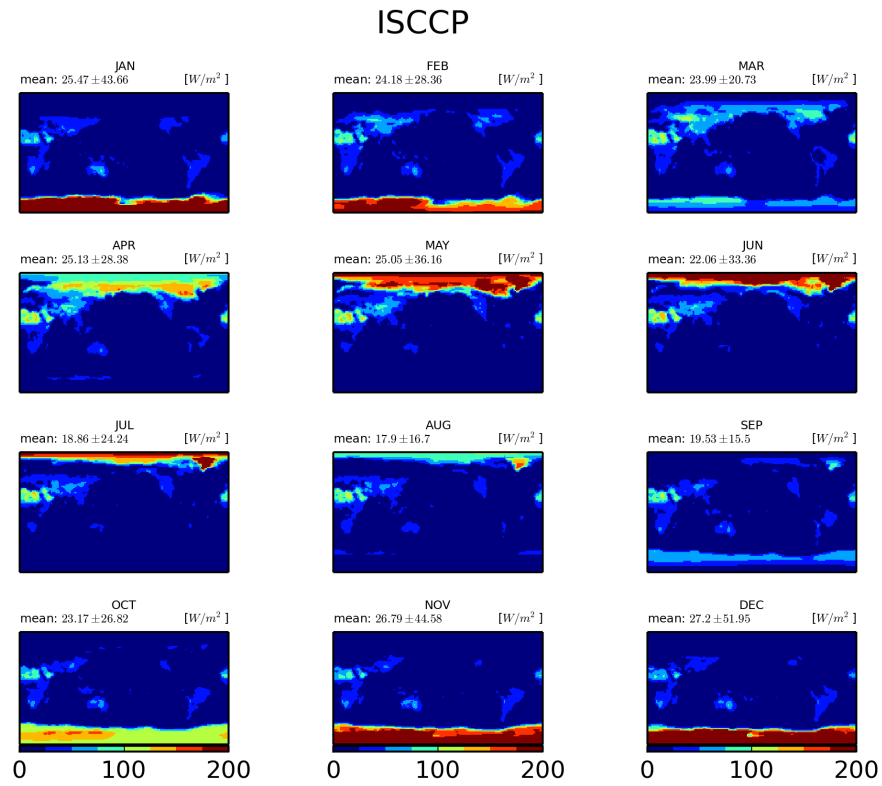


Figure 73: Monthly mean ISCCP

2.1.1 CMIP3 iap fgoals1 0 g-amip

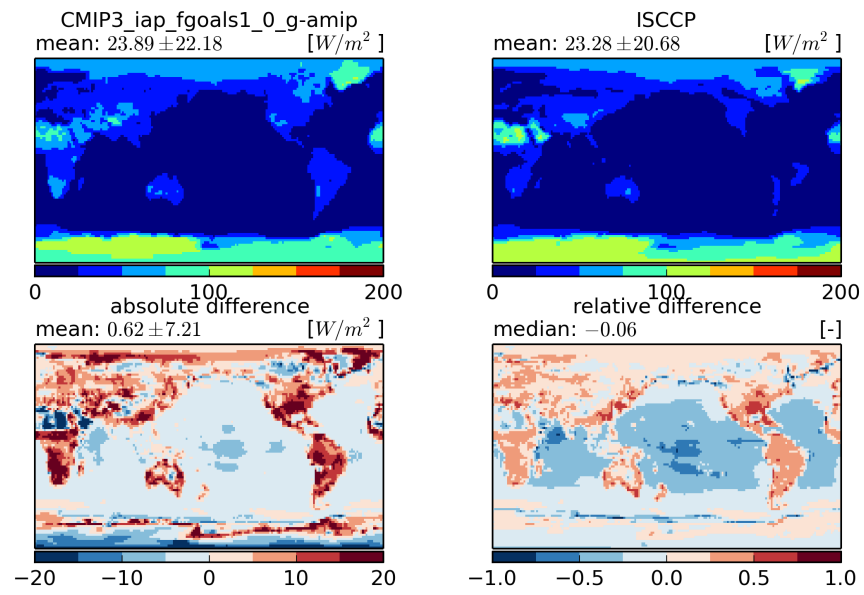


Figure 74: Temporal mean fields (top) and absolute and relative differences (bottom)

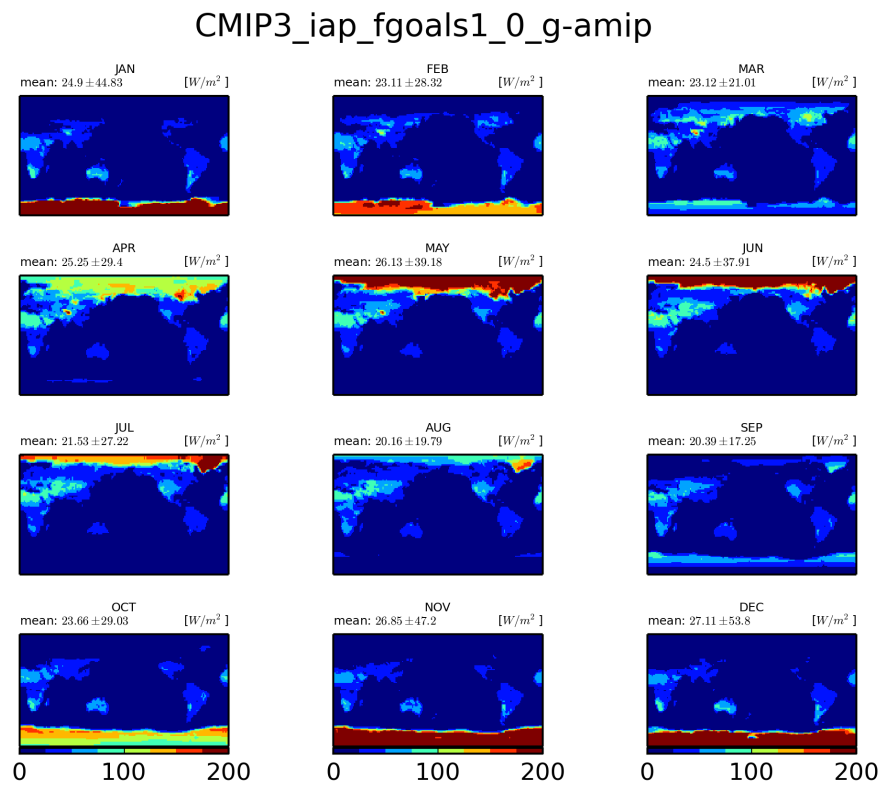


Figure 75: Monthly mean climatology for iap-fgoals1-0-g

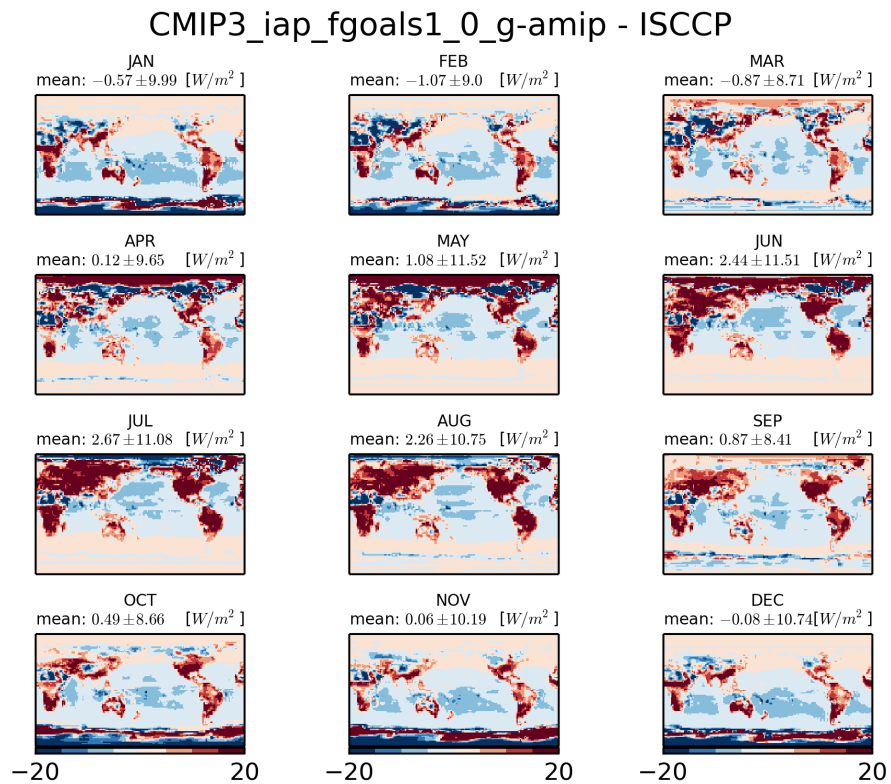


Figure 76: Monthly mean climatology of difference between IAP-FGOALS1-0-G and ISCCP

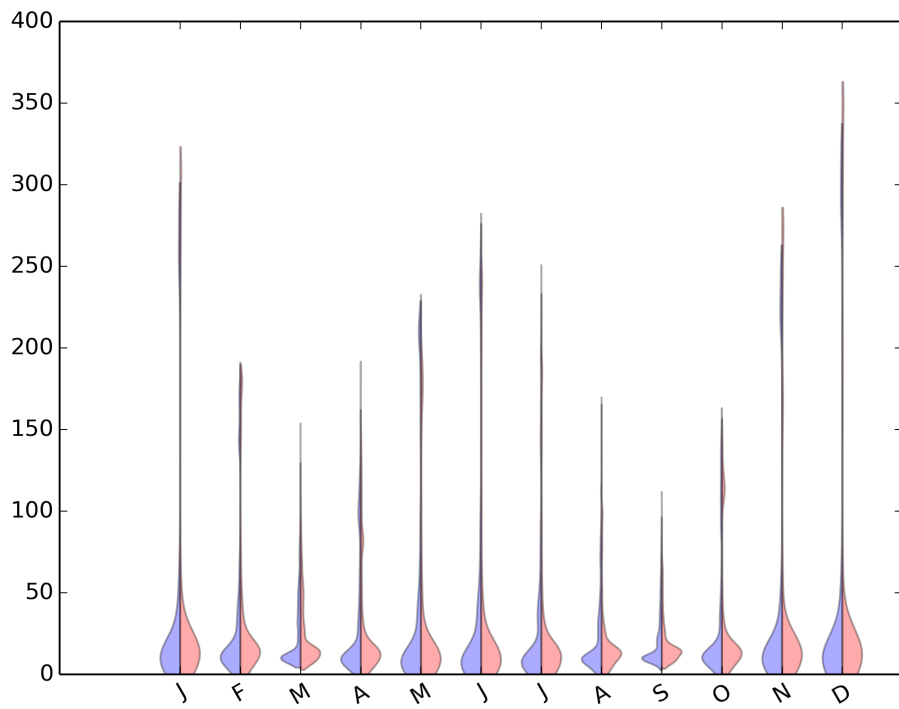


Figure 77: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

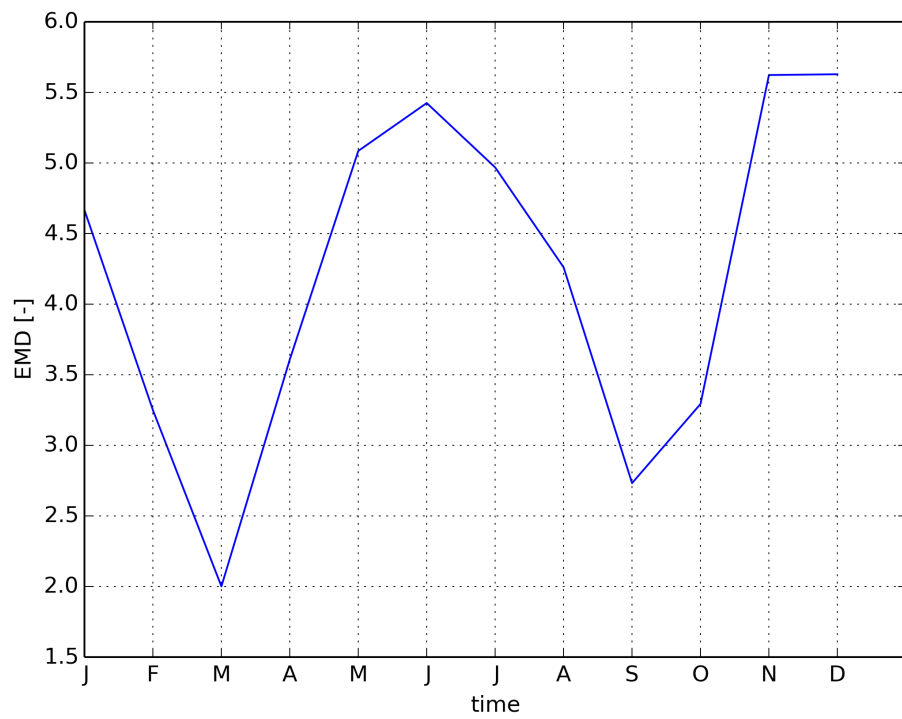


Figure 78: Timeseries of EMD

2.1.2 CMIP3 inmcm3 0-amip

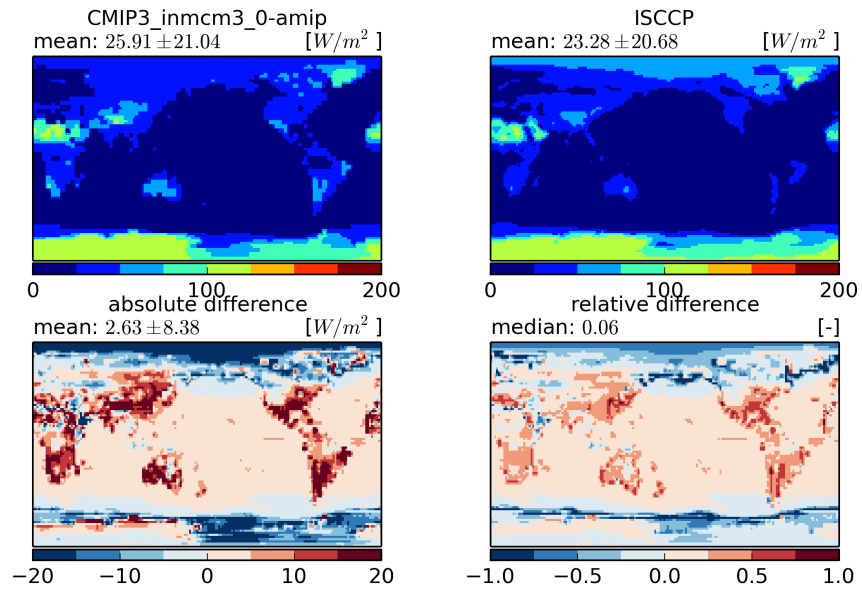


Figure 79: Temporal mean fields (top) and absolute and relative differences (bottom)

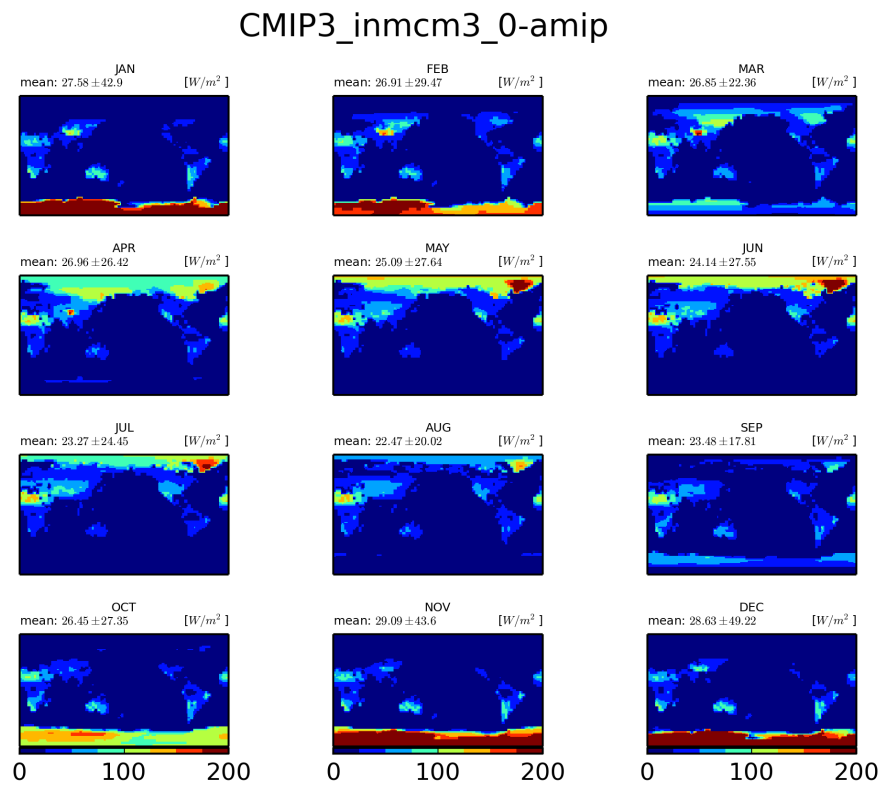


Figure 80: Monthly mean climatology for inmcm3-0

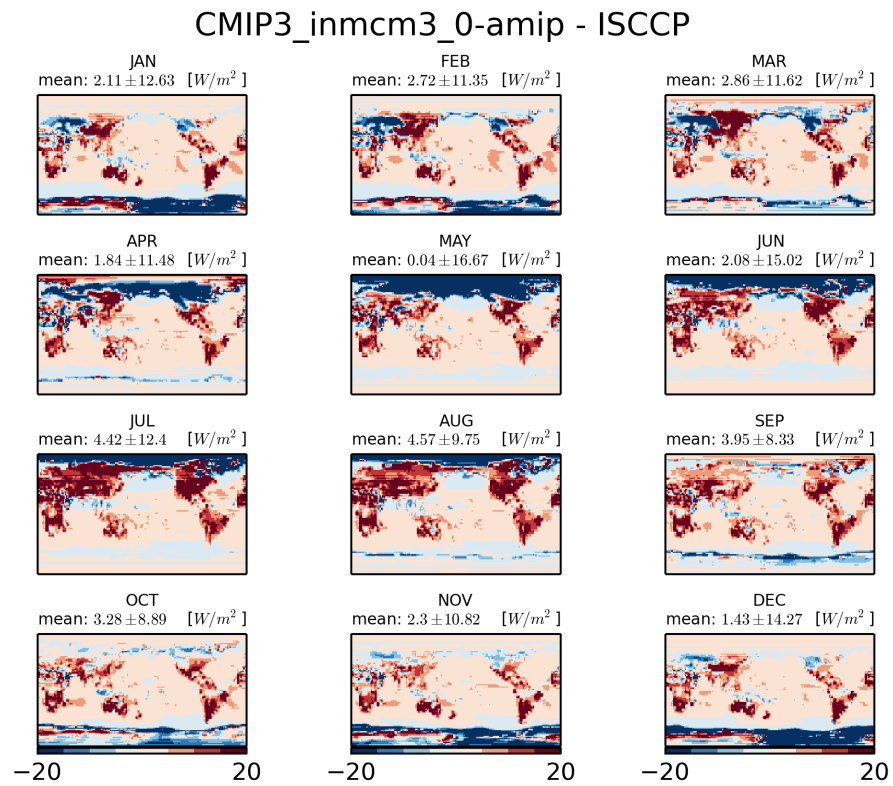


Figure 81: Monthly mean climatology of difference between INMCM3-0 and ISCCP

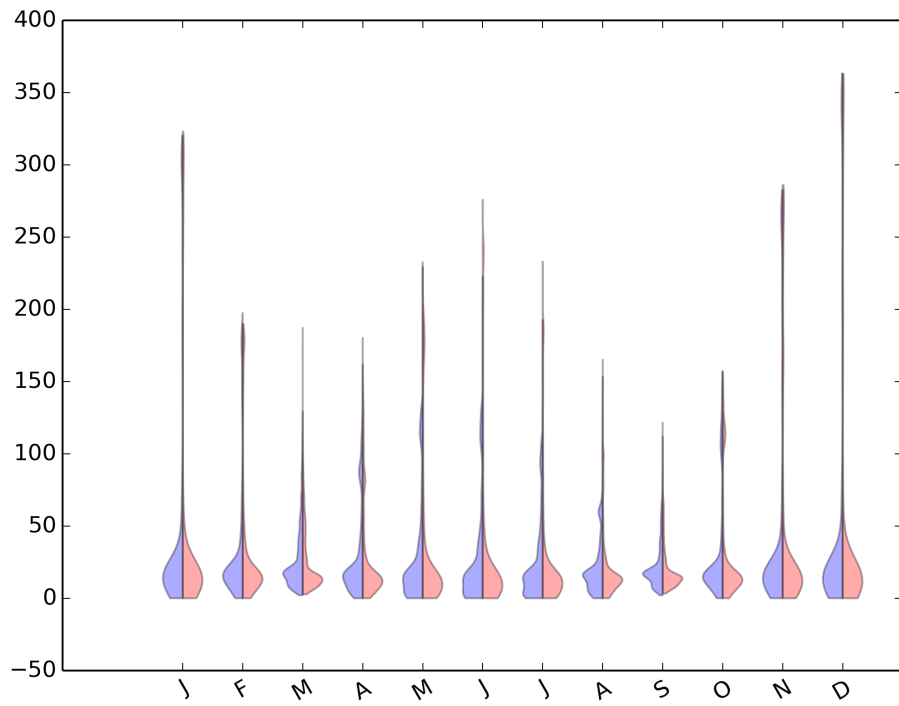


Figure 82: Violin plot for CMIP3-INMCM3-0-AMIP

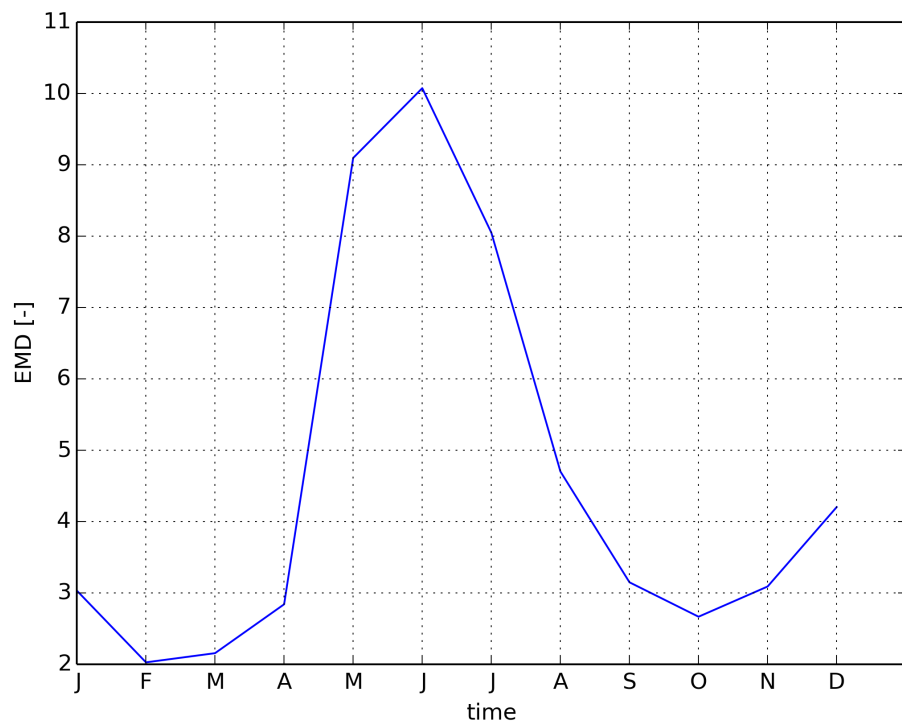


Figure 83: Timeseries of EMD

2.1.3 model mean

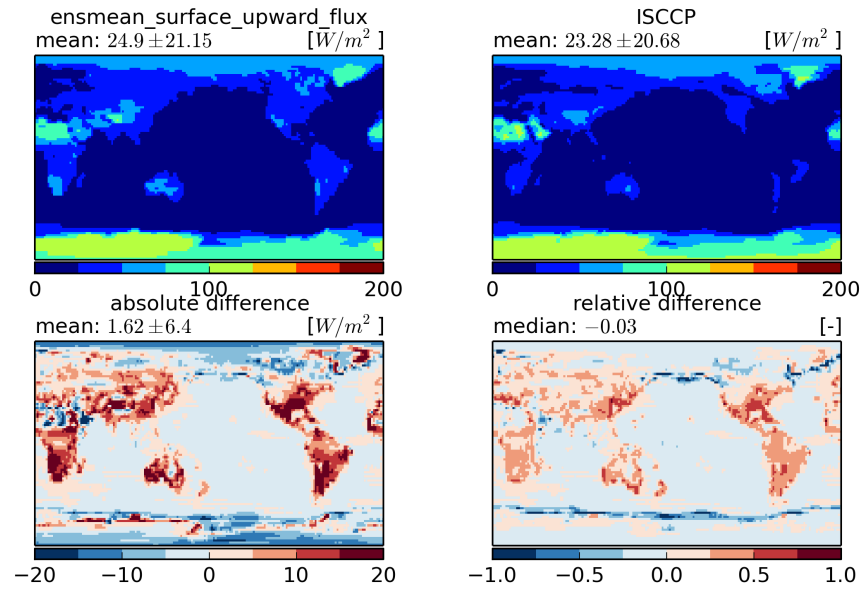


Figure 84: Temporal mean fields (top) and absolute and relative differences (bottom)

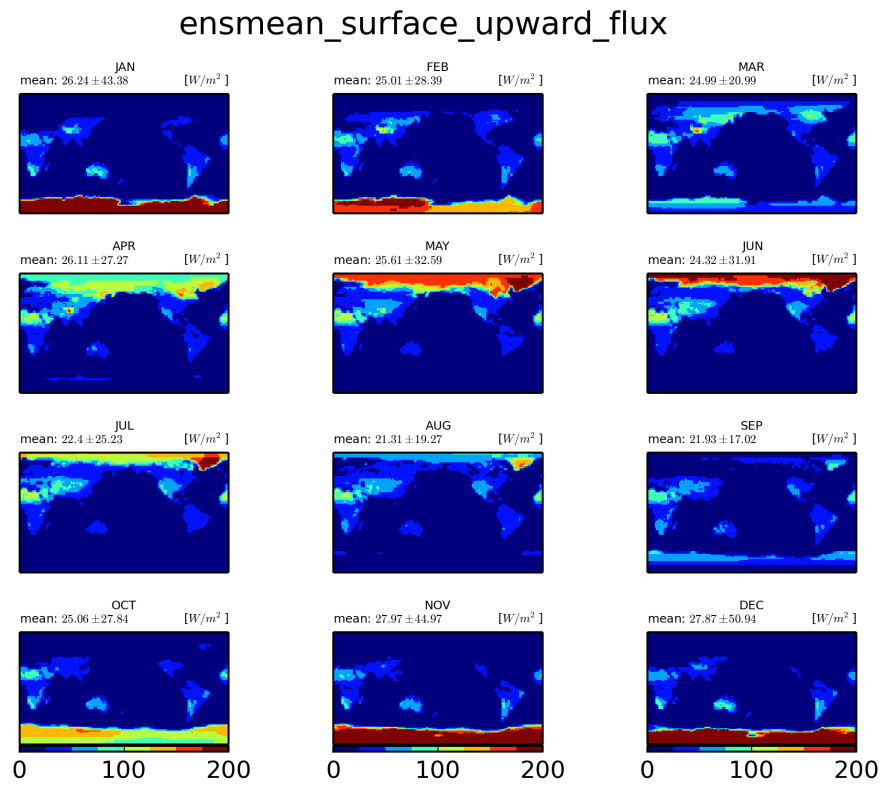


Figure 85: Monthly mean climatology for mean-model

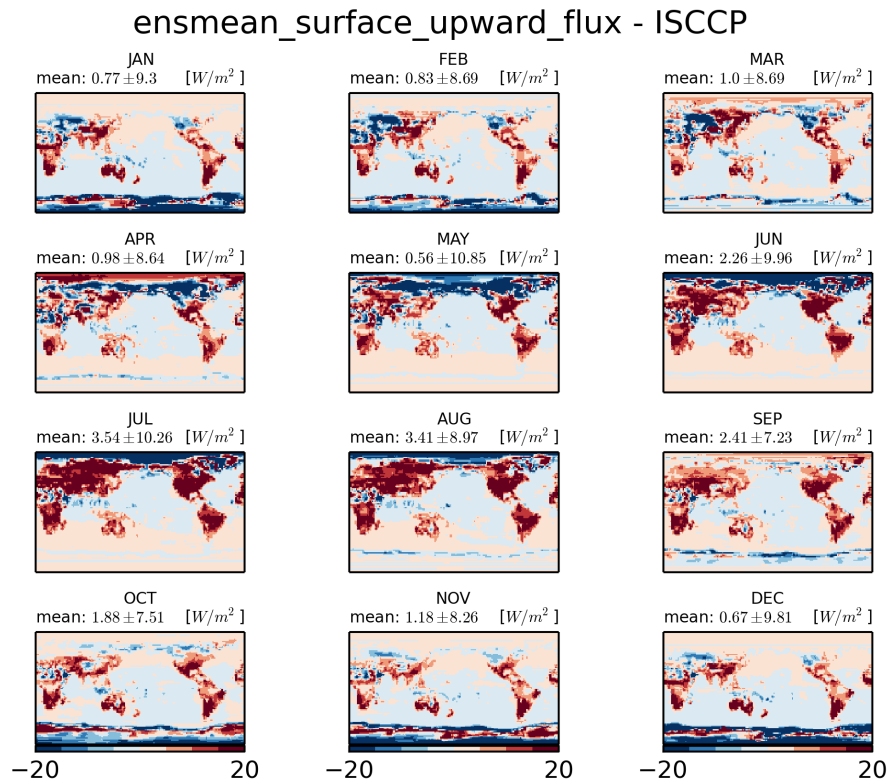


Figure 86: Monthly mean climatology of difference between MEAN-MODEL and ISCCP

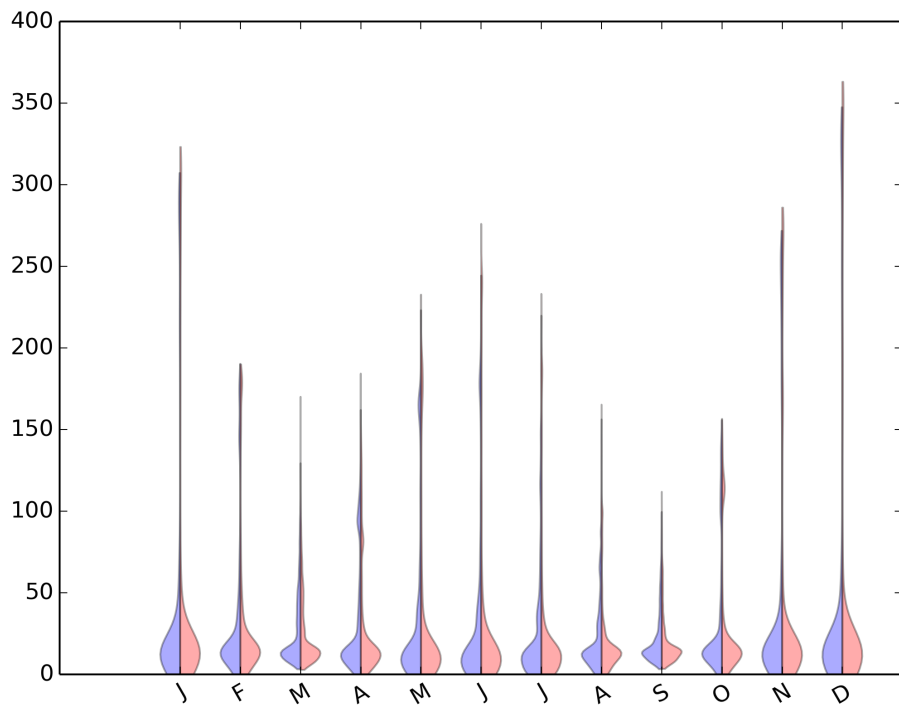


Figure 87: Violin plot for ENSMEAN-SURFACE-UPWARD-FLUX

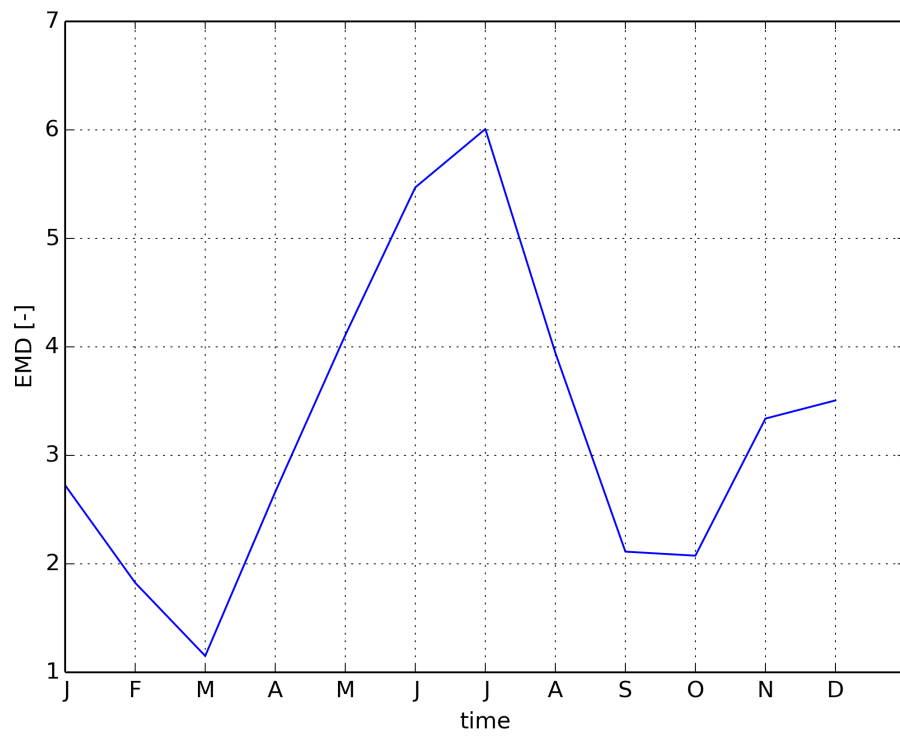


Figure 88: Timeseries of EMD

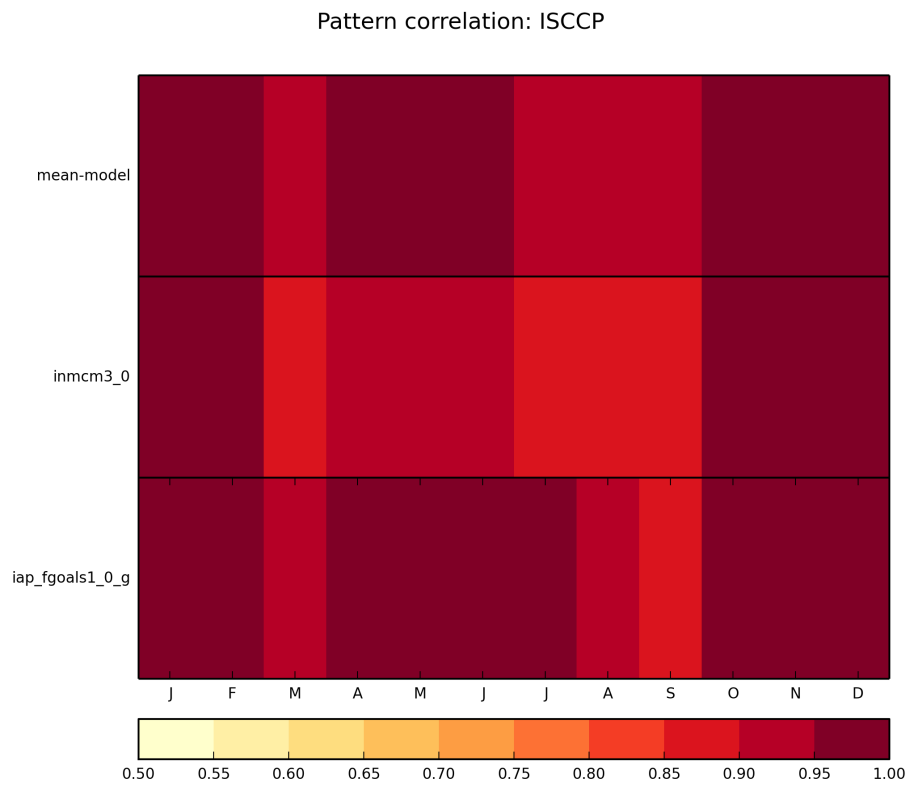


Figure 89: Pattern correlation for ISCCP

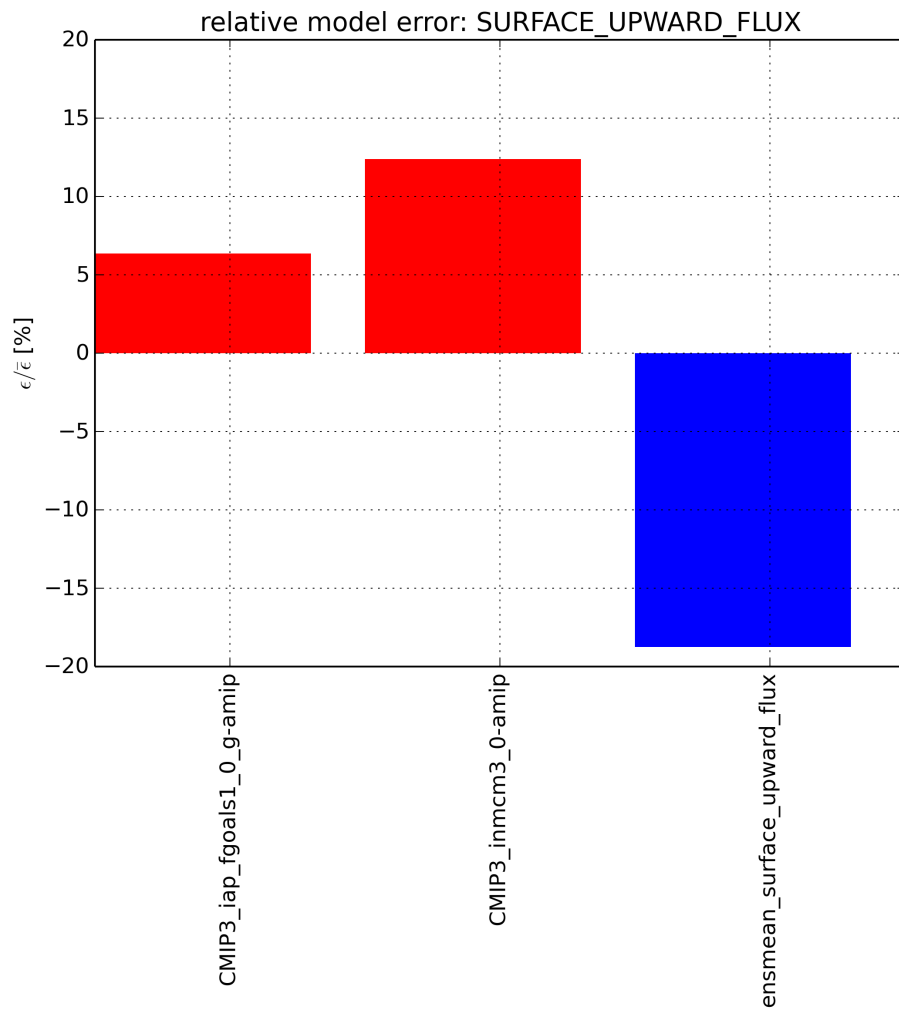


Figure 90: Relative model performance for SURFACE-UPWARD-FLUX

2.2 CERES2.7

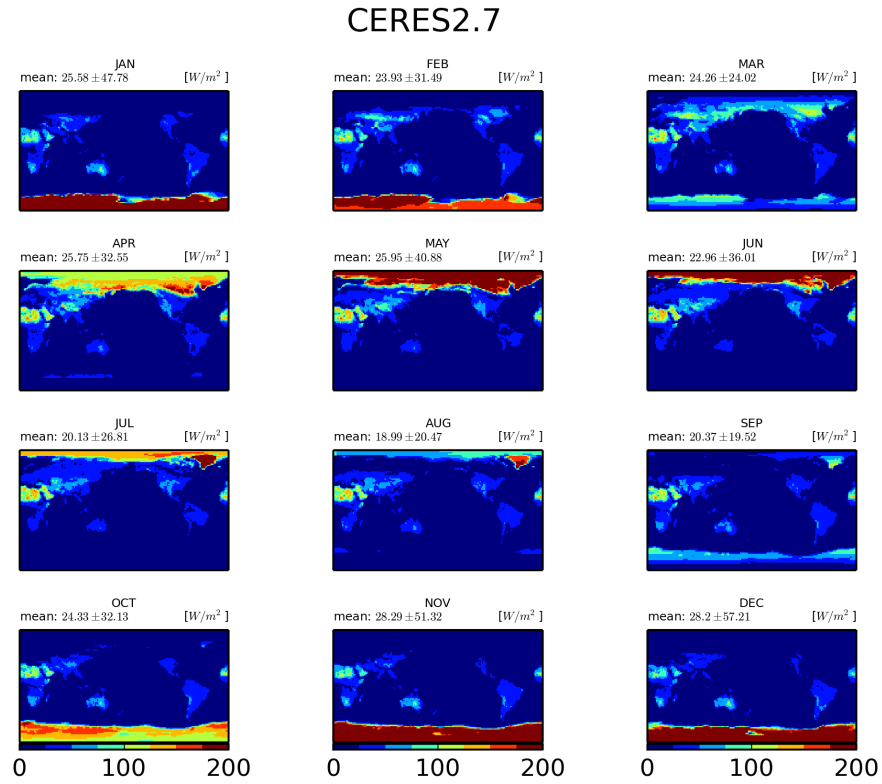


Figure 91: Monthly mean CERES2.7

2.2.1 CMIP3 iap fgoals1 0 g-amip

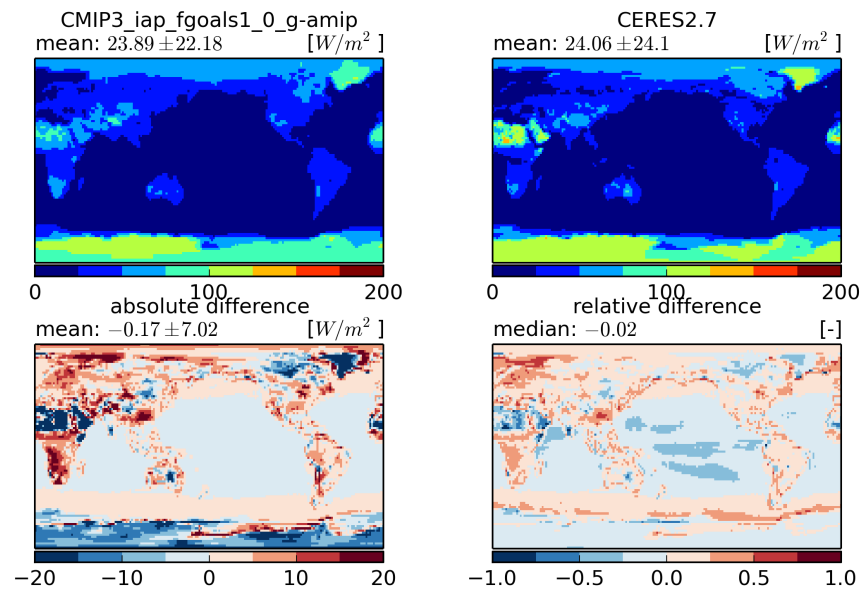


Figure 92: Temporal mean fields (top) and absolute and relative differences (bottom)

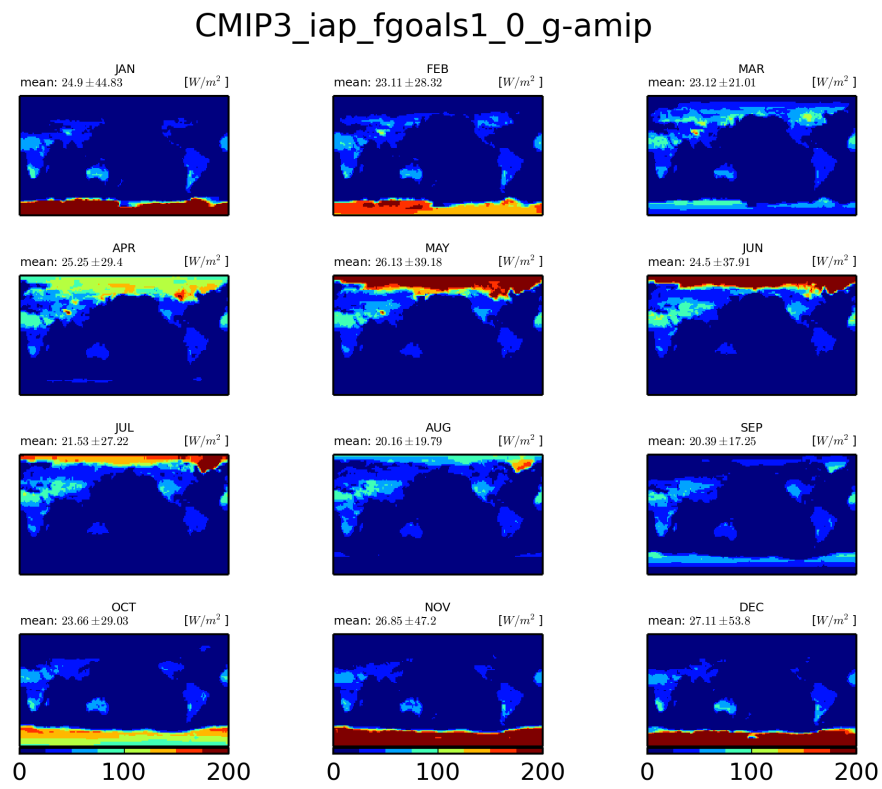


Figure 93: Monthly mean climatology for iap-fgoals1-0-g

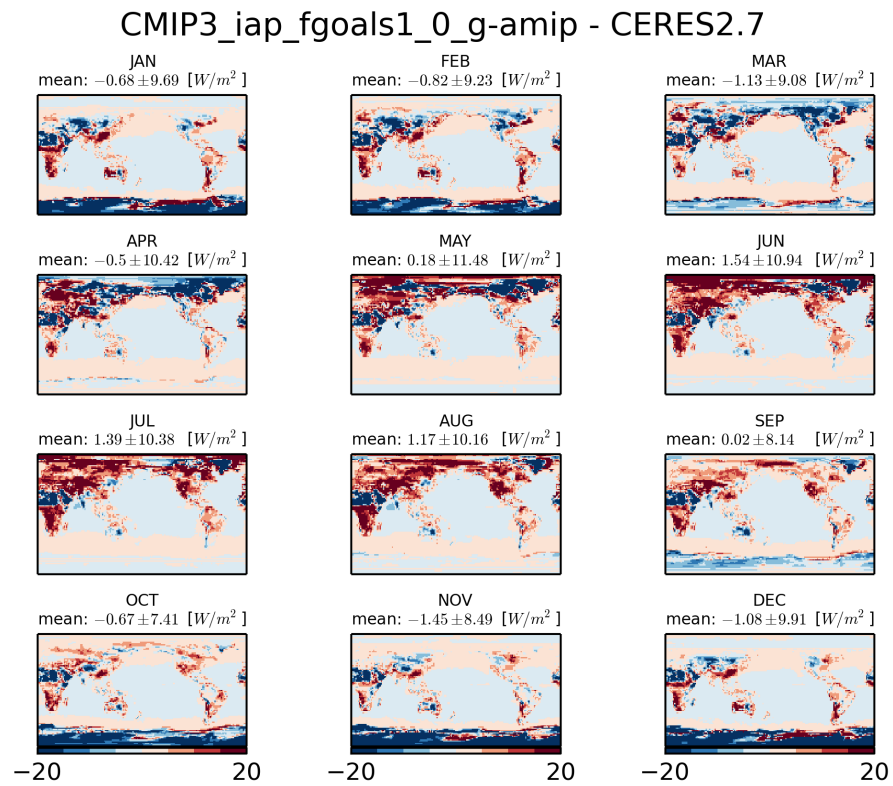


Figure 94: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CERES2.7

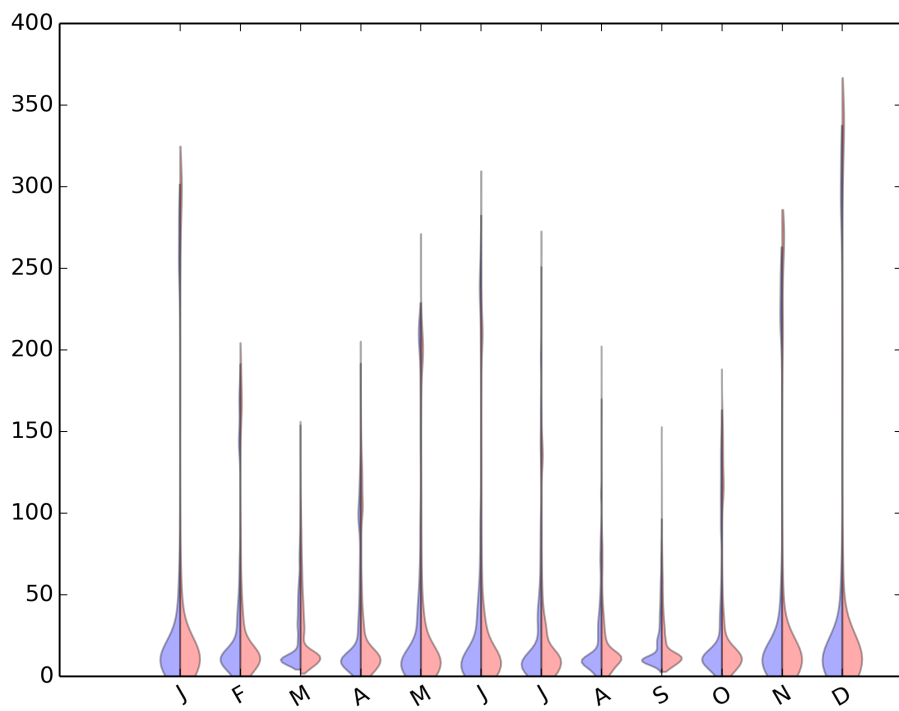


Figure 95: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

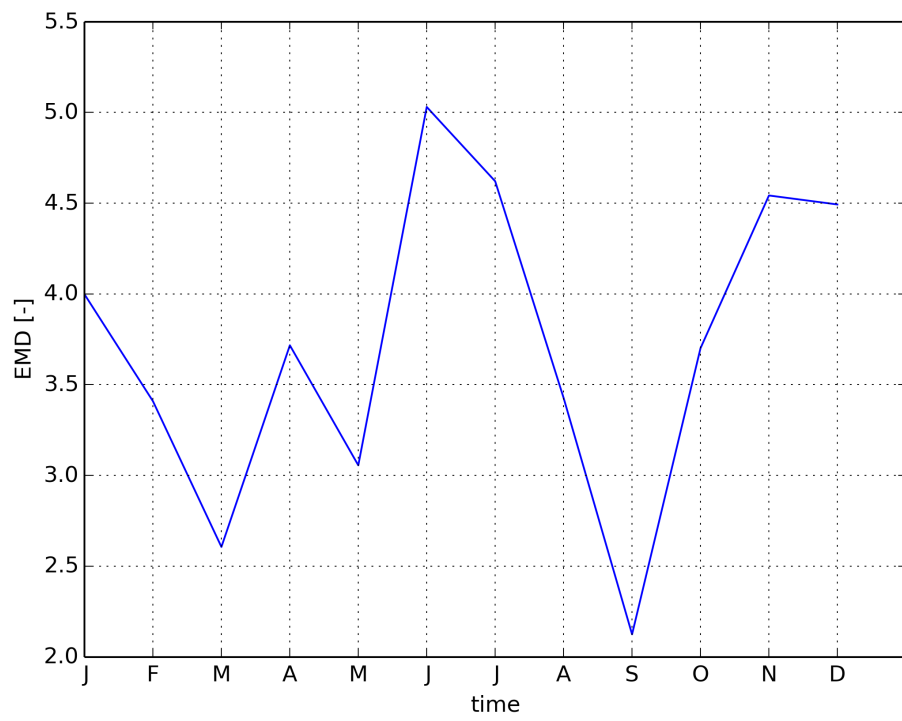


Figure 96: Timeseries of EMD

2.2.2 CMIP3 inmcm3 0-amp

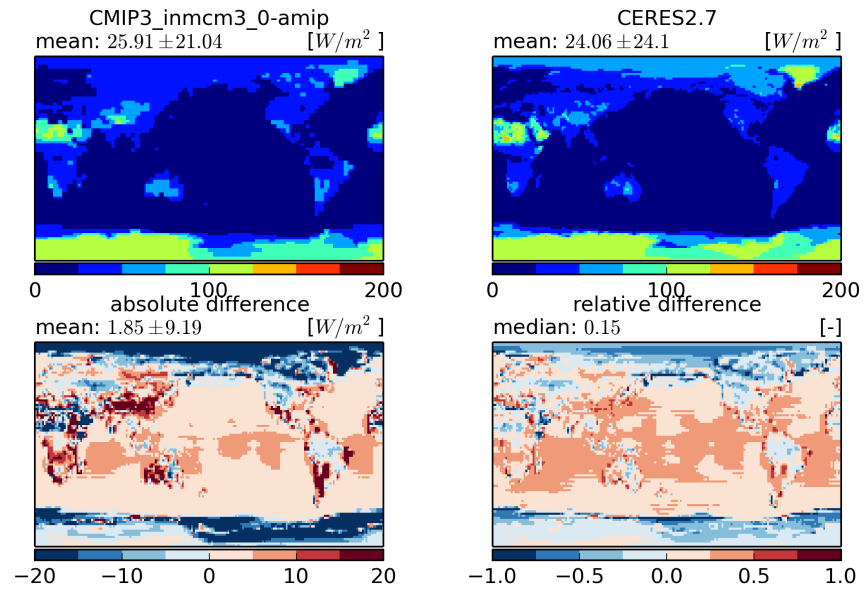


Figure 97: Temporal mean fields (top) and absolute and relative differences (bottom)

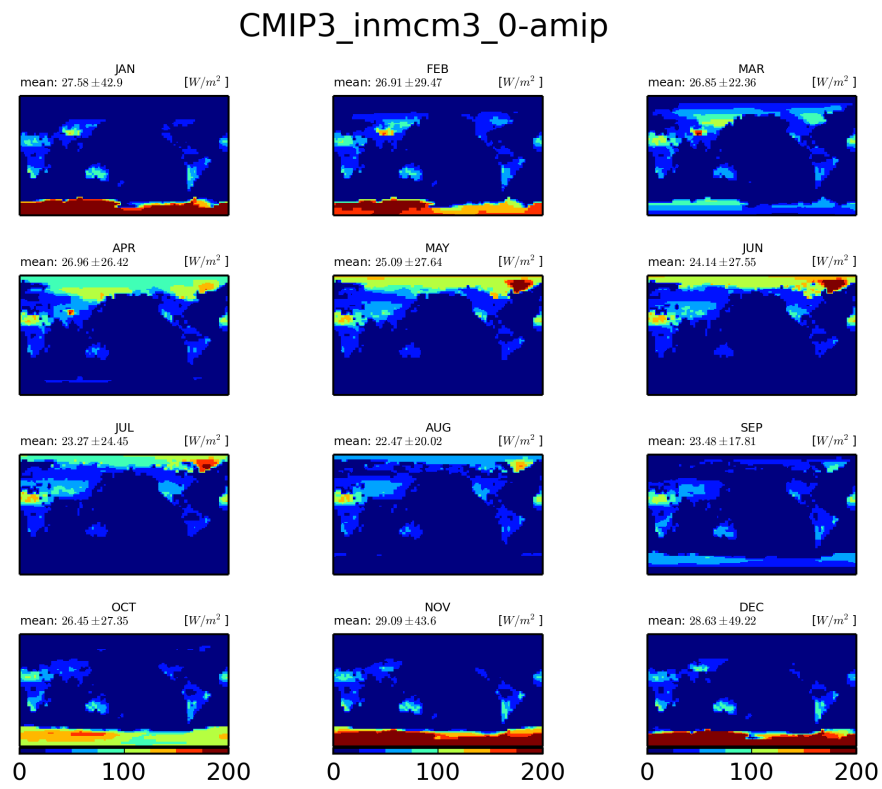


Figure 98: Monthly mean climatology for inmcm3-0

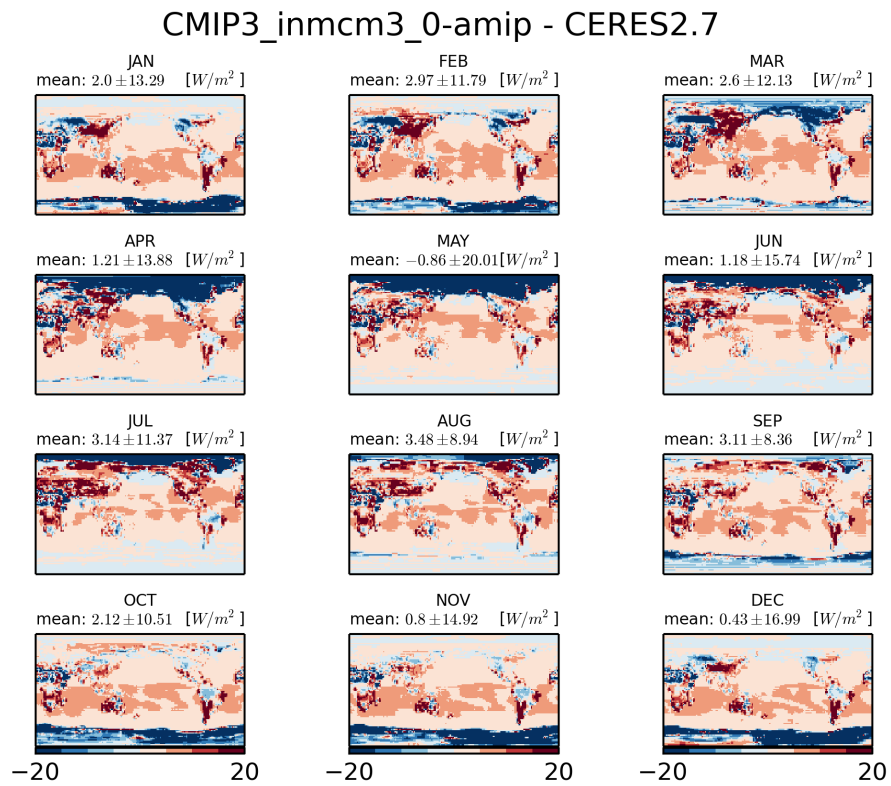


Figure 99: Monthly mean climatology of difference between INMCM3-0 and CERES2.7

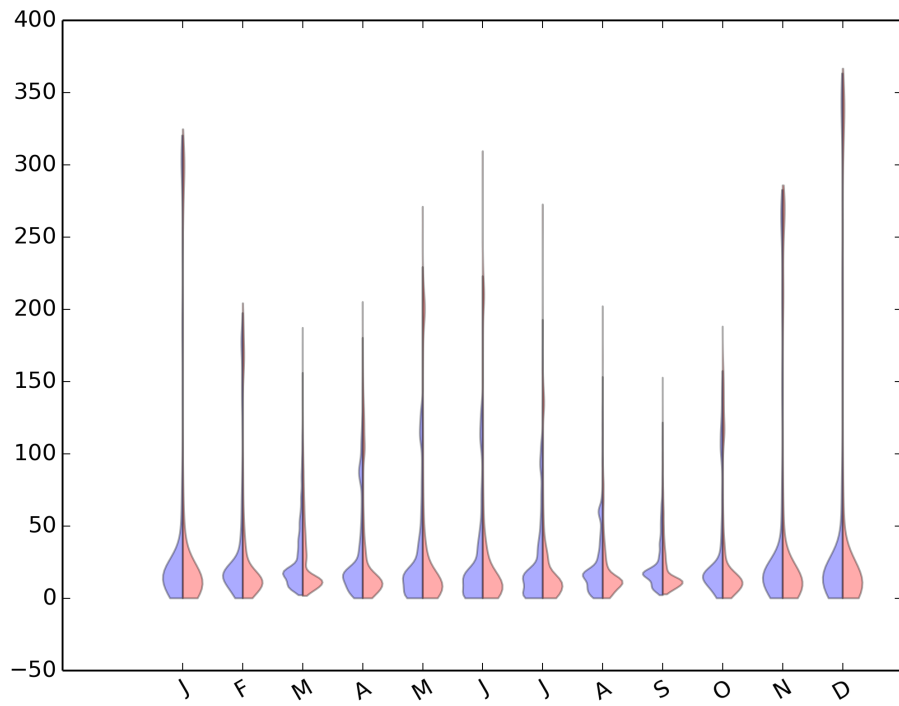


Figure 100: Violin plot for CMIP3-INMCM3-0-AMIP

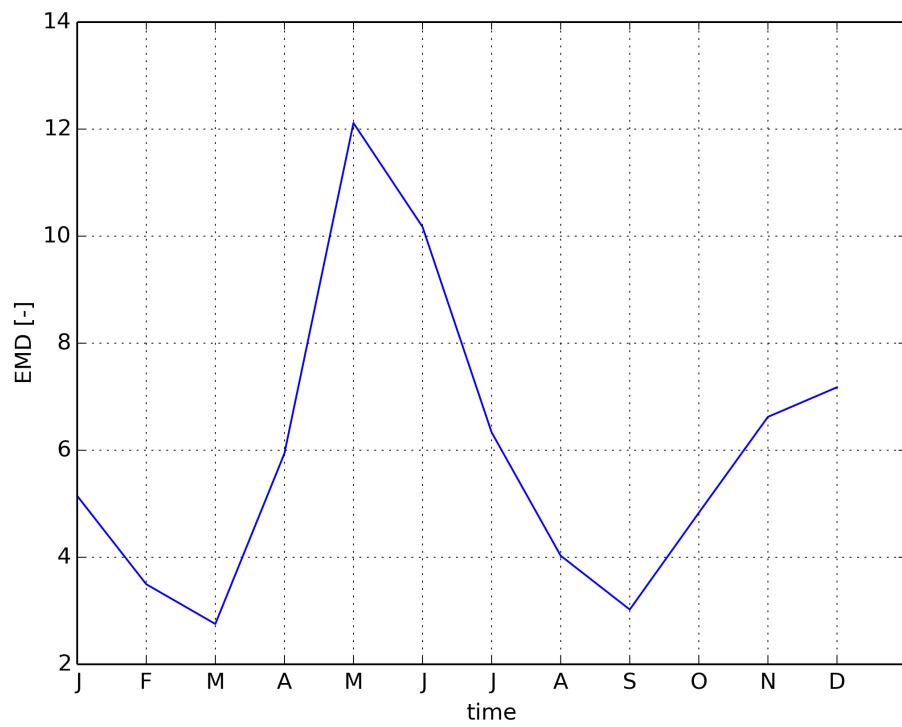


Figure 101: Timeseries of EMD

2.2.3 model mean

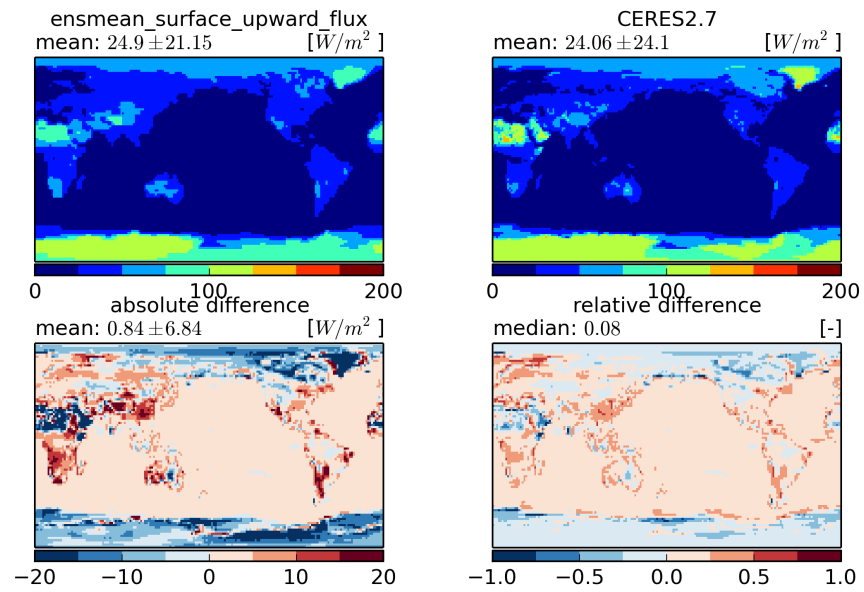


Figure 102: Temporal mean fields (top) and absolute and relative differences (bottom)

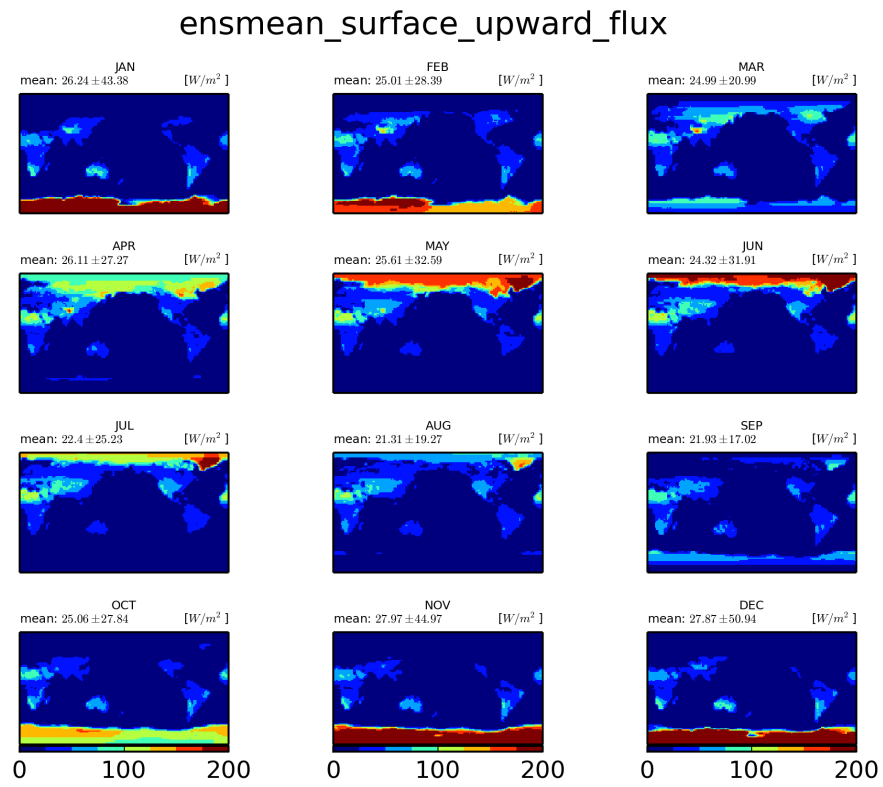


Figure 103: Monthly mean climatology for mean-model

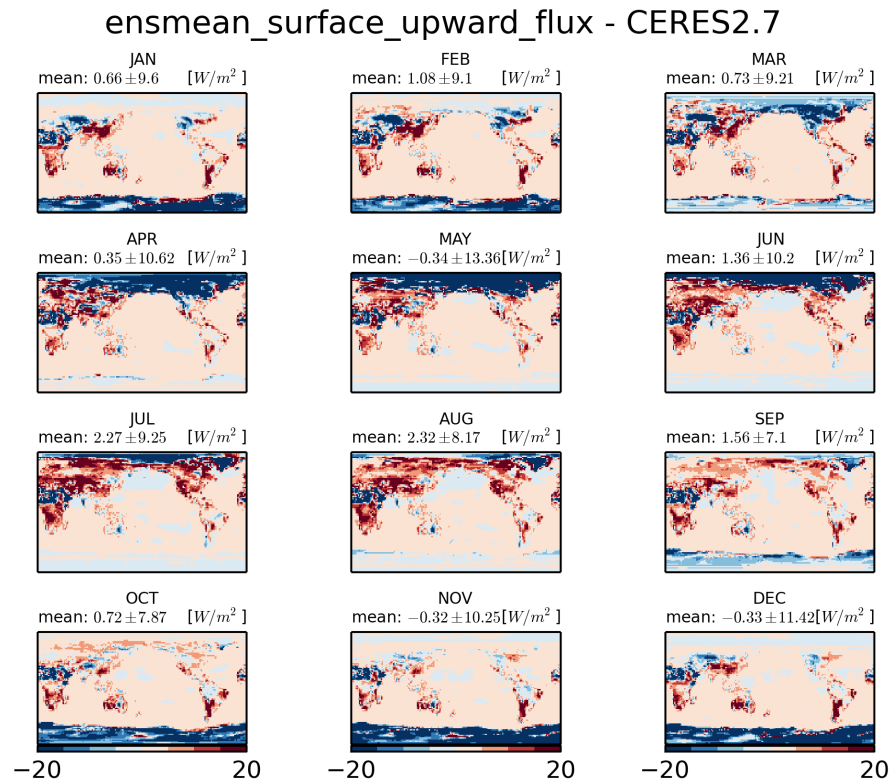


Figure 104: Monthly mean climatology of difference between MEAN-MODEL and CERES2.7

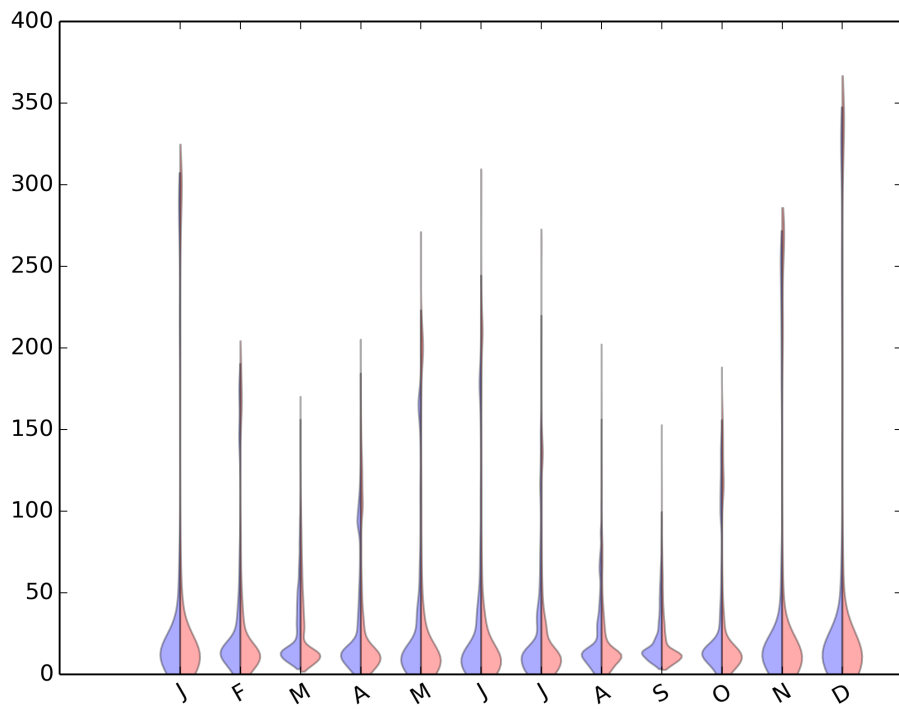


Figure 105: Violin plot for ENSMEAN-SURFACE-UPWARD-FLUX

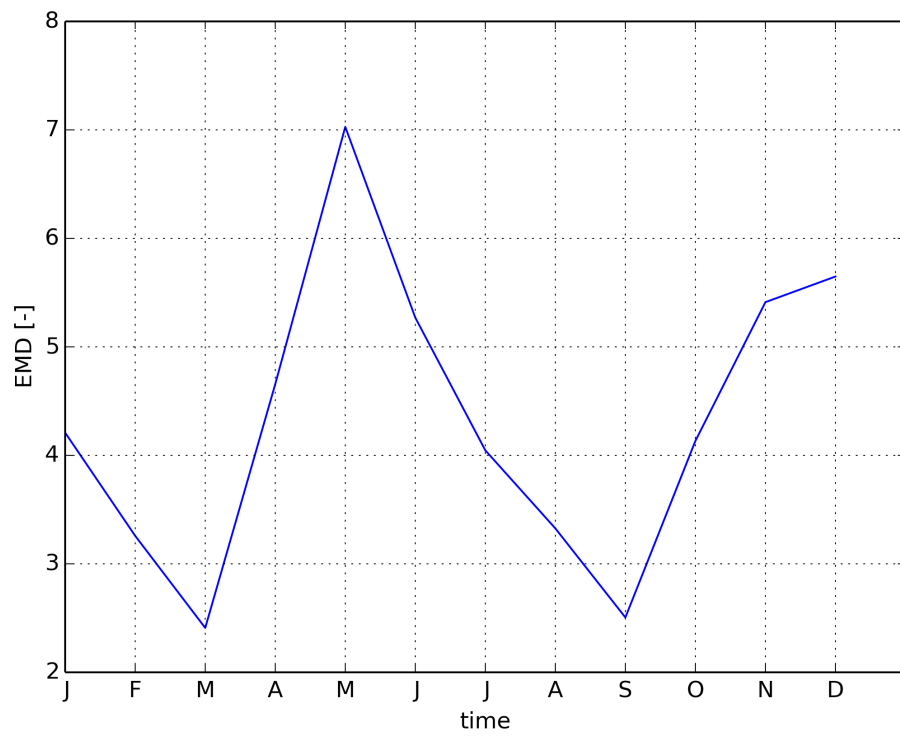


Figure 106: Timeseries of EMD

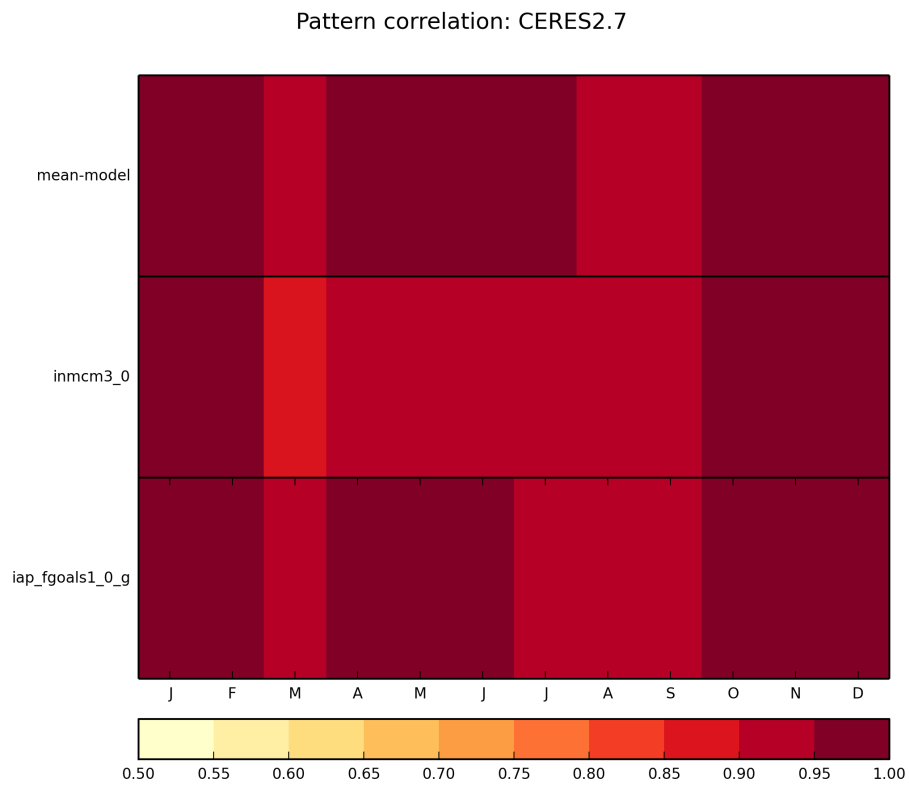


Figure 107: Pattern correlation for CERES2.7

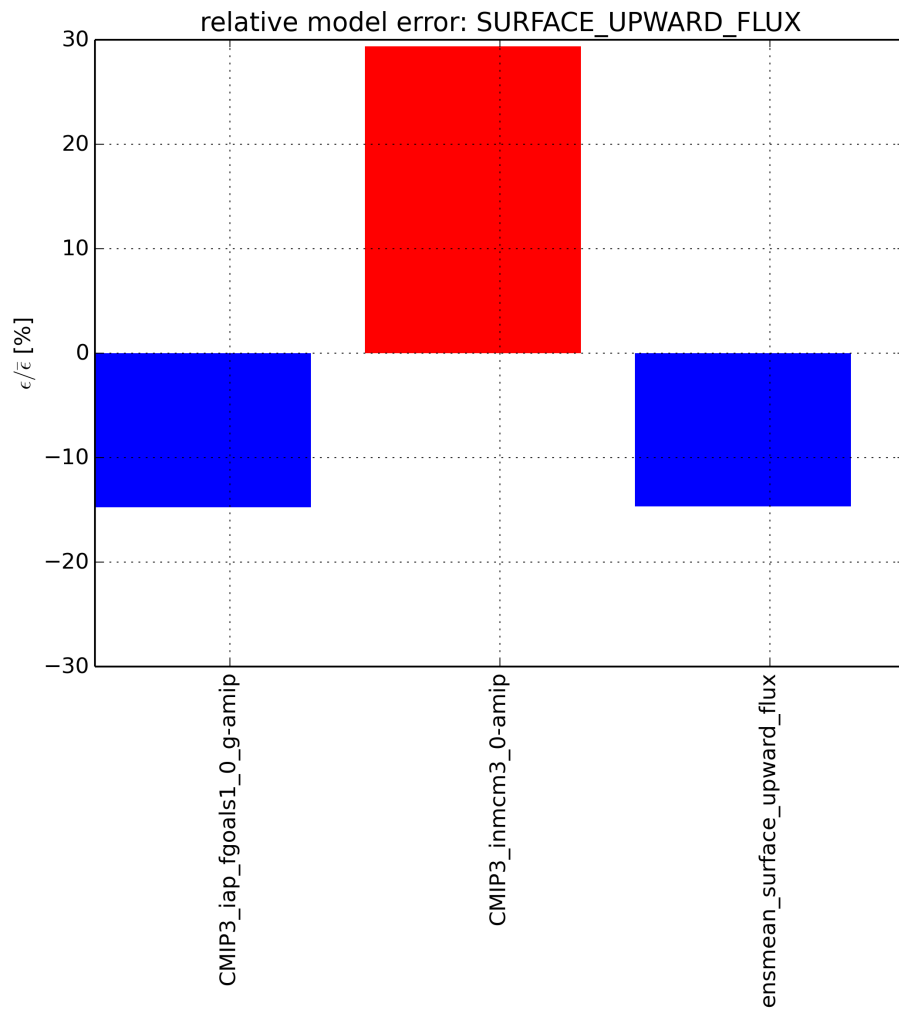


Figure 108: Relative model performance for SURFACE-UPWARD-FLUX

2.3 SRBv3.0

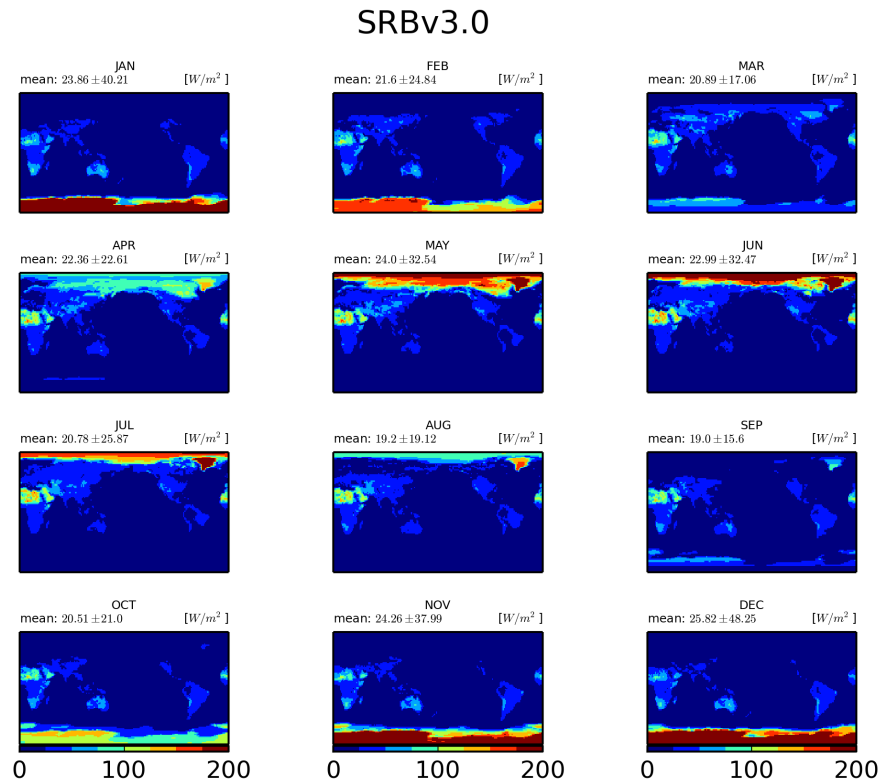


Figure 109: Monthly mean SRBv3.0

2.3.1 CMIP3 iap fgoals1 0 g-ampip

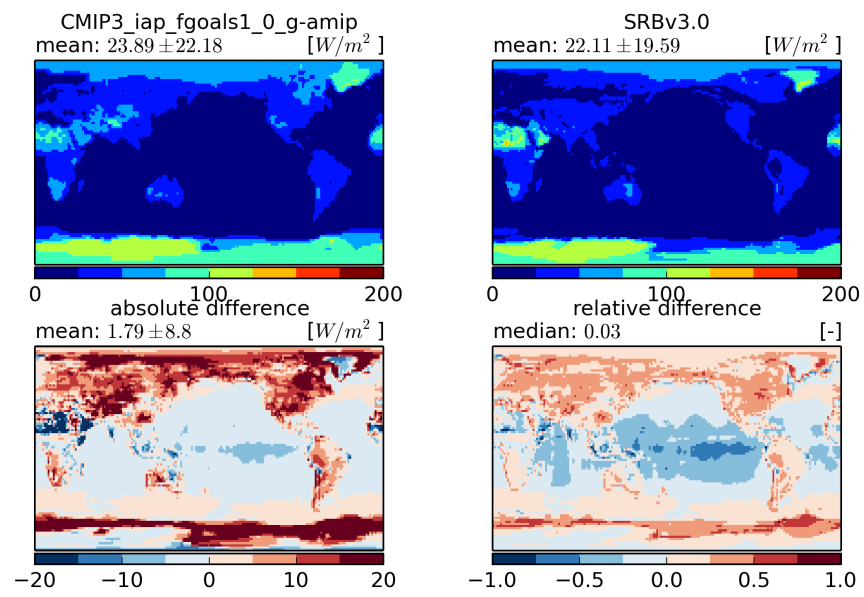


Figure 110: Temporal mean fields (top) and absolute and relative differences (bottom)

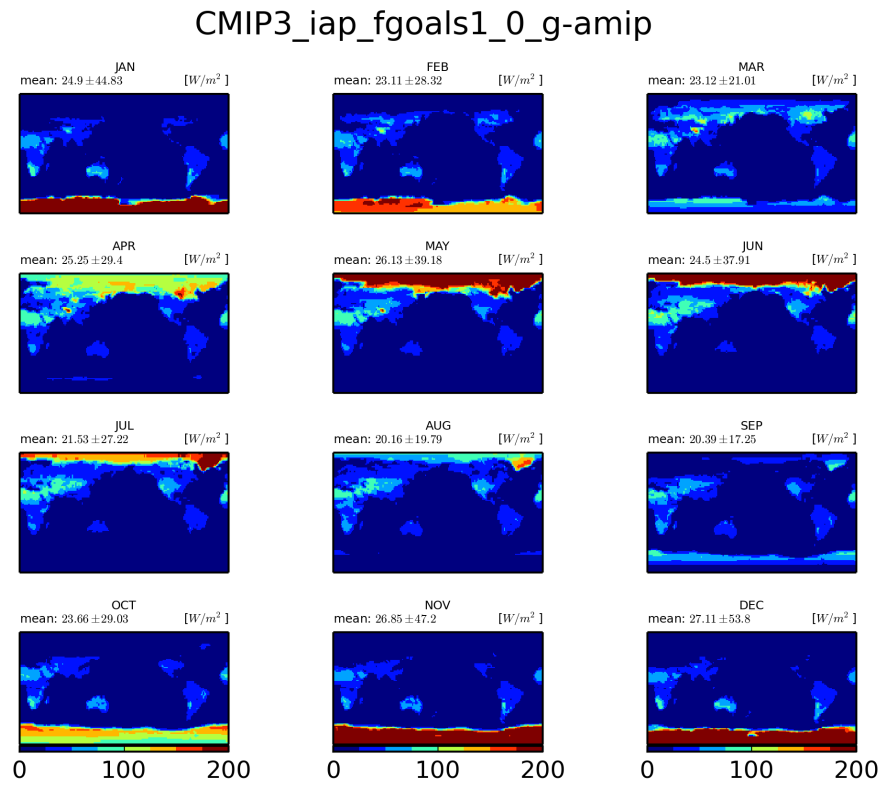


Figure 111: Monthly mean climatology for iap-fgoals1-0-g

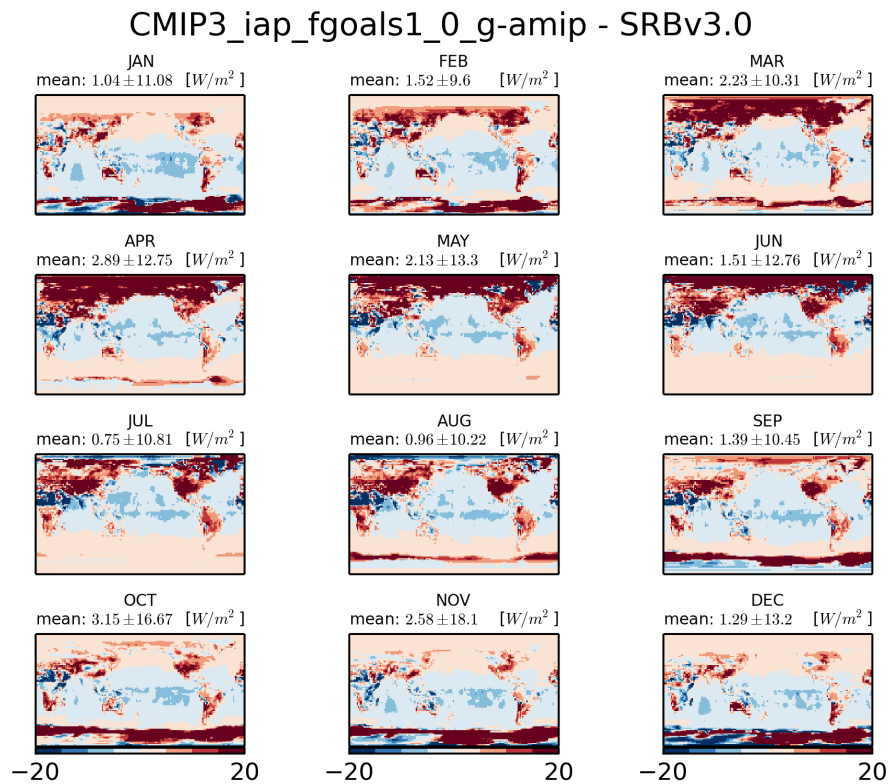


Figure 112: Monthly mean climatology of difference between IAP-FGOALS1-0-G and SRBV3.0

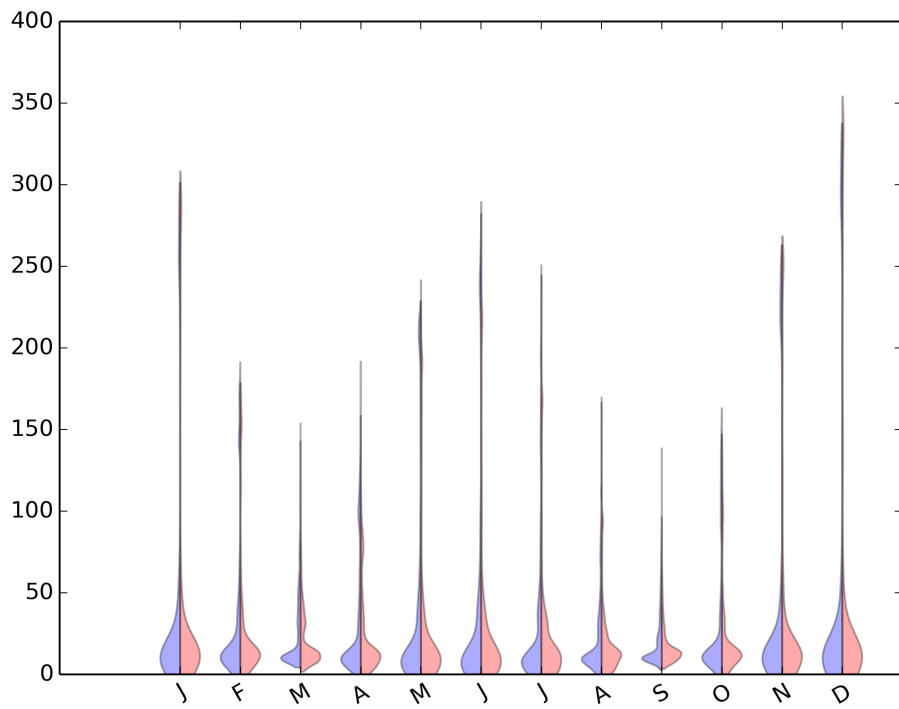


Figure 113: Violin plot for CMIP3-IAP-FGOALS1-0-G-AMIP

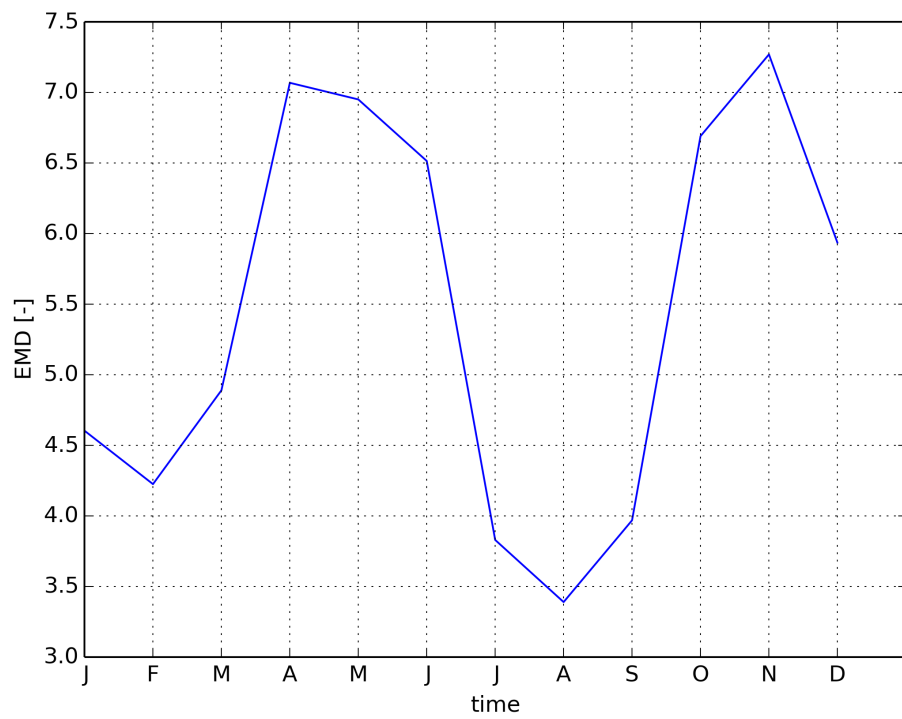


Figure 114: Timeseries of EMD

2.3.2 CMIP3 inmcm3 0-amp

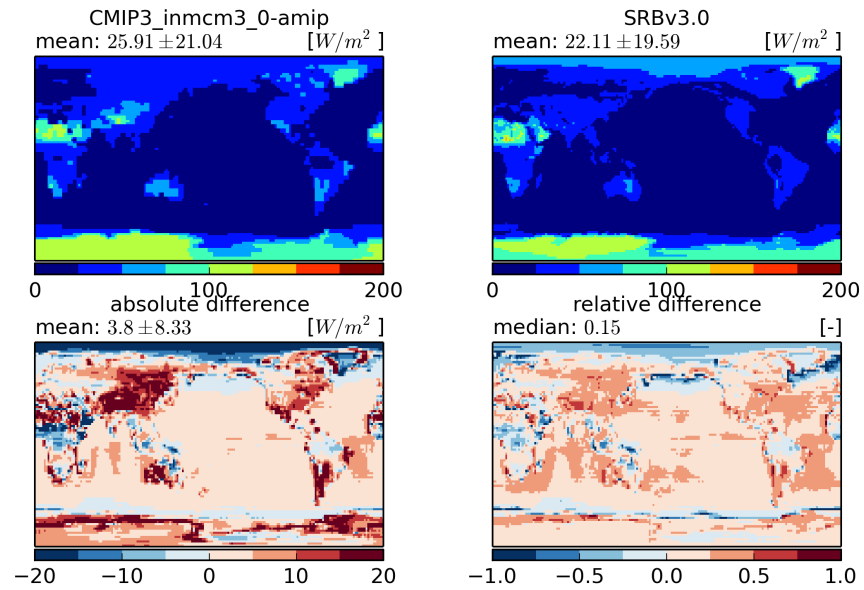


Figure 115: Temporal mean fields (top) and absolute and relative differences (bottom)

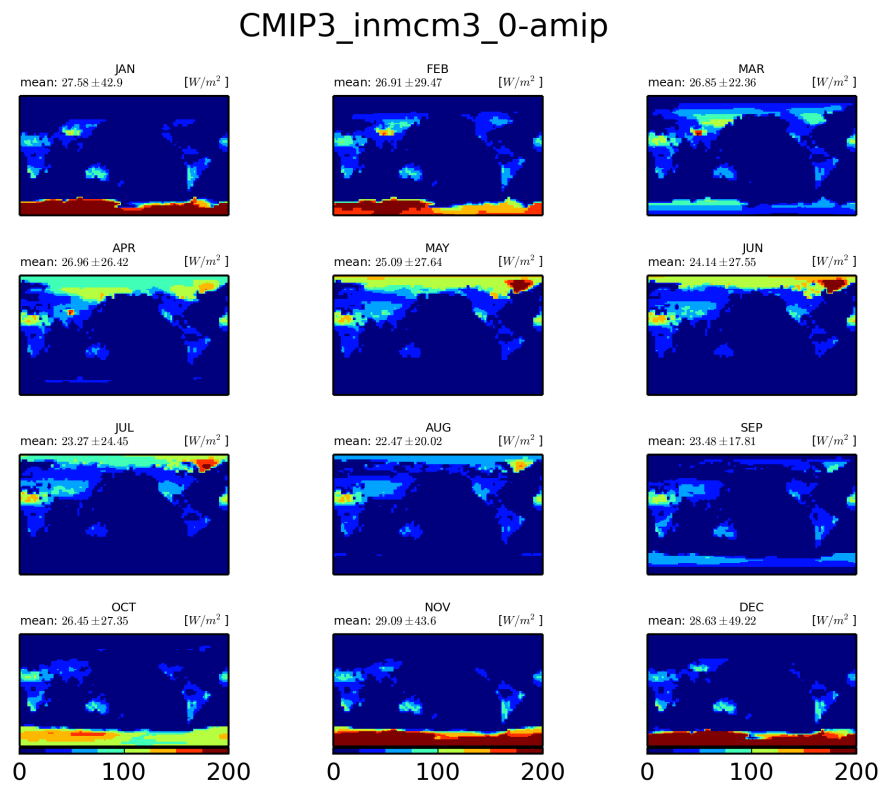


Figure 116: Monthly mean climatology for inmcm3-0

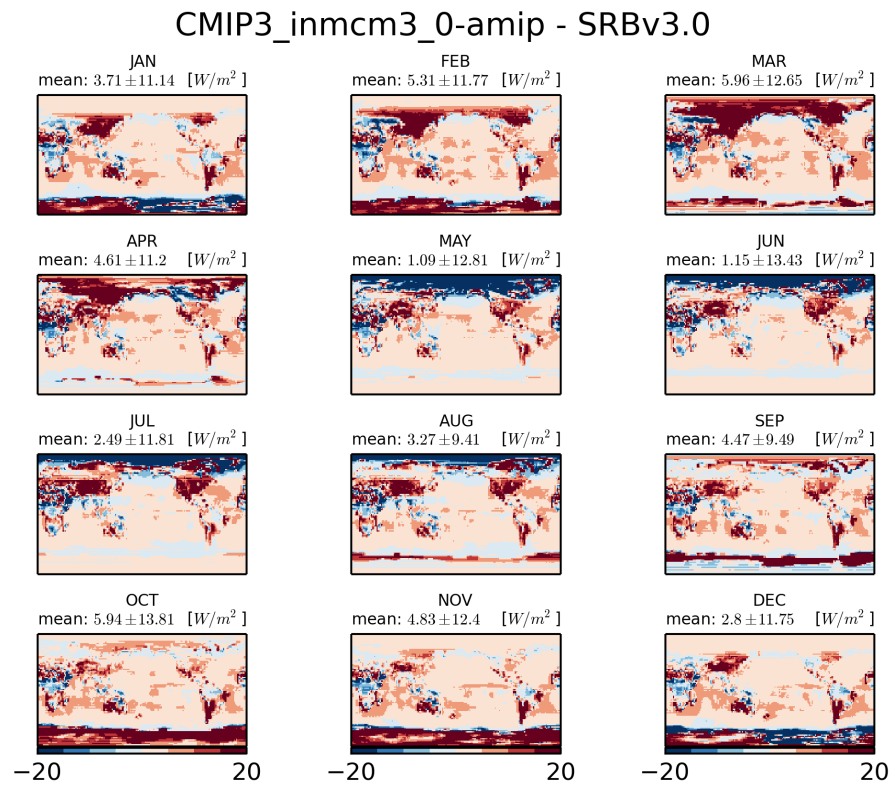


Figure 117: Monthly mean climatology of difference between INMCM3-0 and SRBV3.0

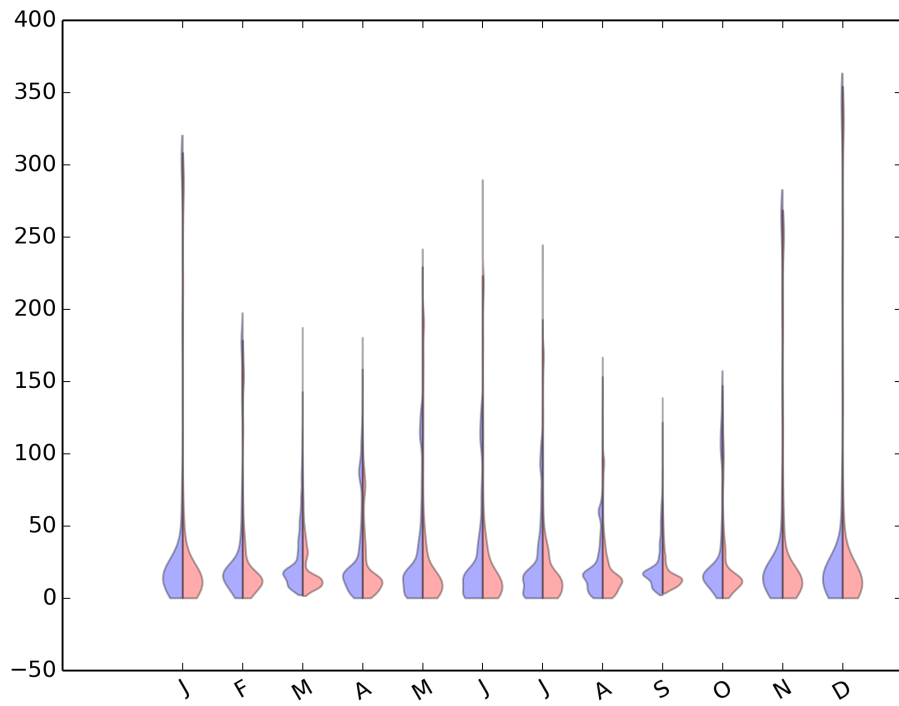


Figure 118: Violin plot for CMIP3-INMCM3-0-AMIP

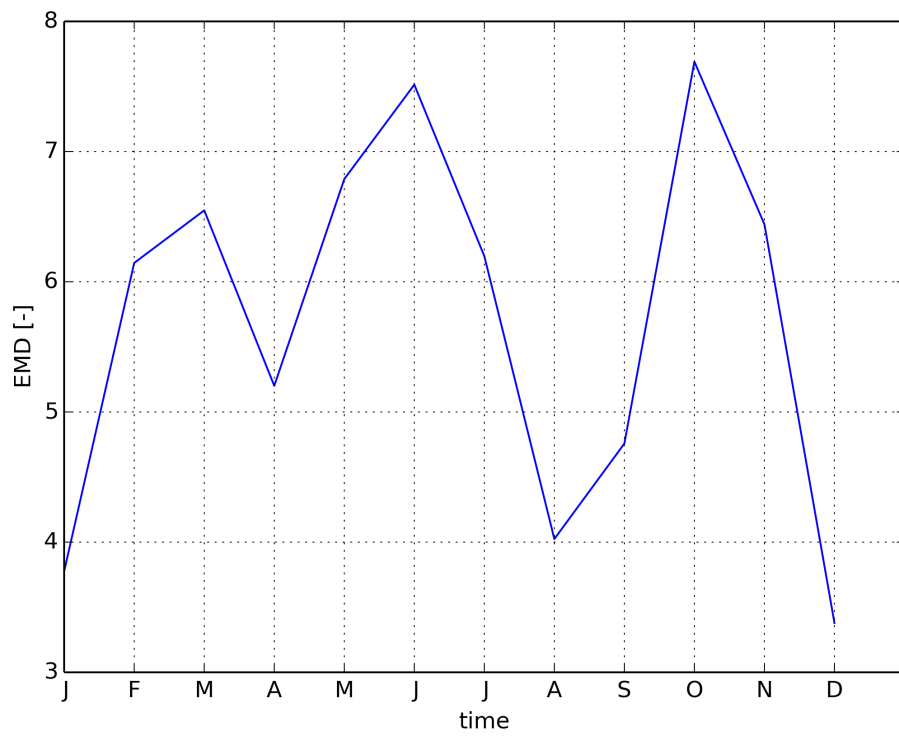


Figure 119: Timeseries of EMD

2.3.3 model mean

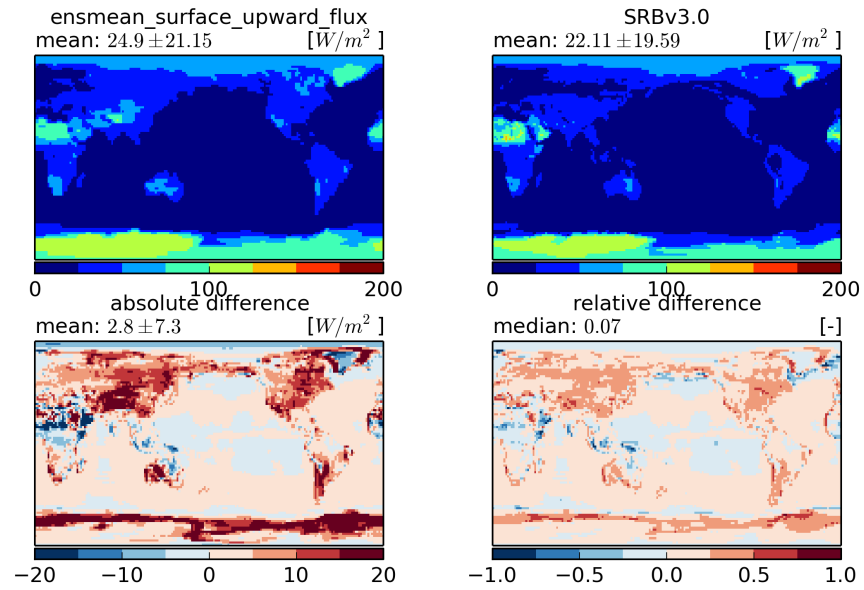


Figure 120: Temporal mean fields (top) and absolute and relative differences (bottom)

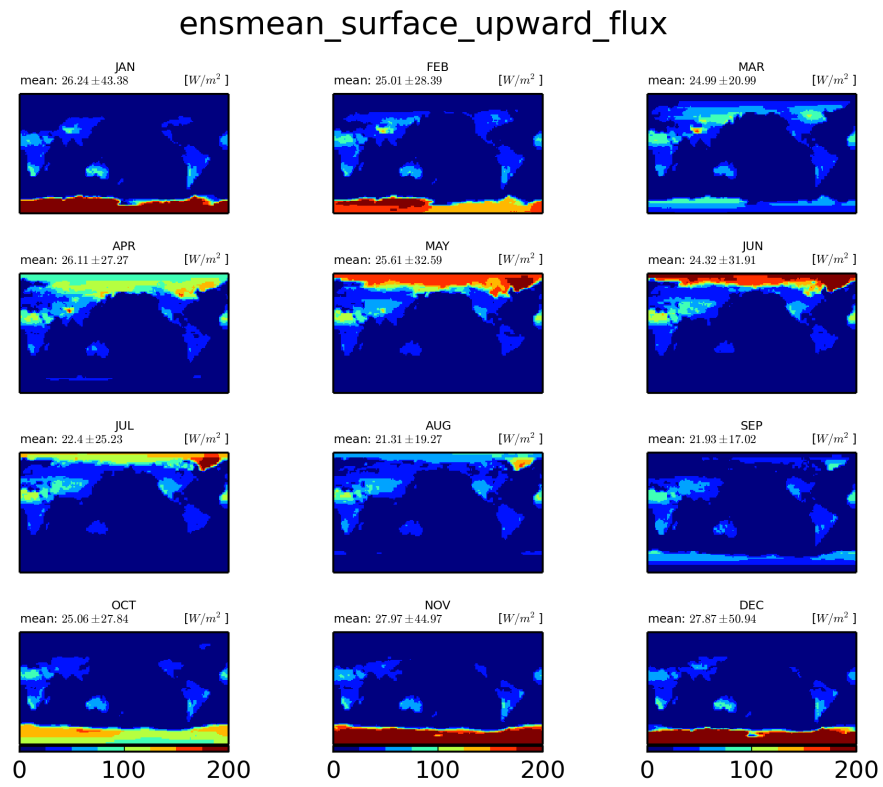


Figure 121: Monthly mean climatology for mean-model

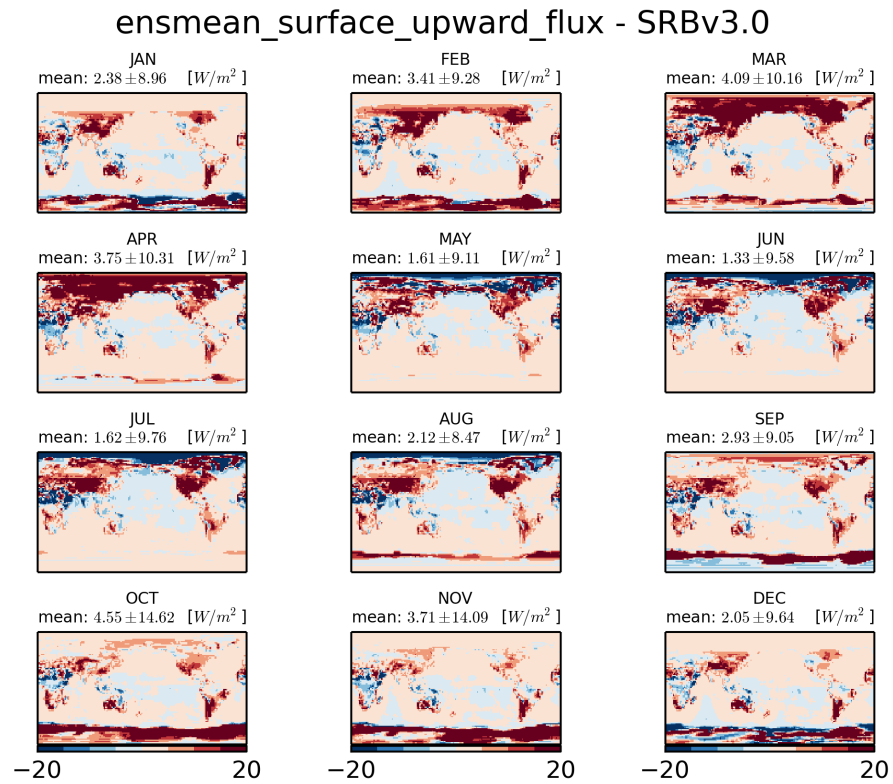


Figure 122: Monthly mean climatology of difference between MEAN-MODEL and SRBV3.0

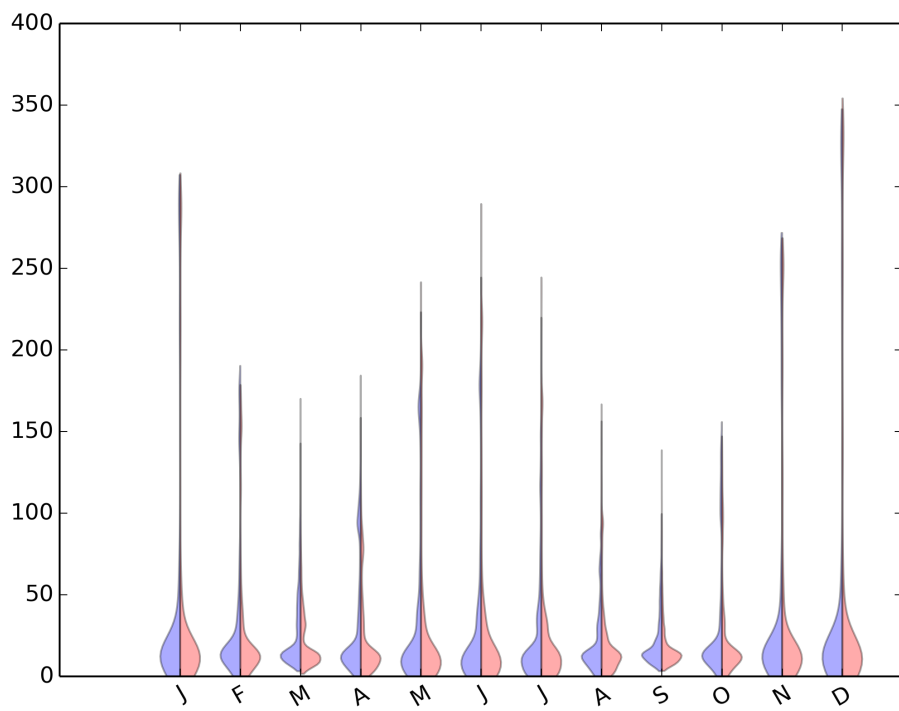


Figure 123: Violin plot for ENSMEAN-SURFACE-UPWARD-FLUX

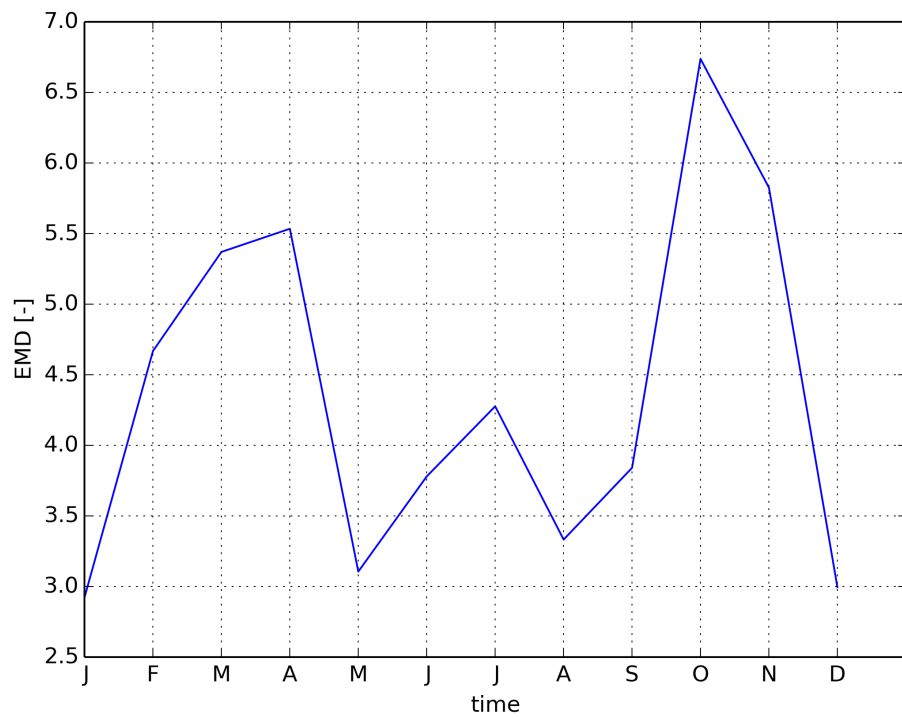


Figure 124: Timeseries of EMD

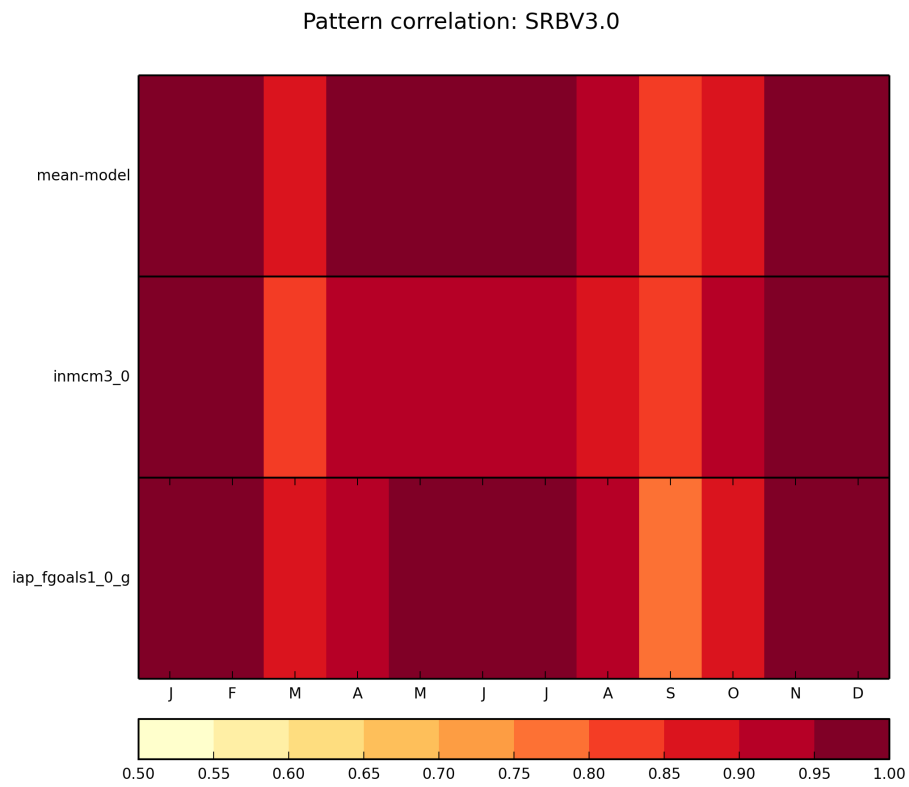


Figure 125: Pattern correlation for SRBV3.0

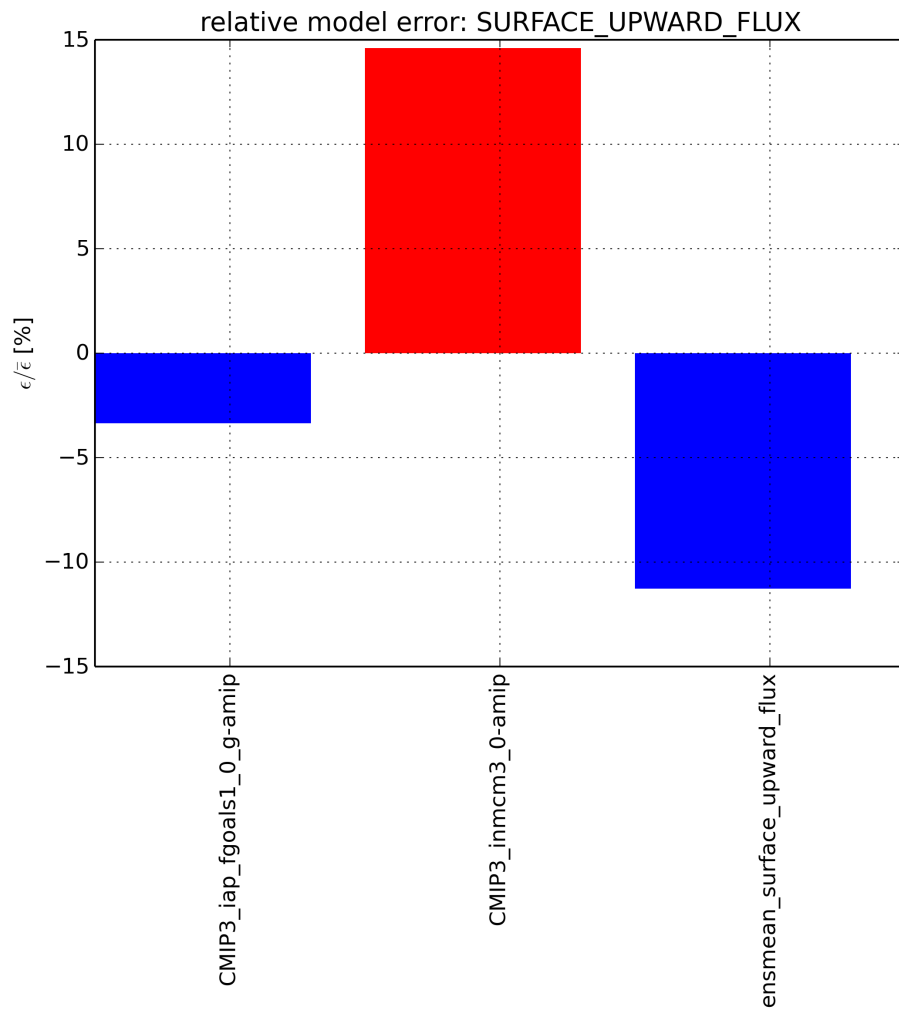


Figure 126: Relative model performance for SURFACE-UPWARD-FLUX

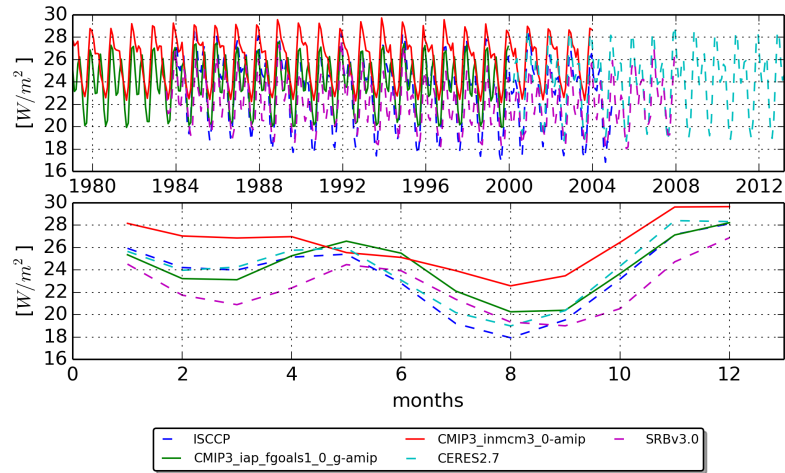


Figure 127: Global means for SHORTWAVE UPWARD RADIATION FLUX IN AIR

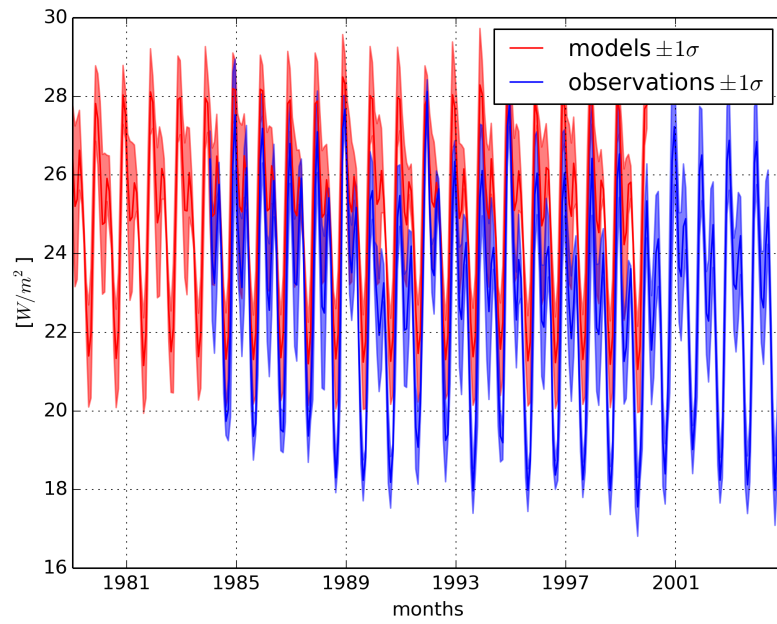


Figure 128: Global means for SHORTWAVE UPWARD RADIATION FLUX IN AIR (summary); areas indicate $\pm 1\sigma$ as derived from the ensemble of models or observations

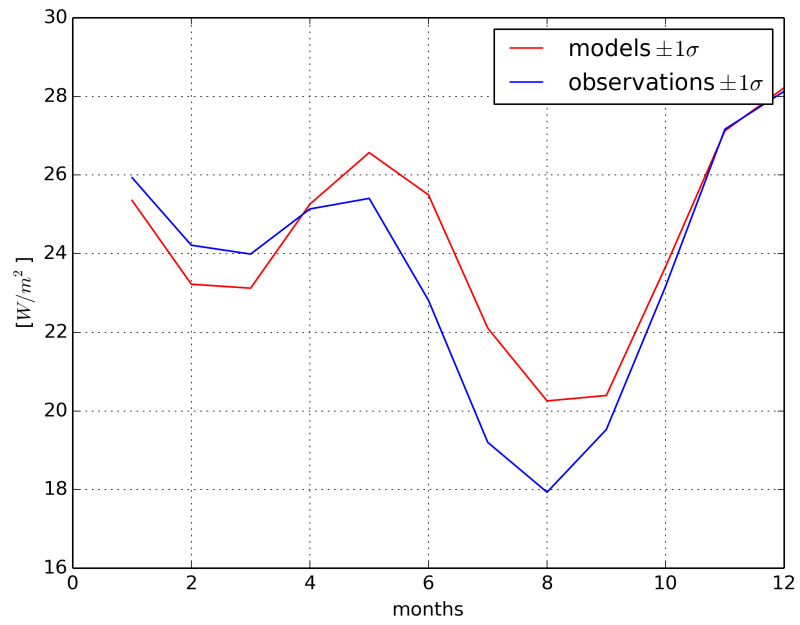


Figure 129: Global means for SHORTWAVE UPWARD RADIATION FLUX IN AIR (summary climatology)

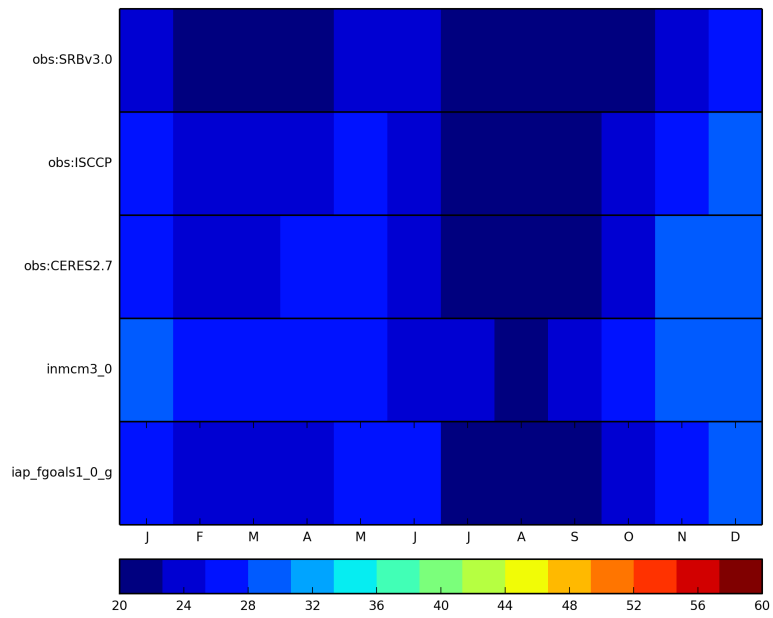


Figure 130: Global means climatology for SHORTWAVE UPWARD RADIATION FLUX IN AIR

3 NET SURFACE SOLAR RADIATION FLUX IN AIR

3.1 ISCCP

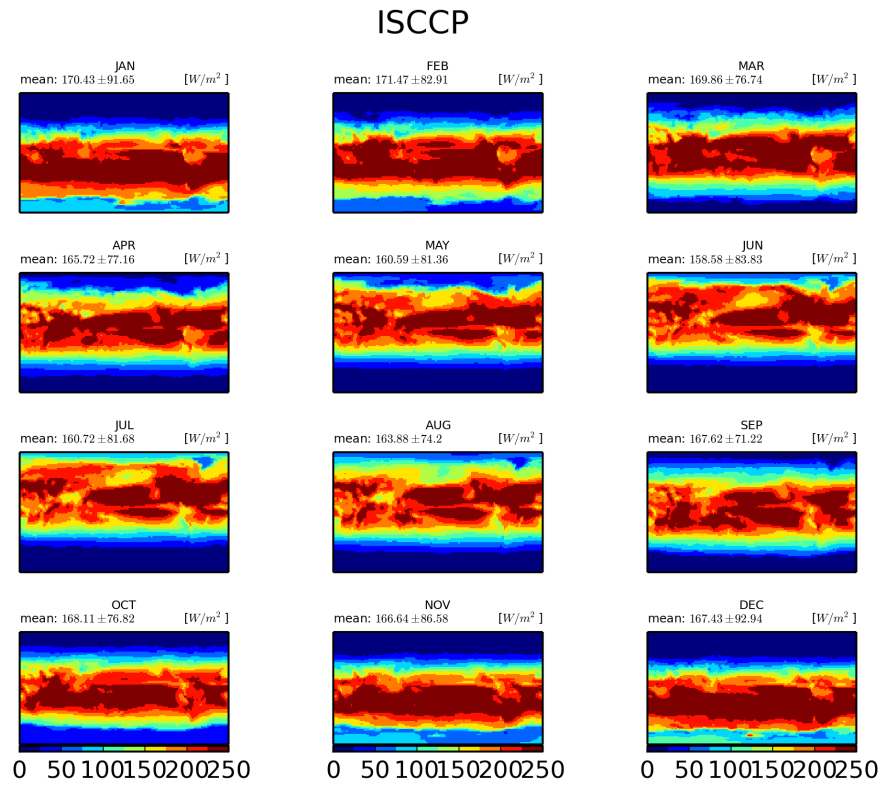


Figure 131: Monthly mean ISCCP

3.1.1 CMIP3 iap fgoals1 0 g-amip

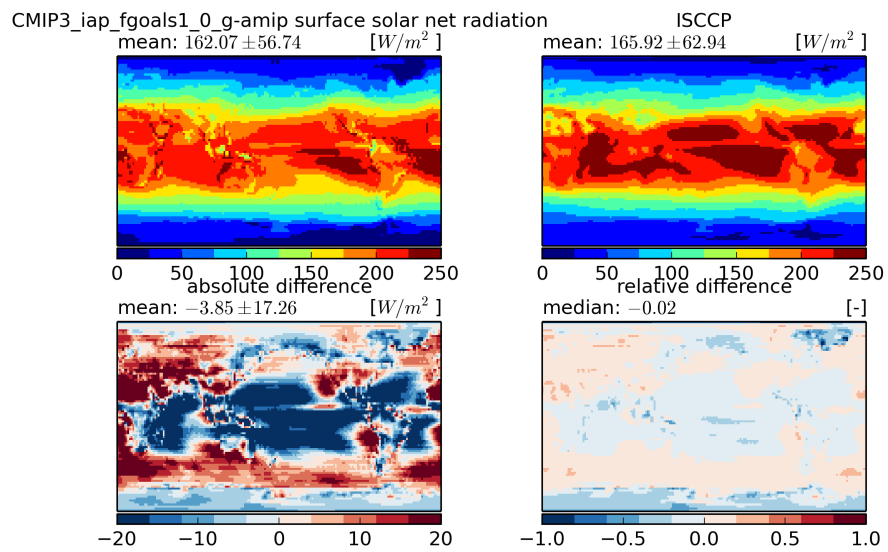


Figure 132: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation

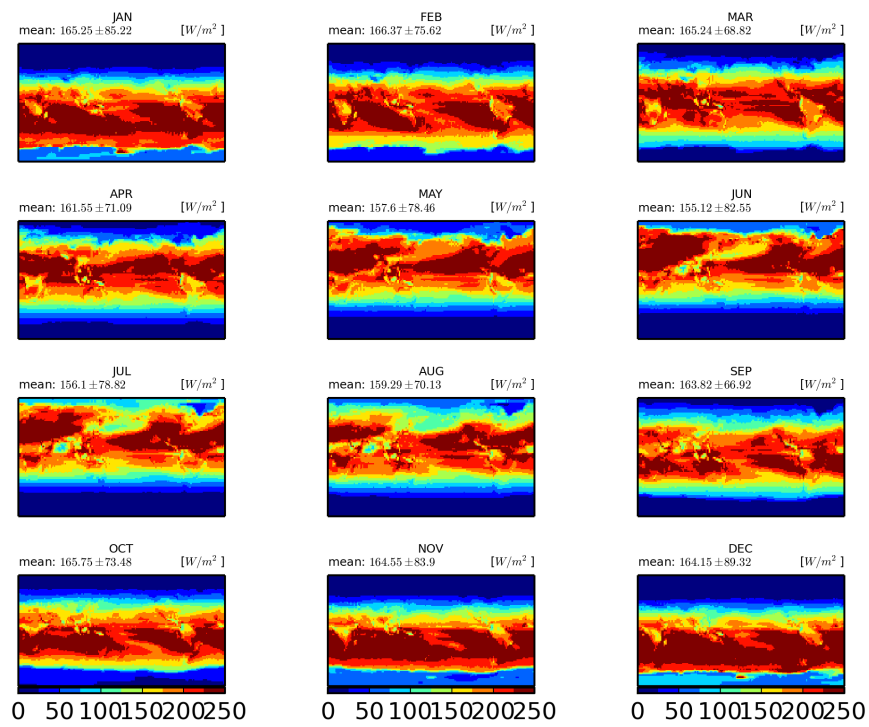


Figure 133: Monthly mean climatology for iap-fgoals1-0-g

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation - ISCCP

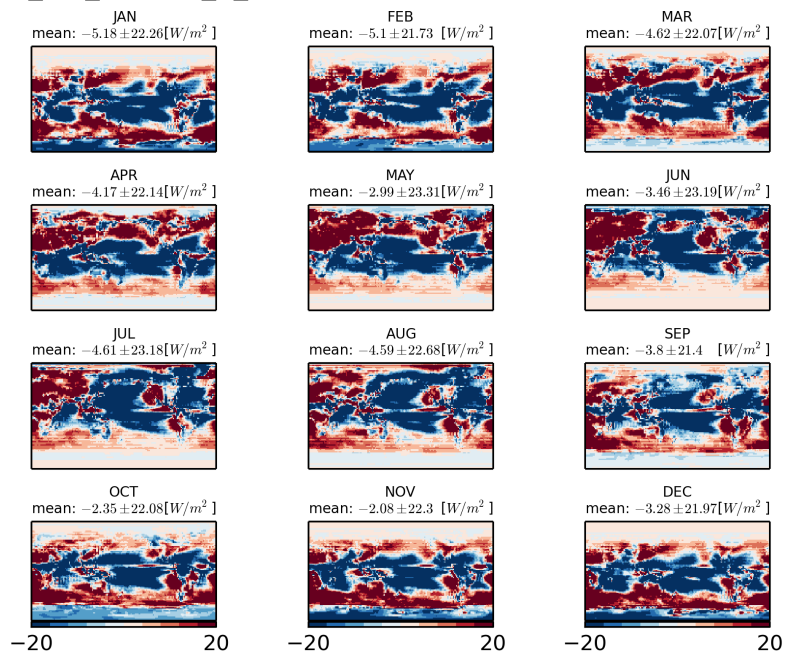


Figure 134: Monthly mean climatology of difference between IAP-FGOALS1-0-G and ISCCP

3.1.2 CMIP3 inmcm3 0-amip

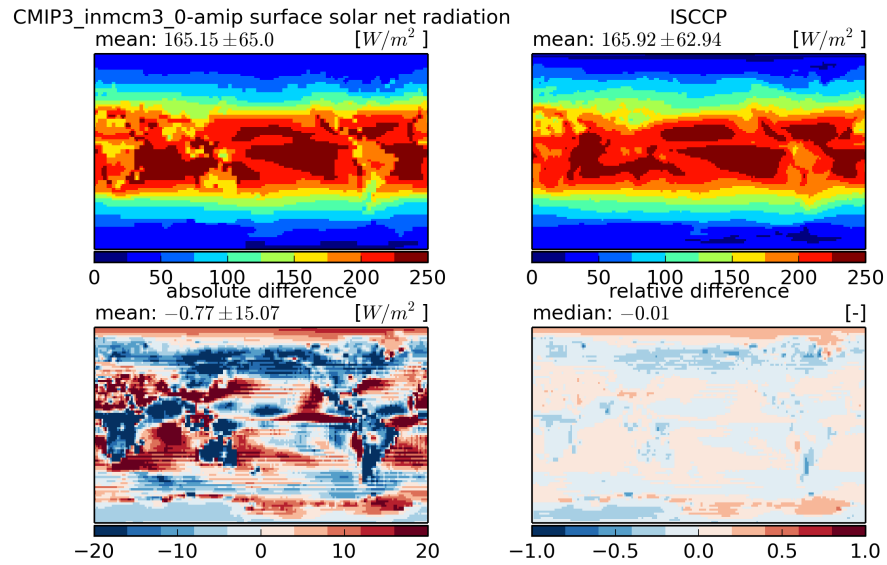


Figure 135: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip surface solar net radiation

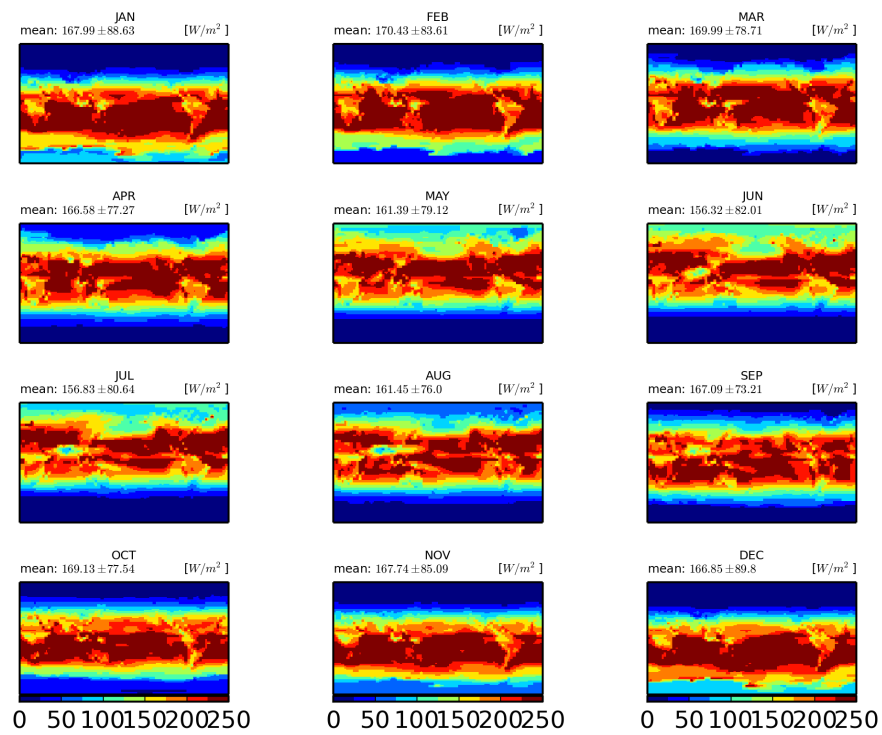


Figure 136: Monthly mean climatology for inmcm3-0

CMIP3_inmcm3_0-amip surface solar net radiation - ISCCP

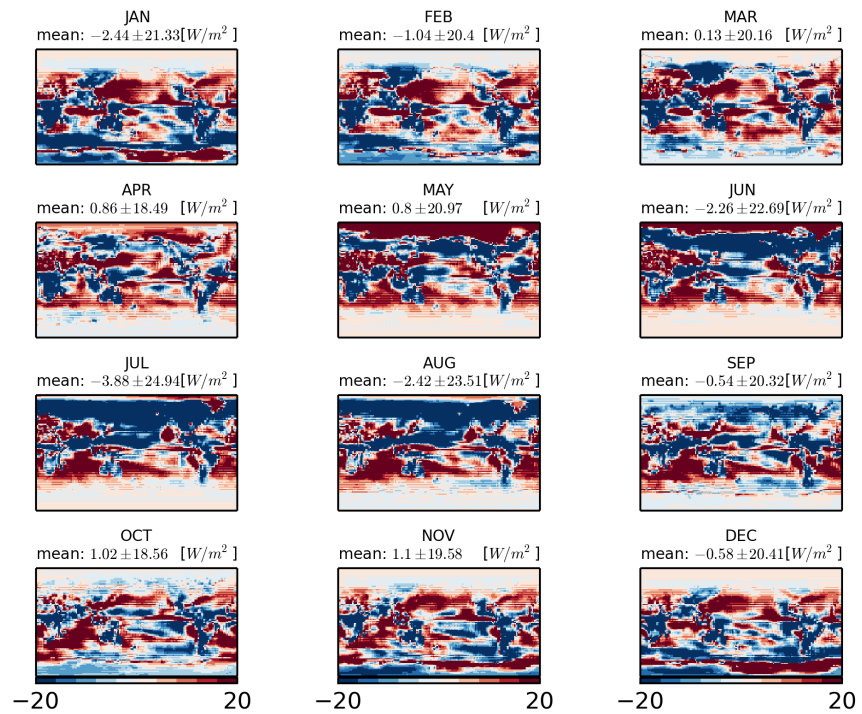


Figure 137: Monthly mean climatology of difference between INMCM3-0 and ISCCP

3.1.3 model mean

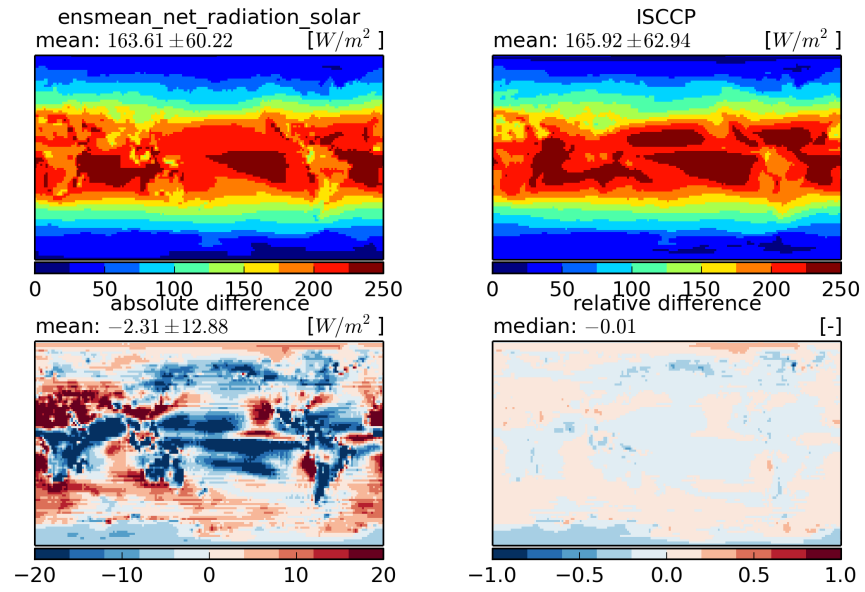


Figure 138: Temporal mean fields (top) and absolute and relative differences (bottom)

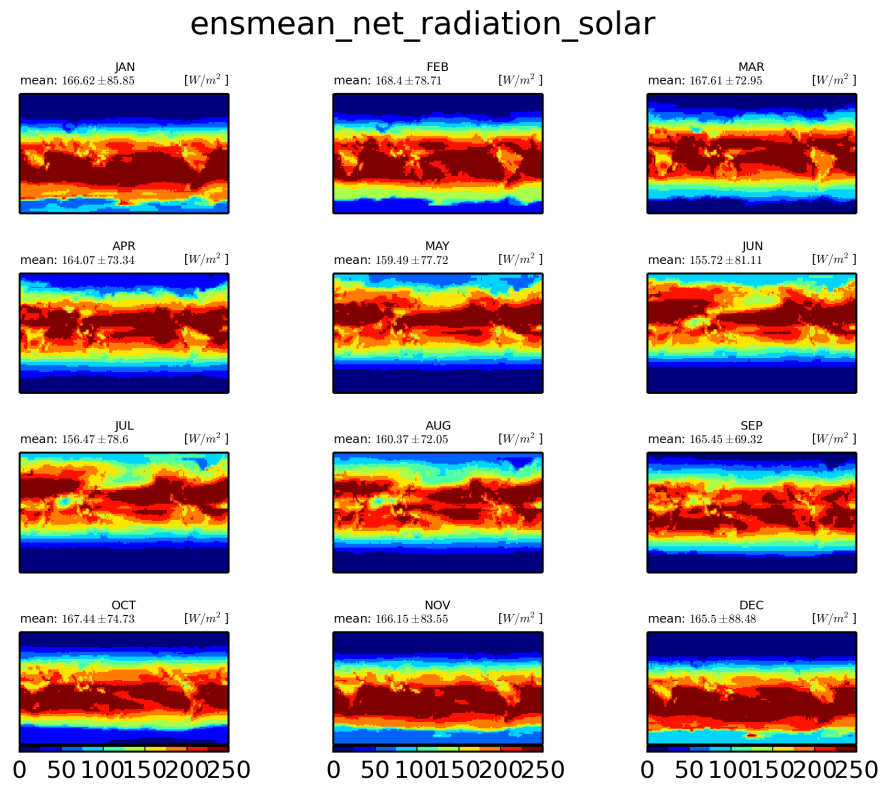


Figure 139: Monthly mean climatology for mean-model

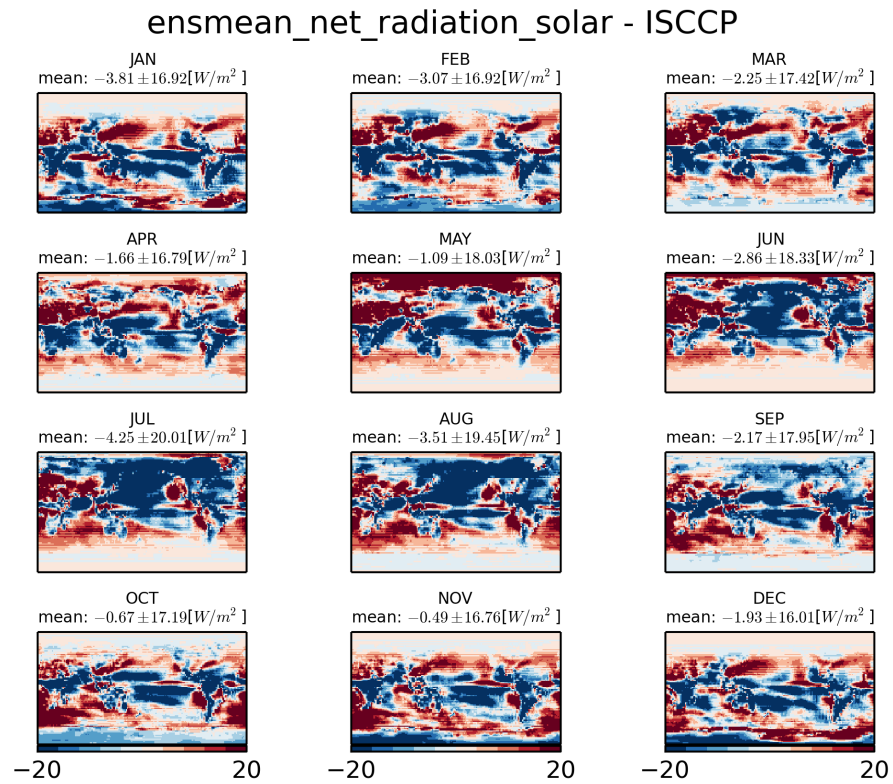


Figure 140: Monthly mean climatology of difference between MEAN-MODEL and ISCCP

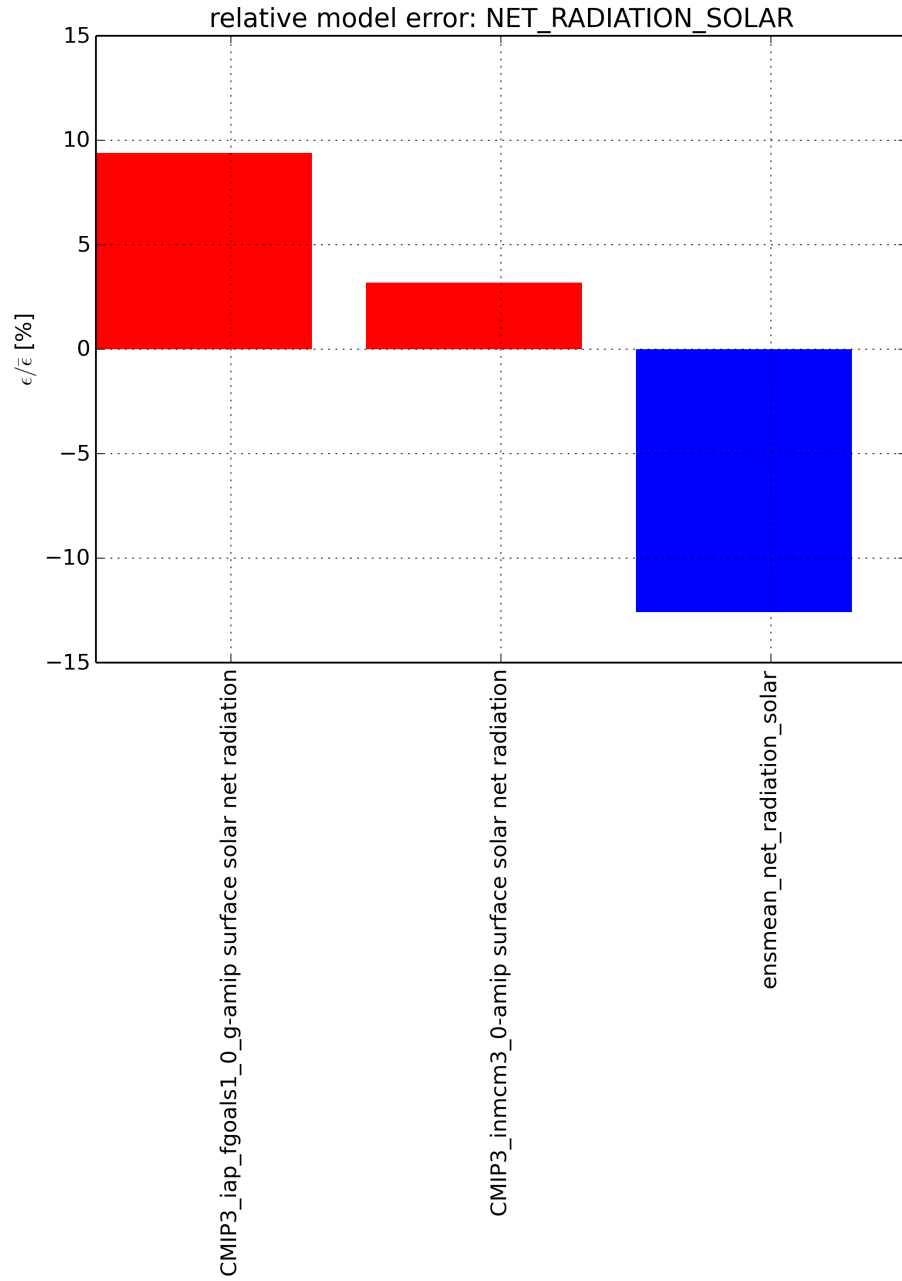


Figure 141: Relative model performance for NET-RADIATION-SOLAR

3.2 CERES2.7

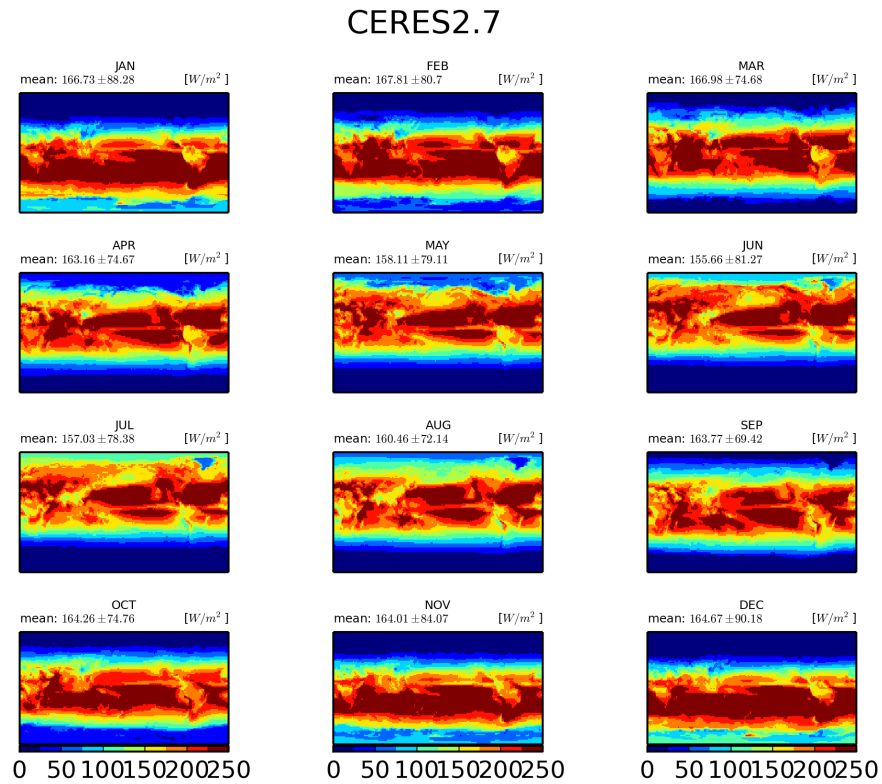


Figure 142: Monthly mean CERES2.7

3.2.1 CMIP3 iap fgoals1 0 g-amip

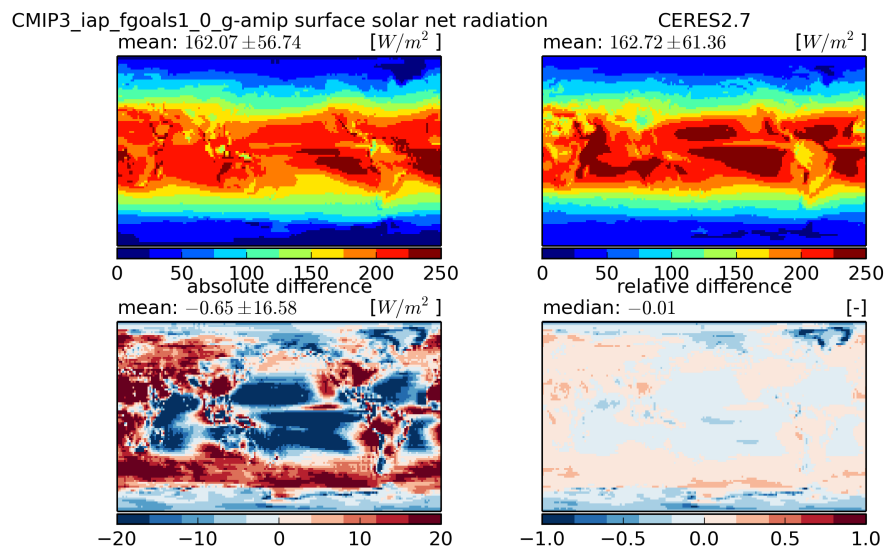


Figure 143: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation

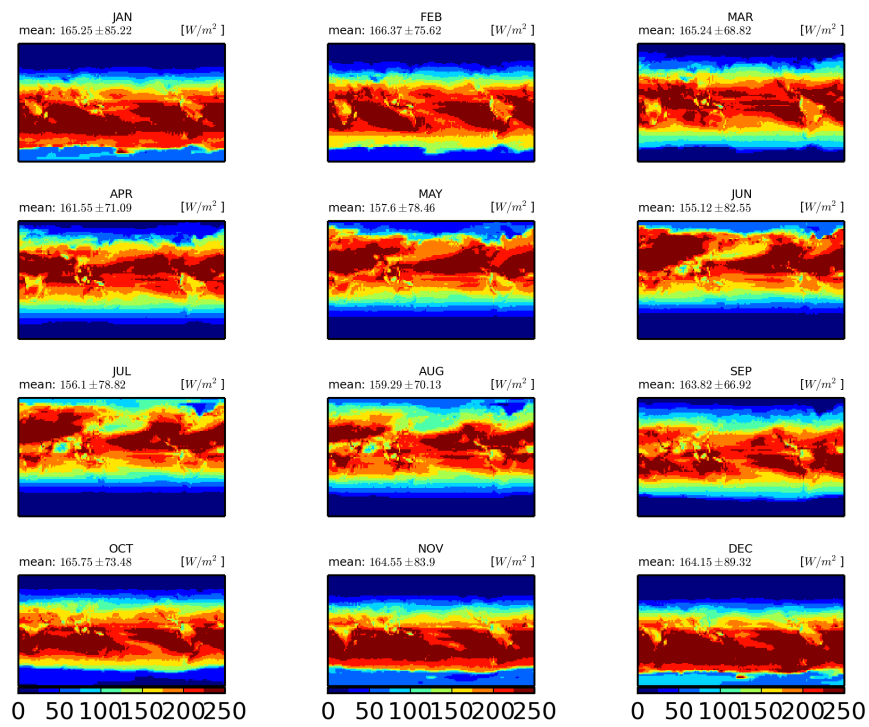


Figure 144: Monthly mean climatology for iap-fgoals1-0-g

CMIP3_iap_fgoals1_0_g-amp surface solar net radiation - CERES2.7

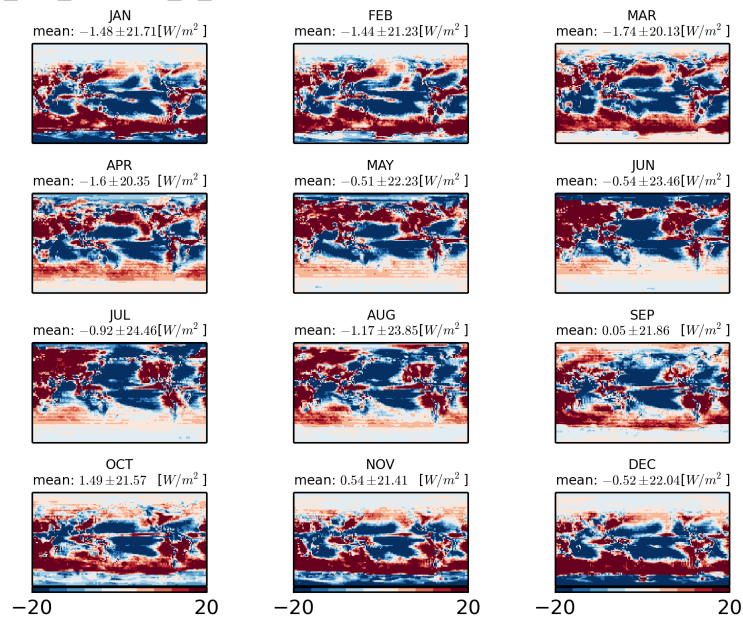


Figure 145: Monthly mean climatology of difference between IAP-FGOALS1-0-G and CERES2.7

3.2.2 CMIP3 inmcm3 0-amp

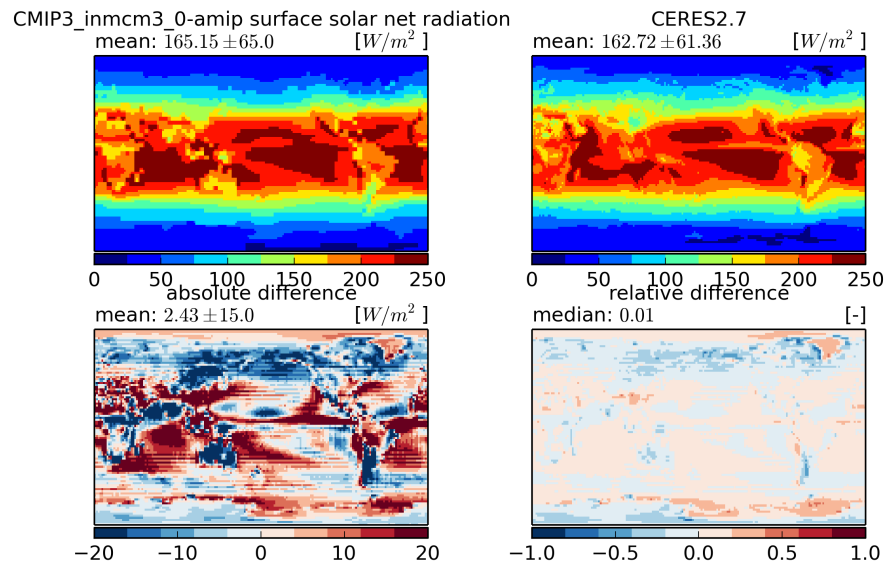


Figure 146: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip surface solar net radiation

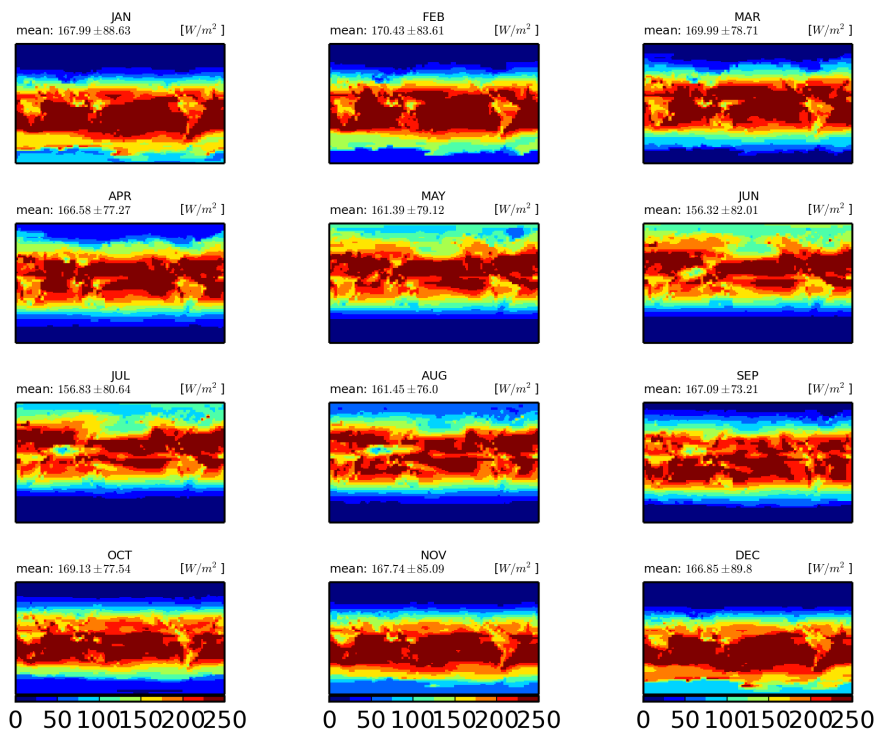


Figure 147: Monthly mean climatology for inmcm3-0

CMIP3_inmcm3_0-amp surface solar net radiation - CERES2.7

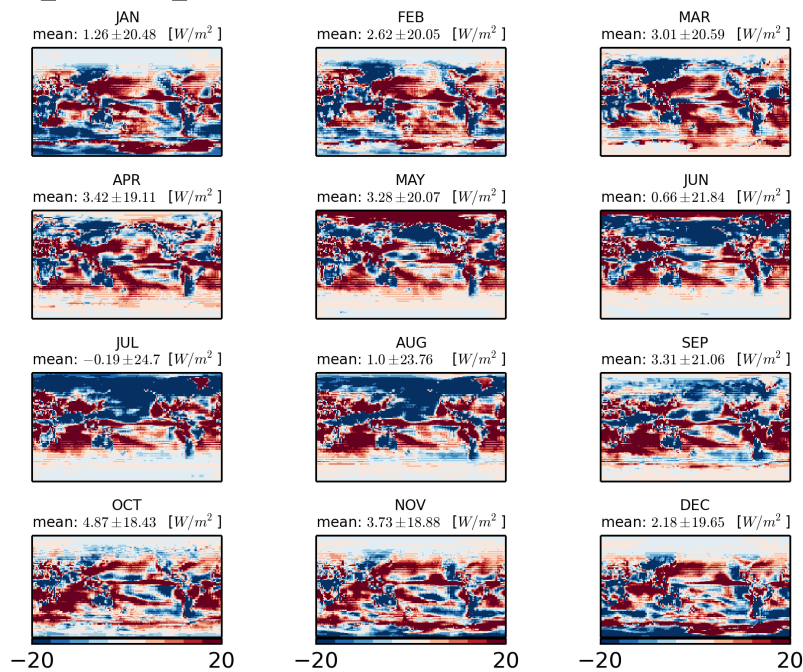


Figure 148: Monthly mean climatology of difference between INMCM3-0 and CERES2.7

3.2.3 model mean

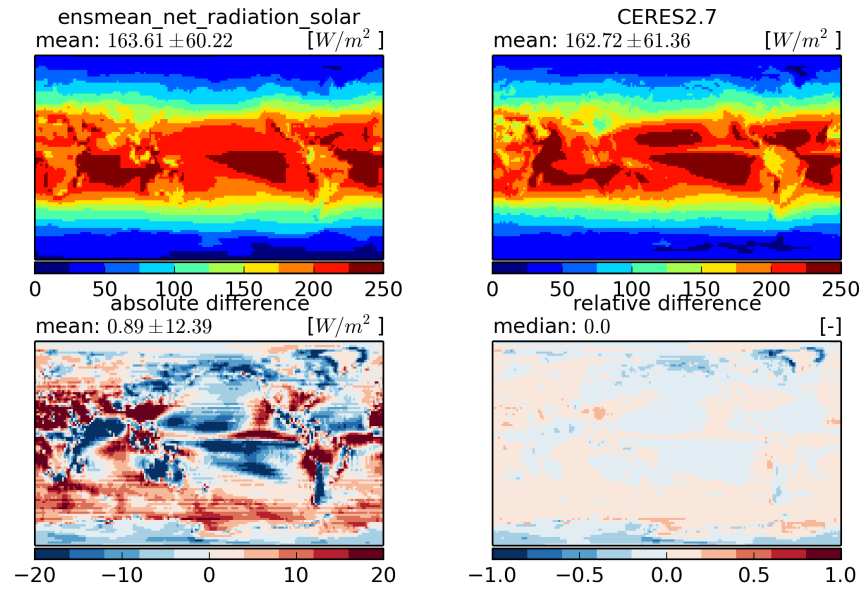


Figure 149: Temporal mean fields (top) and absolute and relative differences (bottom)

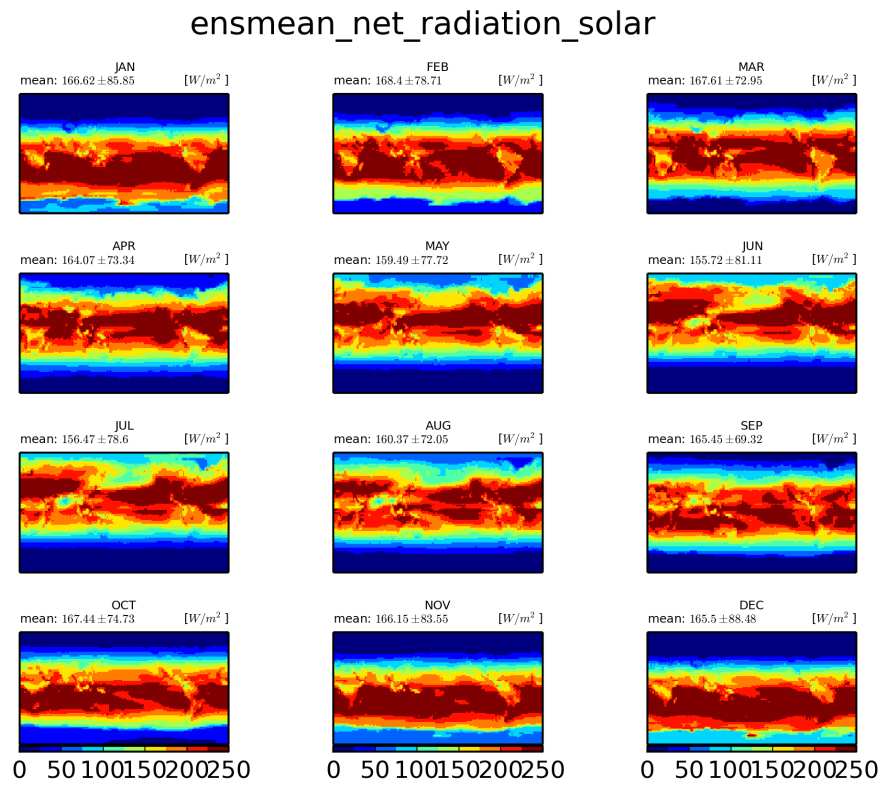


Figure 150: Monthly mean climatology for mean-model

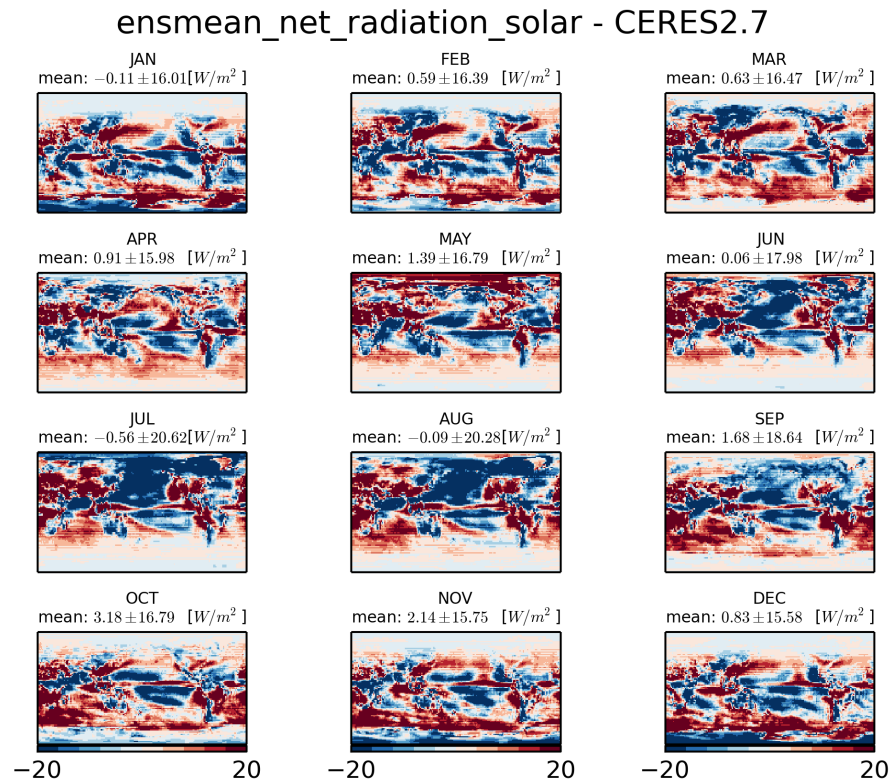


Figure 151: Monthly mean climatology of difference between MEAN-MODEL and CERES2.7

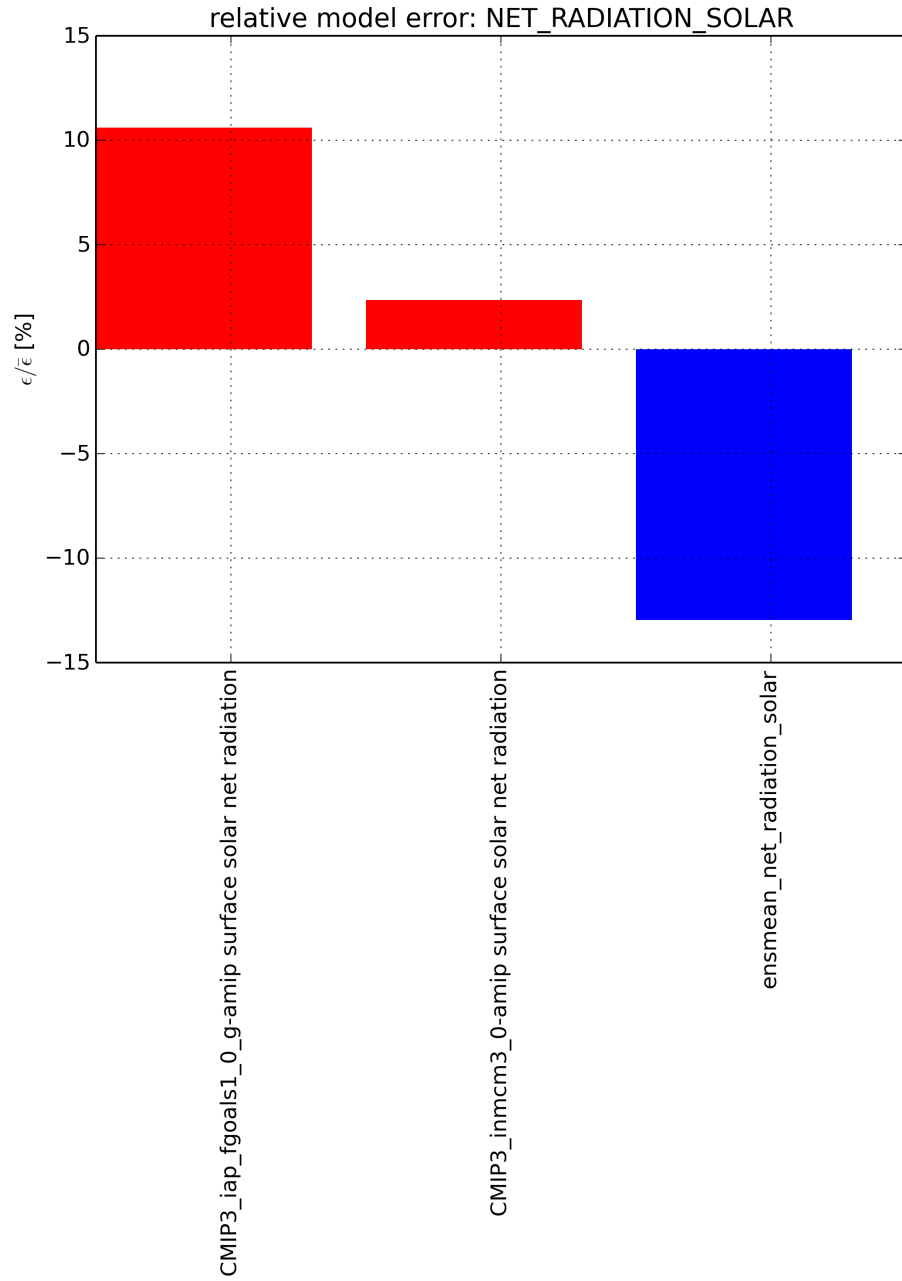


Figure 152: Relative model performance for NET-RADIATION-SOLAR

3.3 SRBv3.0

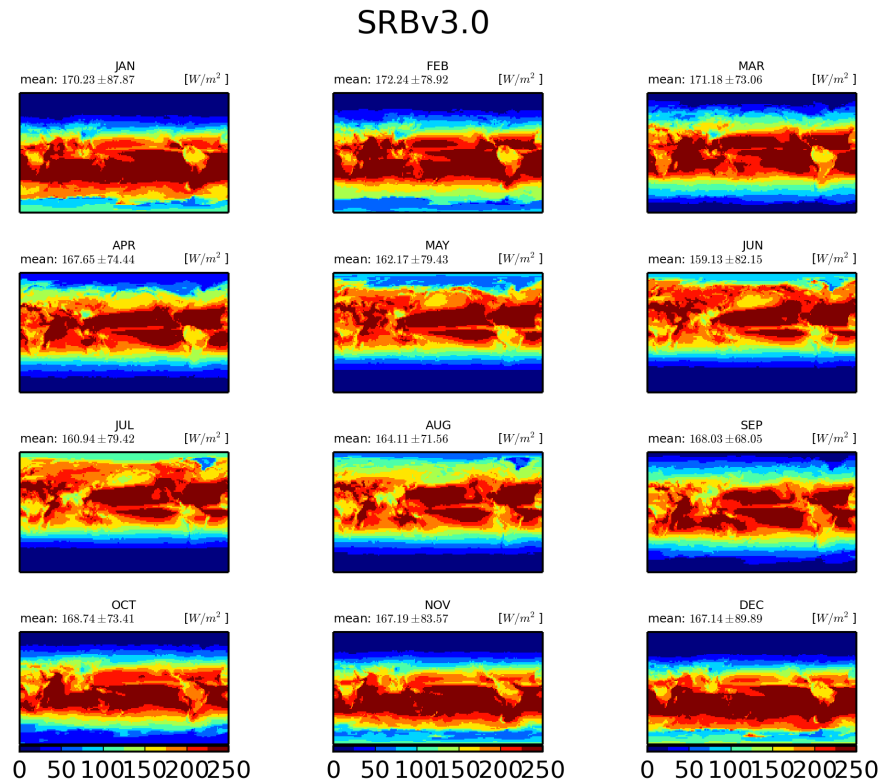


Figure 153: Monthly mean SRBv3.0

3.3.1 CMIP3 iap fgoals1 0 g-amip

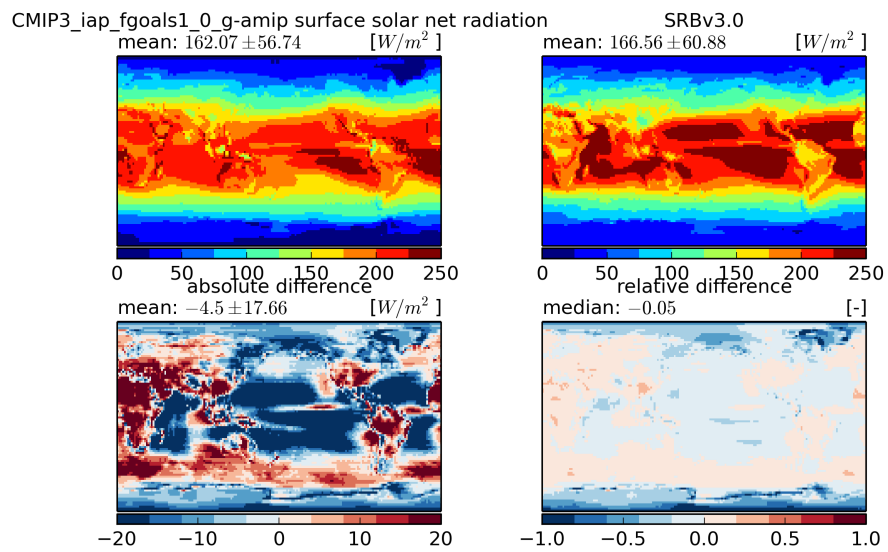


Figure 154: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_iap_fgoals1_0_g-amip surface solar net radiation

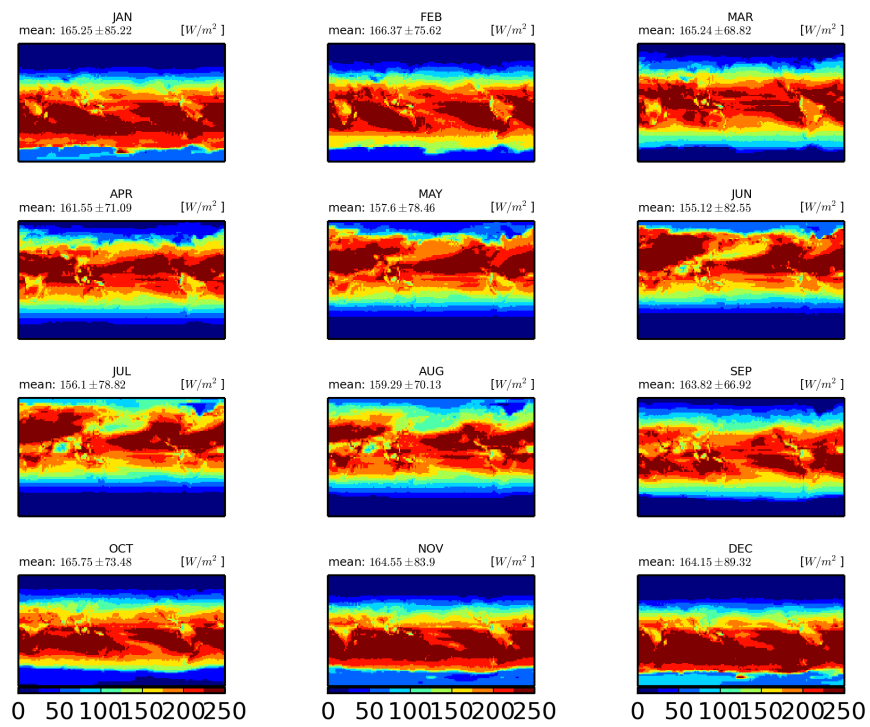


Figure 155: Monthly mean climatology for iap-fgoals1-0-g

CMIP3_jap_fgoals1_0_g-amip surface solar net radiation - SRBV3.0

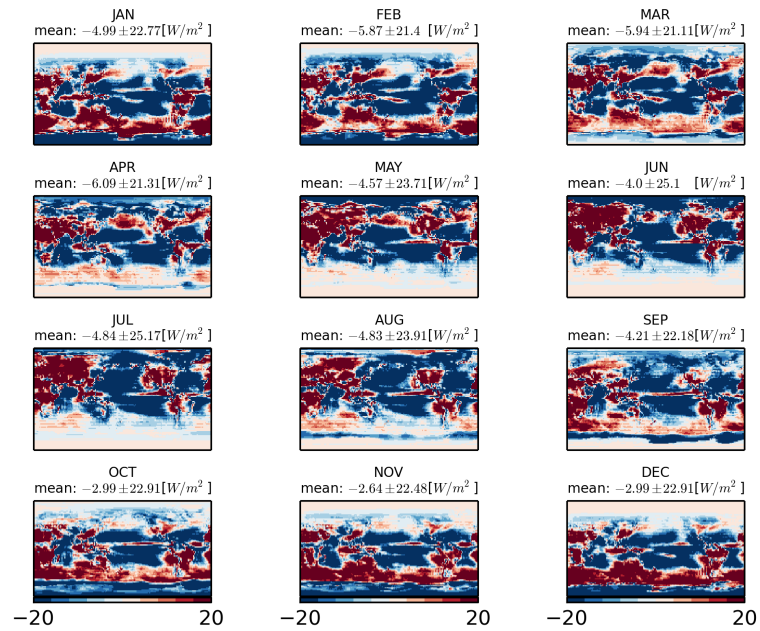


Figure 156: Monthly mean climatology of difference between IAP-FGOALS1-0-G and SRBV3.0

3.3.2 CMIP3 inmcm3 0-amp

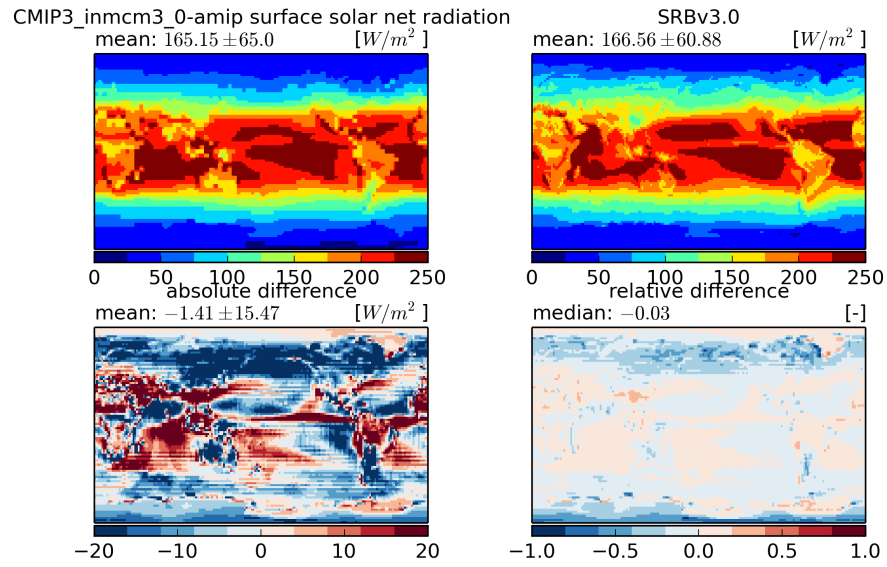


Figure 157: Temporal mean fields (top) and absolute and relative differences (bottom)

CMIP3_inmcm3_0-amip surface solar net radiation

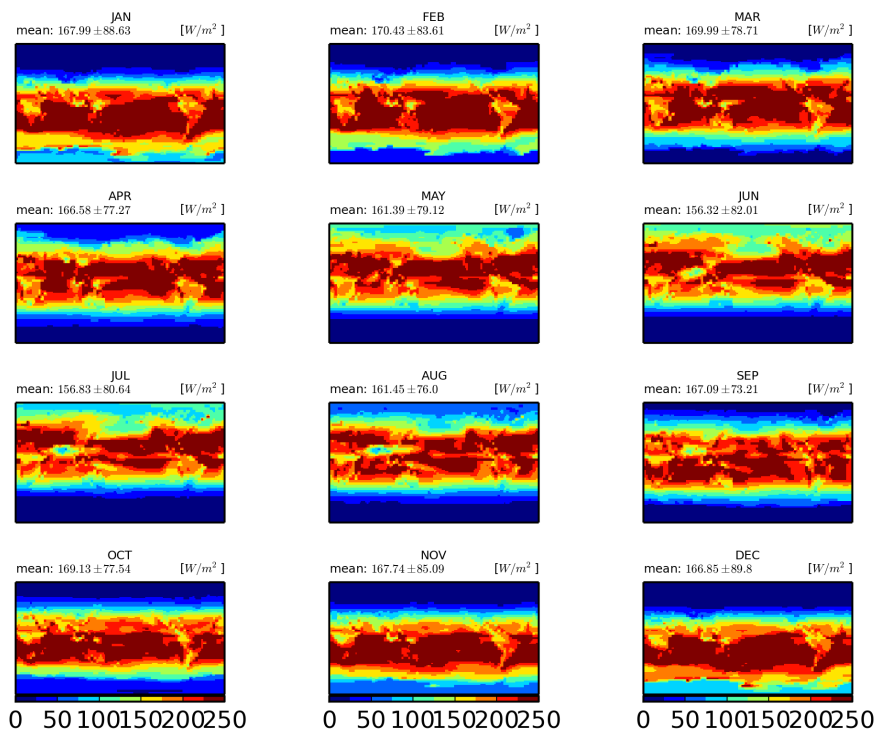


Figure 158: Monthly mean climatology for inmcm3-0

CMIP3_inmcm3_0-amip surface solar net radiation - SRBV3.0

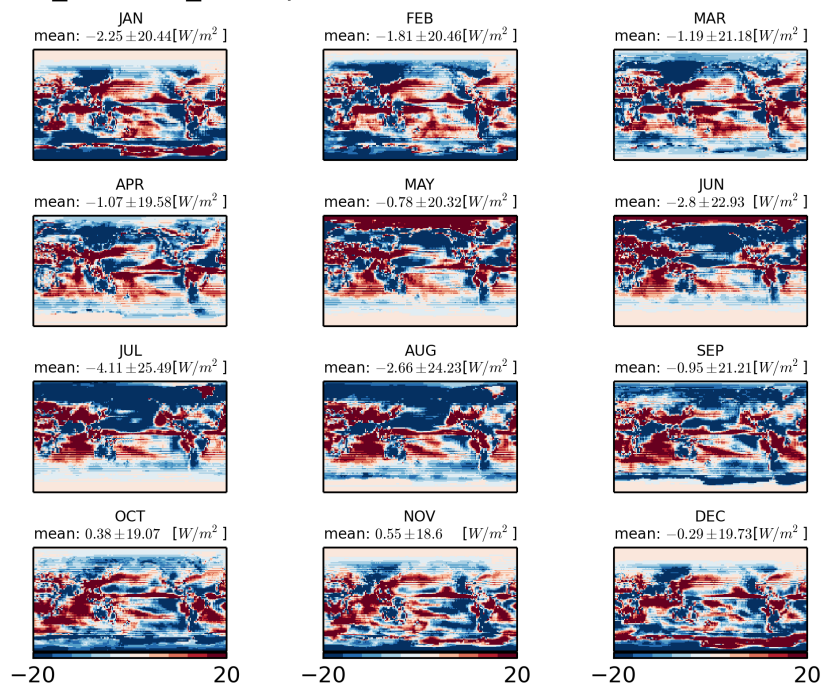


Figure 159: Monthly mean climatology of difference between INMCM3-0 and SRBV3.0

3.3.3 model mean

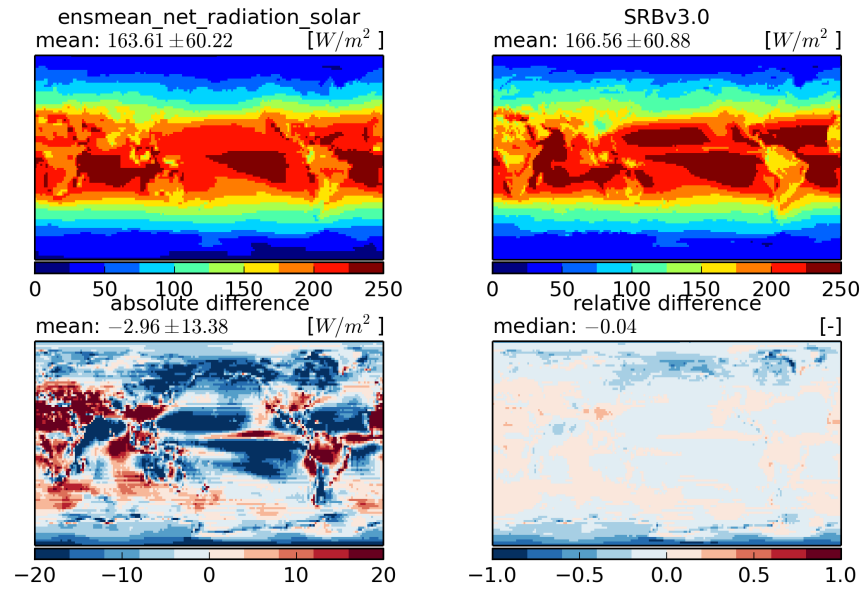


Figure 160: Temporal mean fields (top) and absolute and relative differences (bottom)

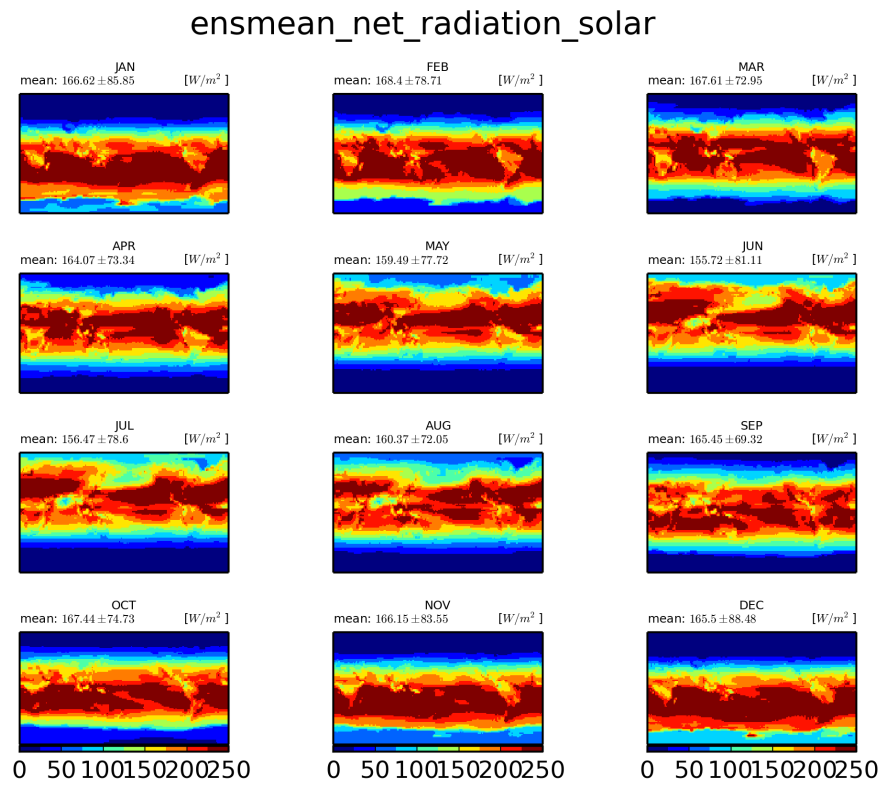


Figure 161: Monthly mean climatology for mean-model

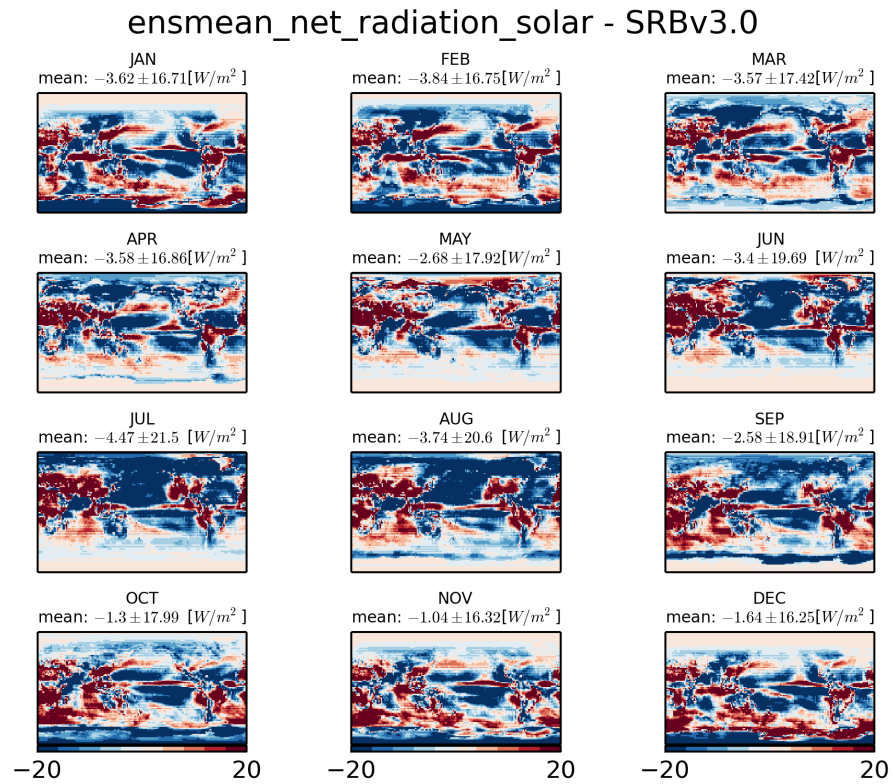


Figure 162: Monthly mean climatology of difference between MEAN-MODEL and SRBV3.0

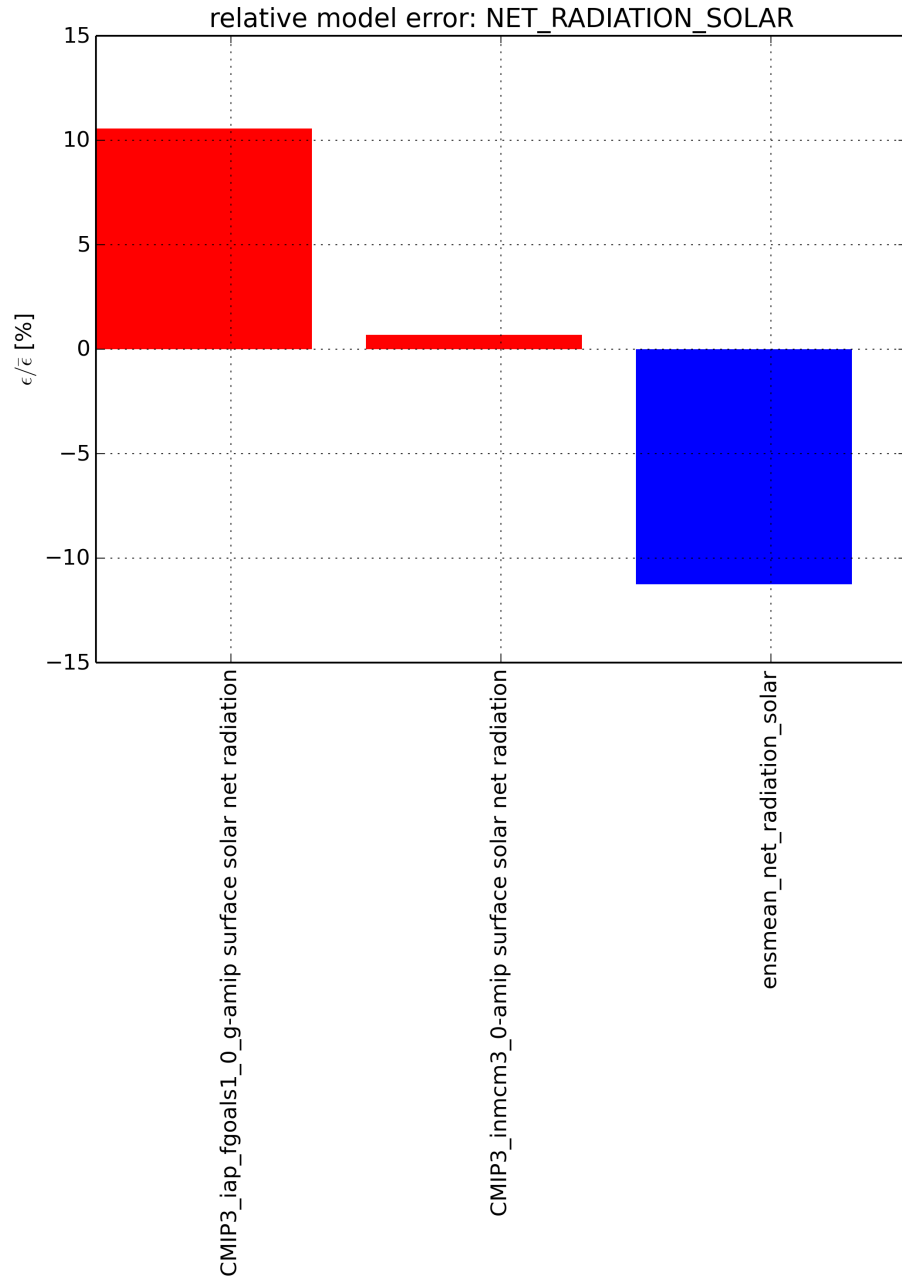


Figure 163: Relative model performance for NET-RADIATION-SOLAR

3 NET SURFACE SOLAR RADIATION FLUX IN AIR

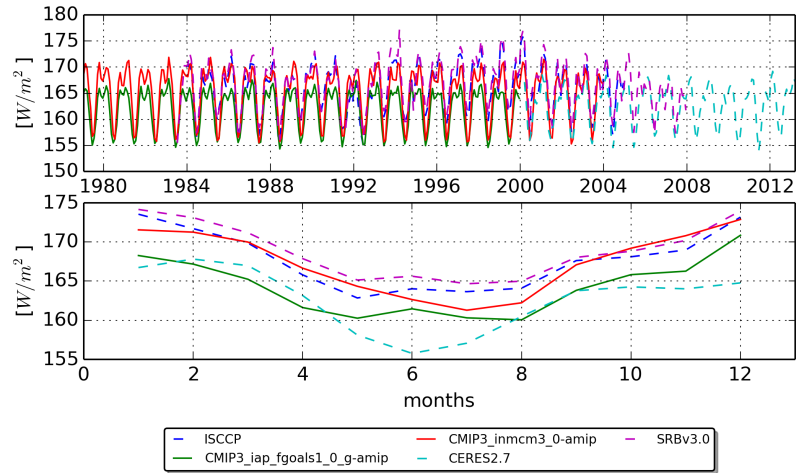


Figure 164: Global means for NET SURFACE SOLAR RADIATION FLUX IN AIR

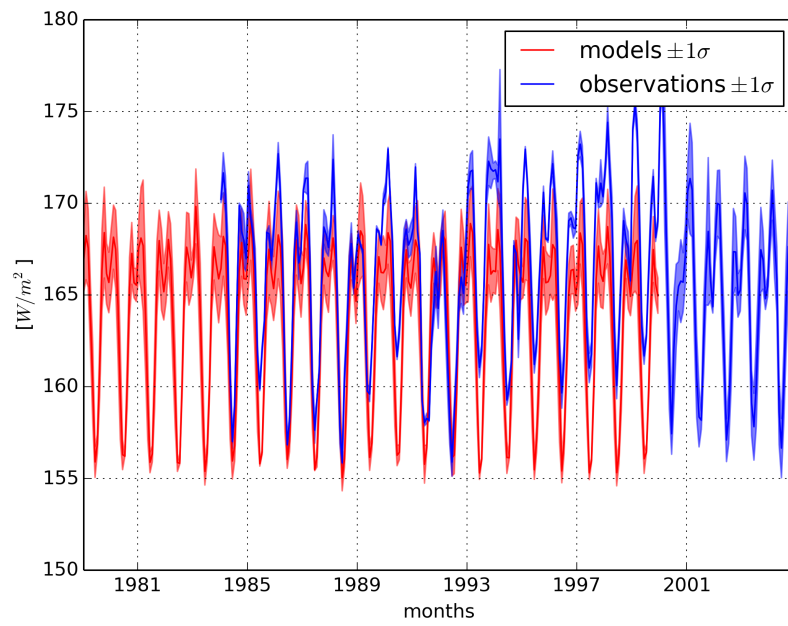


Figure 165: Global means for NET SURFACE SOLAR RADIATION FLUX IN AIR (summary); areas indicate $\pm 1\sigma$ as derived from the ensemble of models or observations

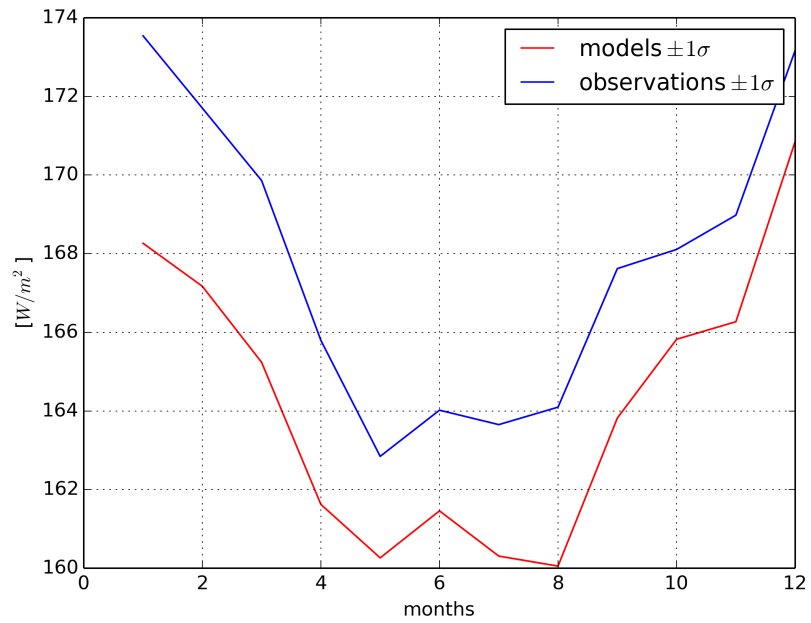


Figure 166: Global means for NET SURFACE SOLAR RADIATION FLUX IN AIR (summary climatology)

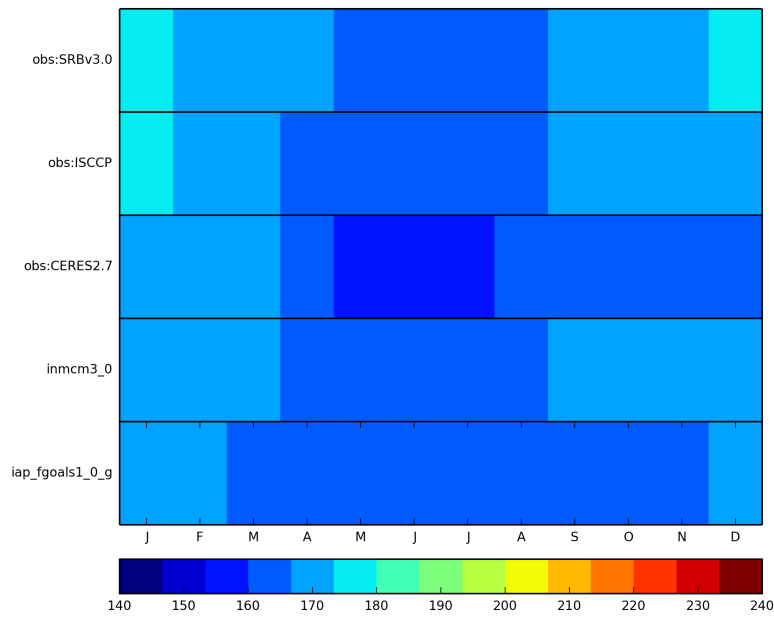


Figure 167: Global means climatology for NET SURFACE SOLAR RADIATION FLUX IN AIR

4 Summary error statistics

4.1 Gleckler metric

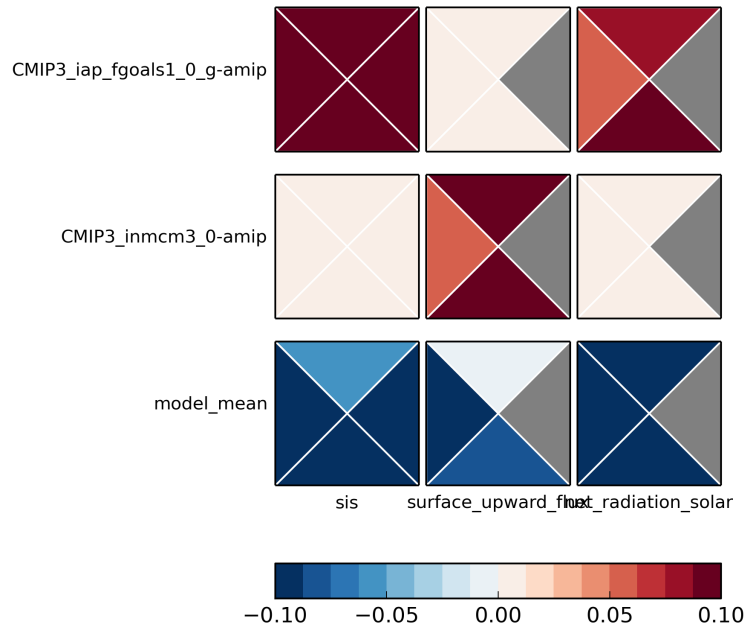
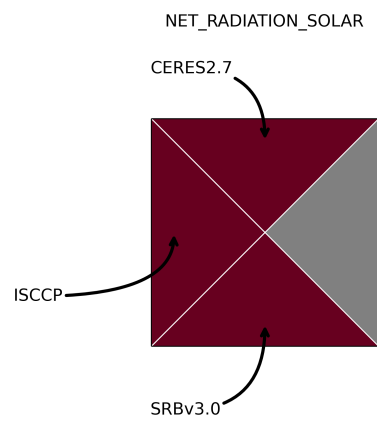
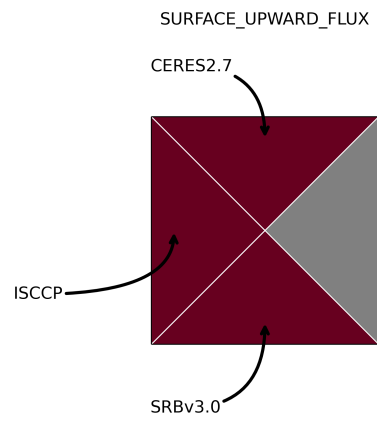
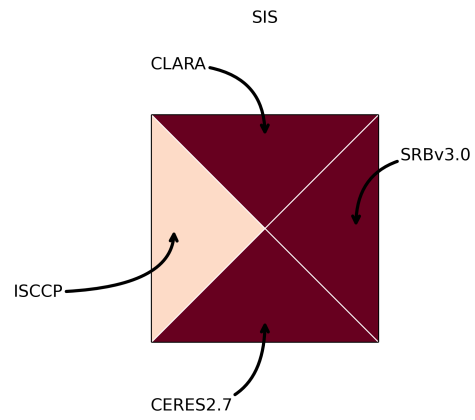


Figure 168: Gleckler et al. (2008) model performance index

4 Summary error statistics



4.2 Model ranking consistency

4.2.1 SIS

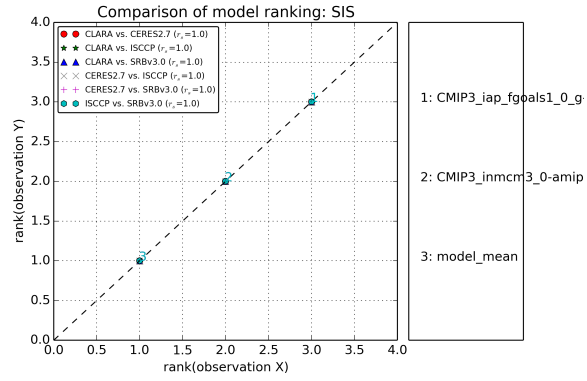


Figure 169: Model RANKING for different observational datasets: SIS

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

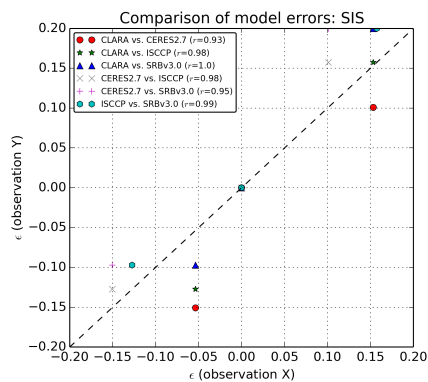


Figure 170: Model ERROR for different observational datasets: SIS

4.2.2 SURFACE UPWARD FLUX

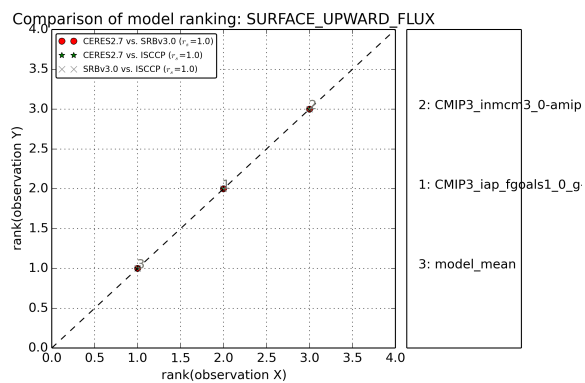


Figure 171: Model RANKING for different observational datasets: SURFACE-UPWARD-FLUX

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

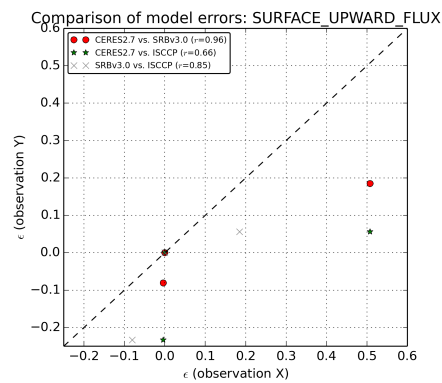


Figure 172: Model ERROR for different observational datasets: SURFACE-UPWARD-FLUX

4.2.3 NET RADIATION SOLAR

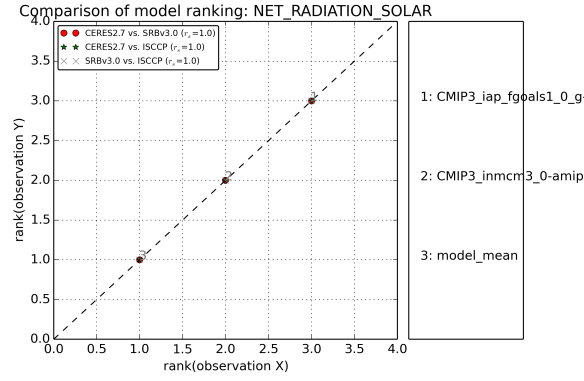


Figure 173: Model RANKING for different observational datasets: NET-RADIATION-SOLAR

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

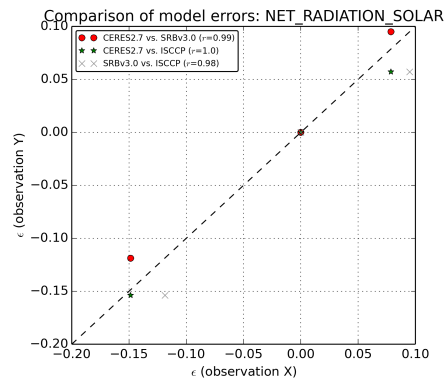


Figure 174: Model ERROR for different observational datasets: NET-RADIATION-SOLAR