

A Comparison of the Outgoing Longwave Radiation (OLR) from the CORe and the CPC Blended OLR (CBO)

2023-09-08

How the Comparison is Conducted

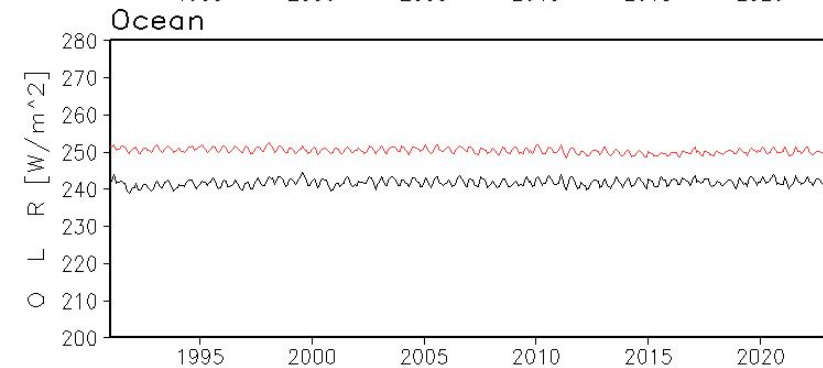
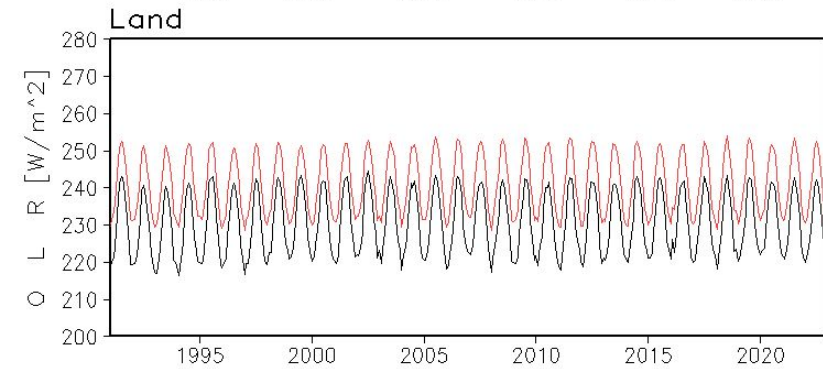
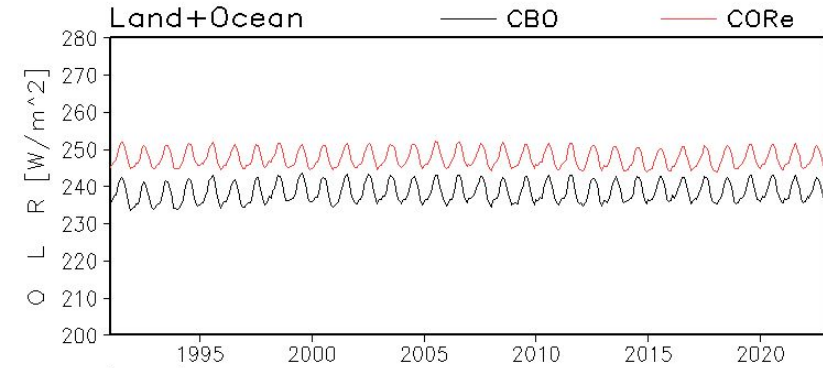
- The new CPC observation based OLR data set, called CPC Blended OLR (CBO) are aggregated spatially from its native grid of 0.25° lat/lon to the CORE Gaussian grid of 512×256 ;
- Daily, pentad, and monthly fields of global OLR from the CORE and the CBO are compared to examine how 1991-2020 30-year climatology and anomalies are represented;
- Comparisons are conducted for a 32-year period from January 1991 to December 2022;
- In defining 1991-2020 30-year climatology at a Gaussian grid point, 365-day time series of 30-year mean daily OLR at the point are computed and subjected to a harmonic analysis. The summation of the first 6 harmonics is taken as the daily climatology;

Total OLR

1) Time Series of Global and Tropical Monthly Mean OLR

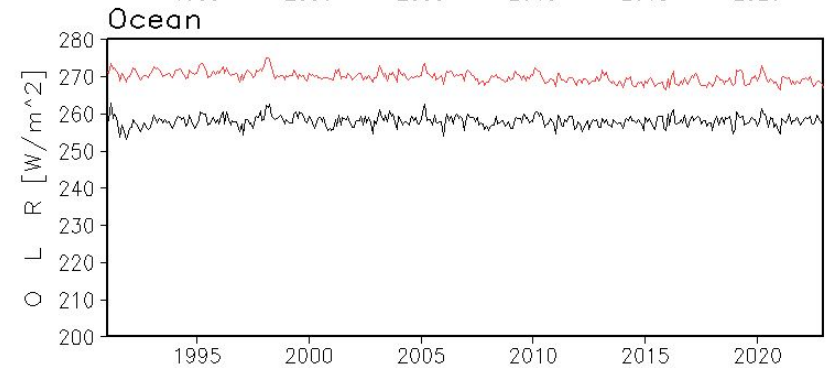
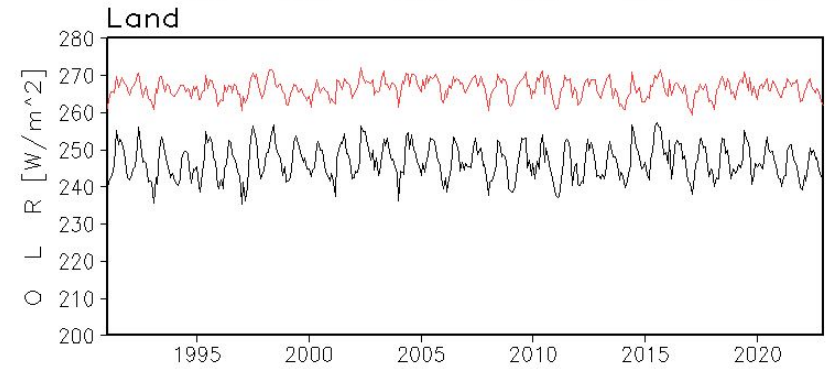
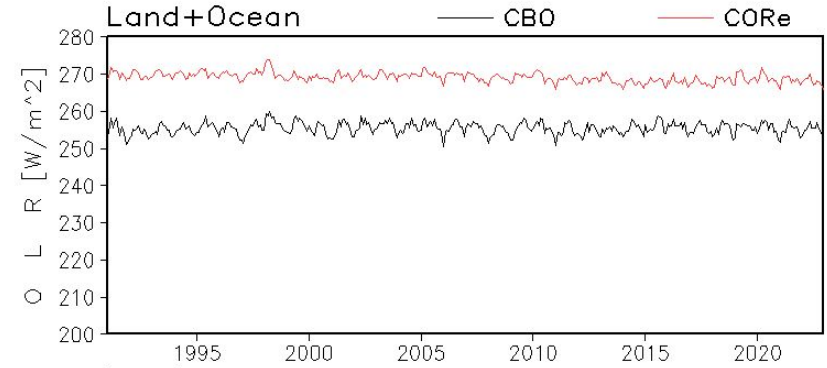
Comparison of CORE and CBO OLR

< 90S - 90N >



Comparison of CORE and CBO OLR

< 20S - 20N >



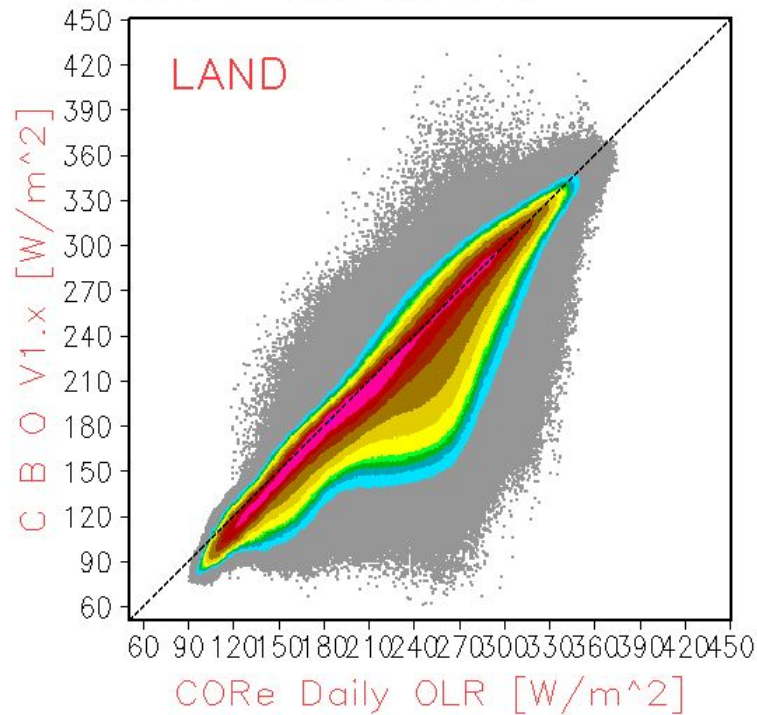
Total OLR

2) Scatter Density Plots of Daily Mean OLR

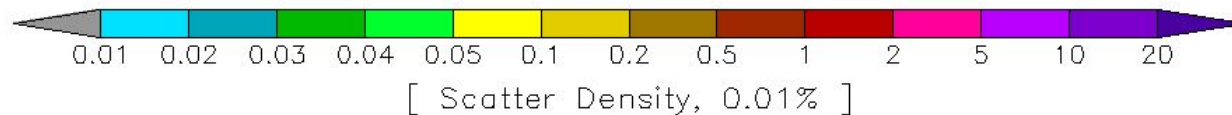
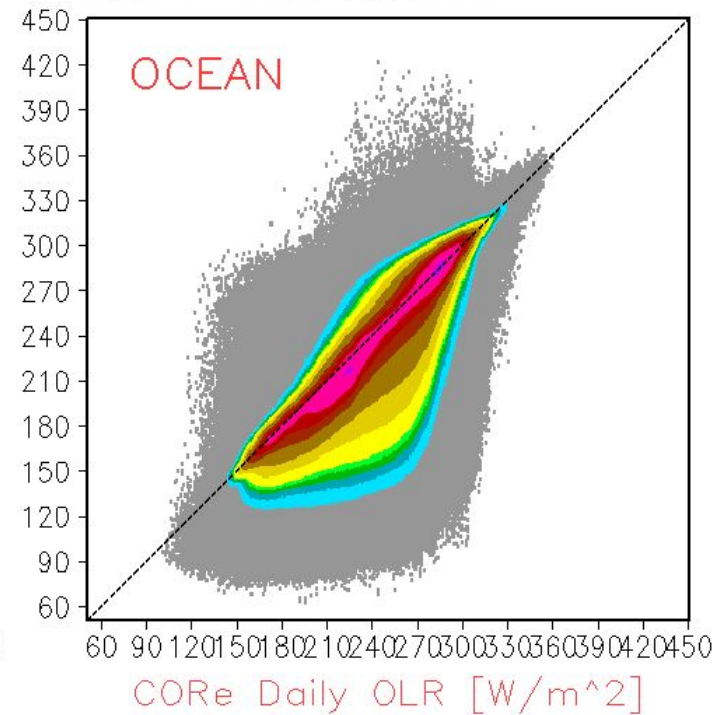
Comparison of CORE Daily OLR against CBO V1.x

[Jan.1991 – Dec.2022]

CORR: 0.914
BIAS : +8.0 [W/m²]



CORR: 0.959
BIAS : +8.6 [W/m²]



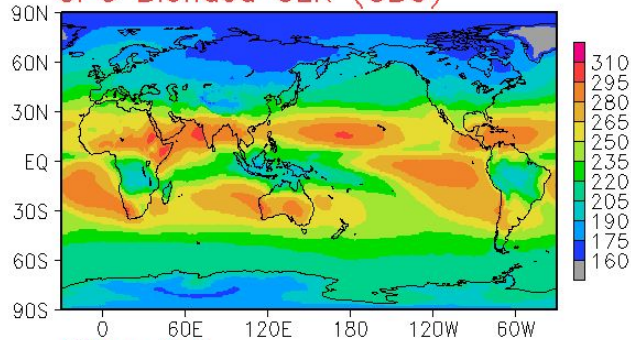
Climatology

1) Monthly Climatology

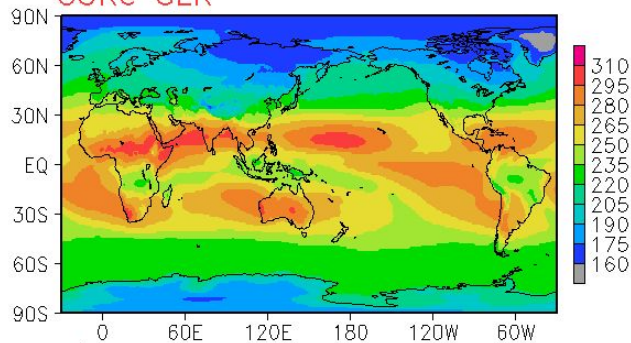
OLR Climatology for January

< 1991 - 2020 >

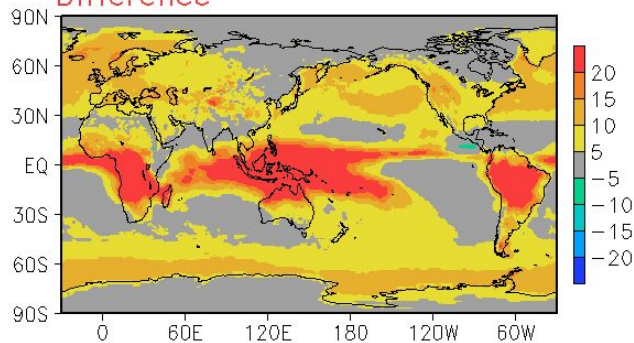
CPC Blended OLR (CBO)



CORe OLR



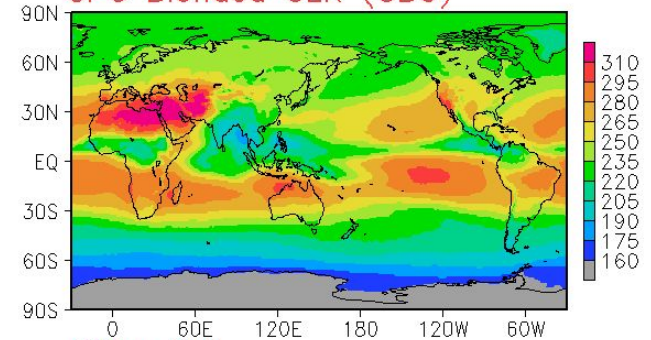
Difference



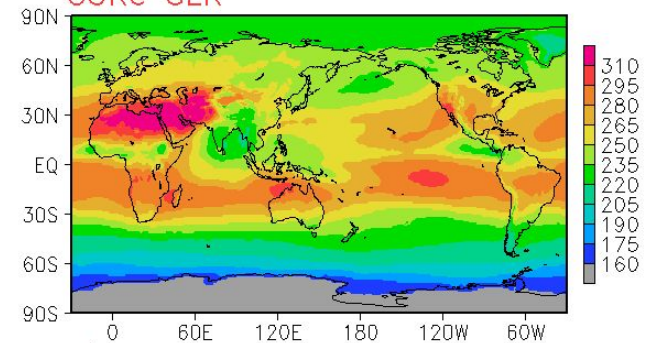
OLR Climatology for July

< 1991 - 2020 >

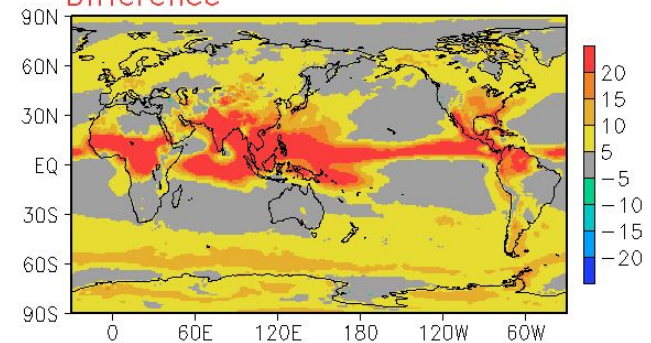
CPC Blended OLR (CBO)



CORe OLR



Difference



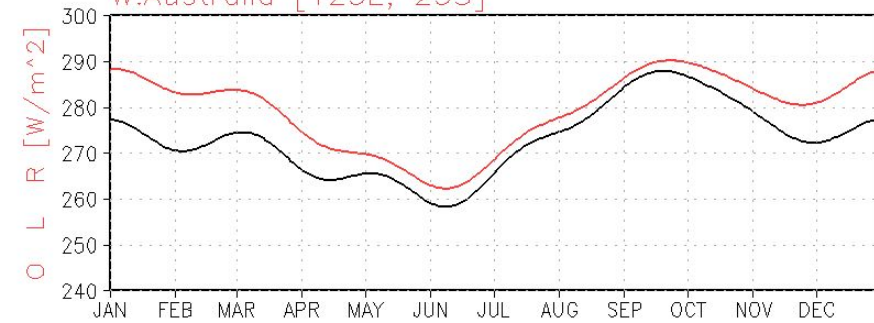
Climatology

2) Seasonal Evolution in Daily Climatology

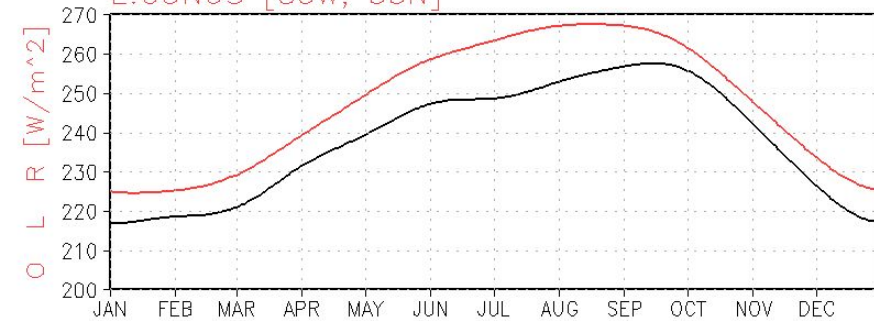
CPC Blended OLR Climatology Version 1.x

— C B O — C O R e

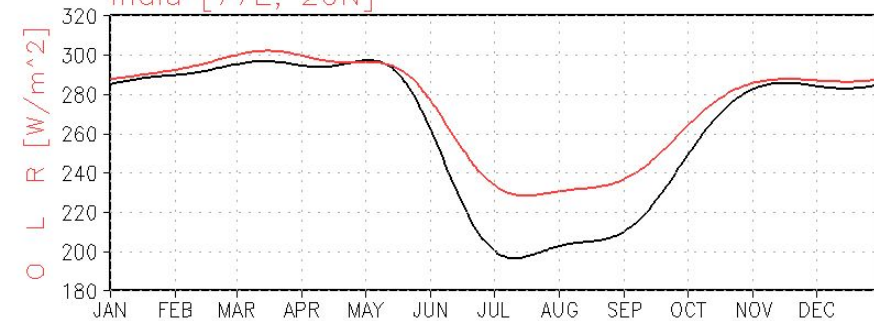
W.Australia [125E; 25S]



E.CONUS [85W; 35N]



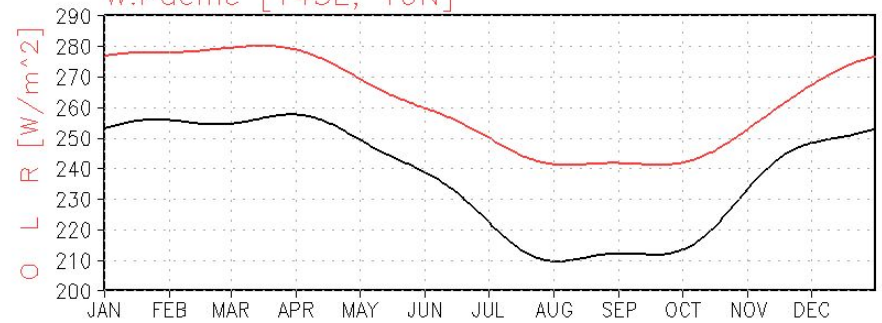
India [77E; 20N]



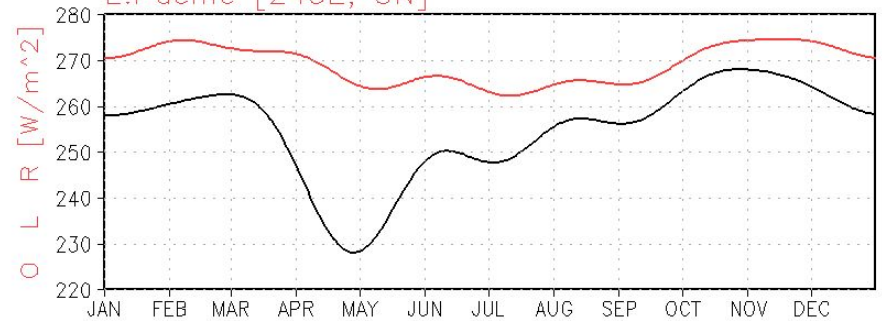
CPC Blended OLR Climatology Version 1.x

— C B O — C O R e

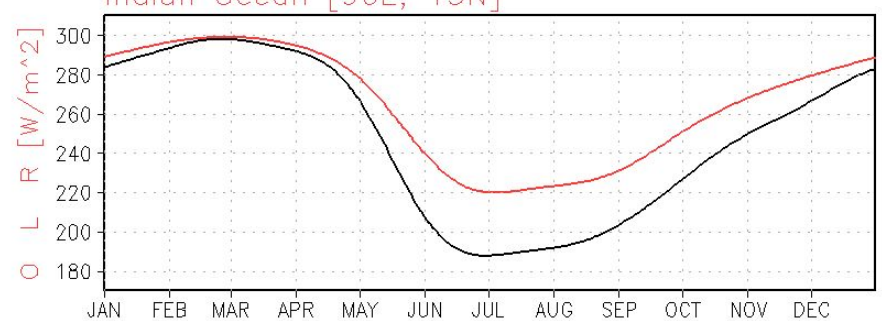
W.Pacific [145E; 10N]



E.Pacific [245E; 5N]



Indian Ocean [90E; 15N]

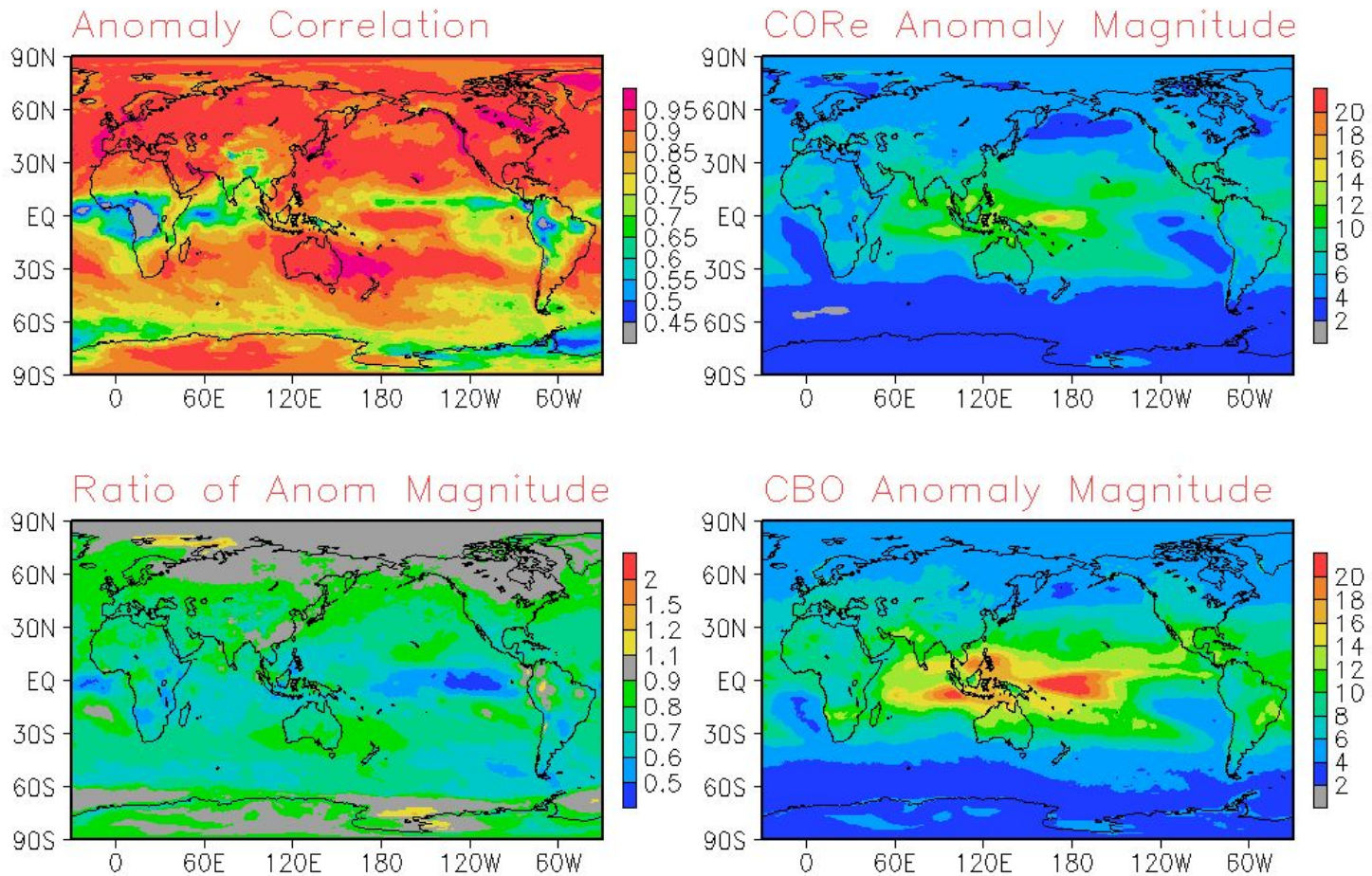


Anomalies

1) Comparison Statistics for Monthly Anomalies

Examinations of CORE Monthly Anomalies

< Jan.1991 – Dec.2022 >



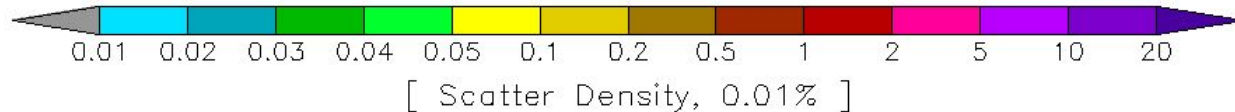
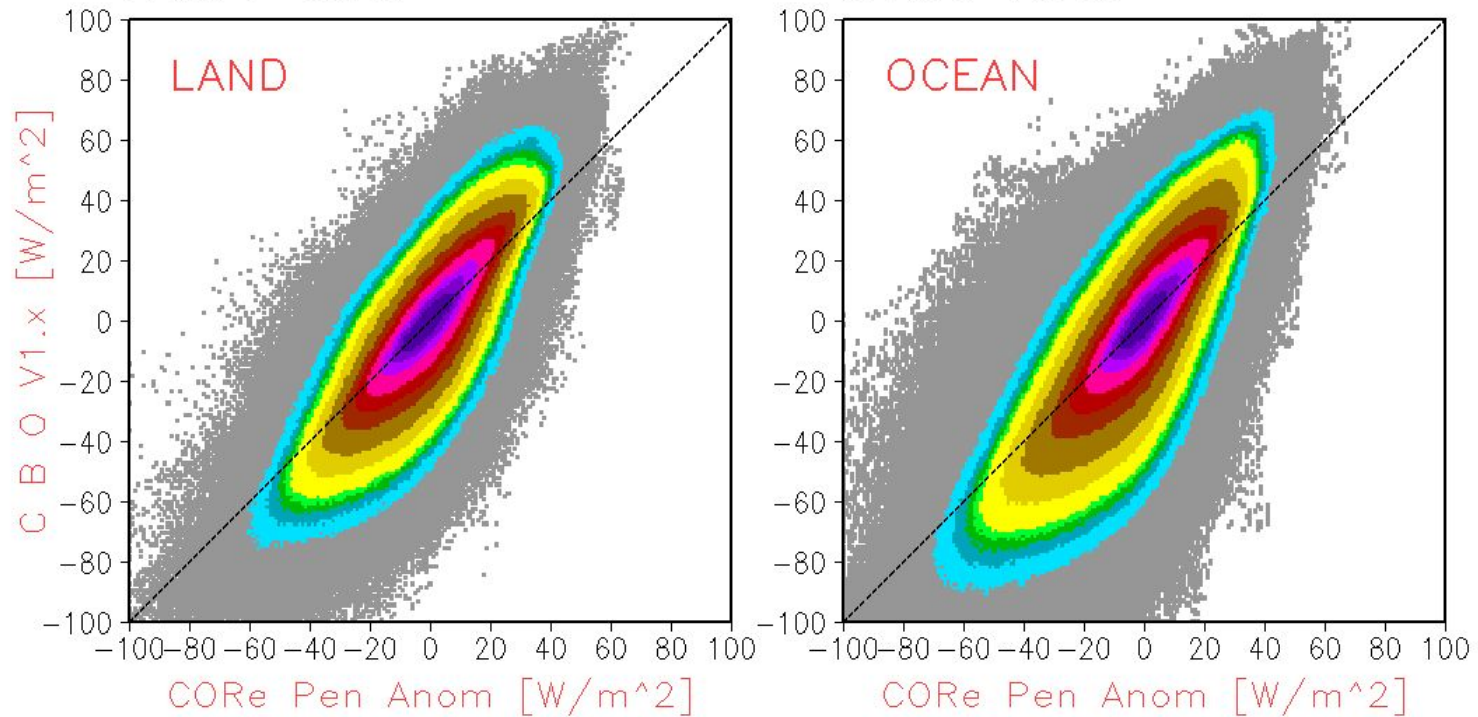
Anomalies

2) Scatter Density Plots of Monthly Anomalies

Comparison of CORe Pentad OLR Anomalies against CBO V1.x
[Jan.1991 – Dec.2022]

CORR : 0.848
RMSE : 7.2 [W/m²]
RATIO : 75.2%

CORR : 0.859
RMSE : 8.3 [W/m²]
RATIO : 70.4%



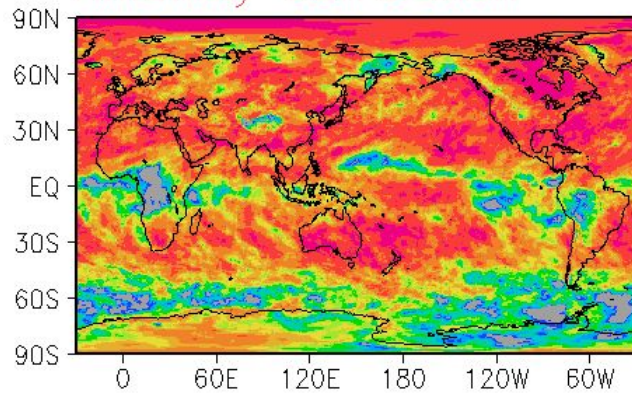
Anomalies

3) Comparison Statistics for Pentad Anomalies

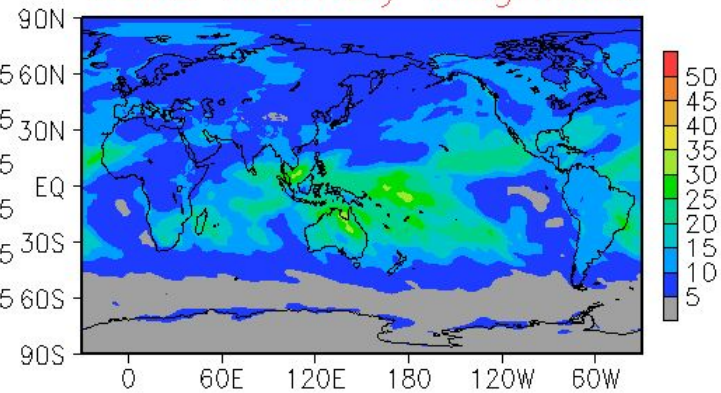
Examinations of CORE Pentad Anomalies

< Jan.1991 – Dec.2022 >

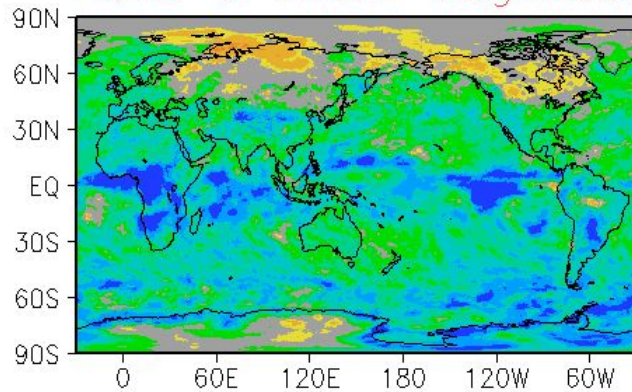
Anomaly Correlation



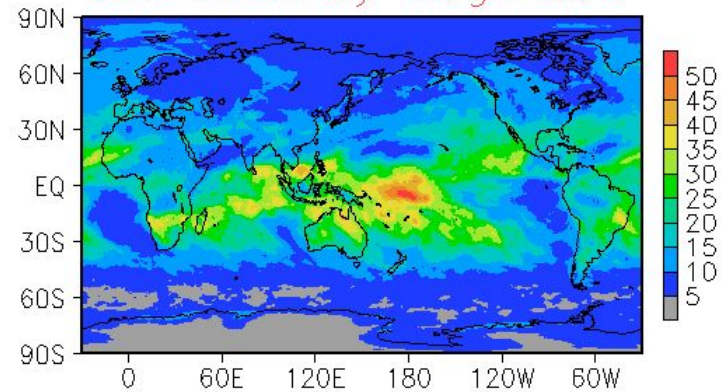
CORE Anomaly Magnitude



Ratio of Anom Magnitude



CBO Anomaly Magnitude



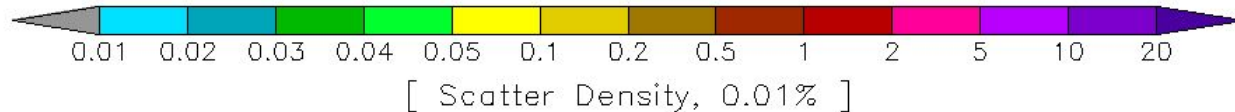
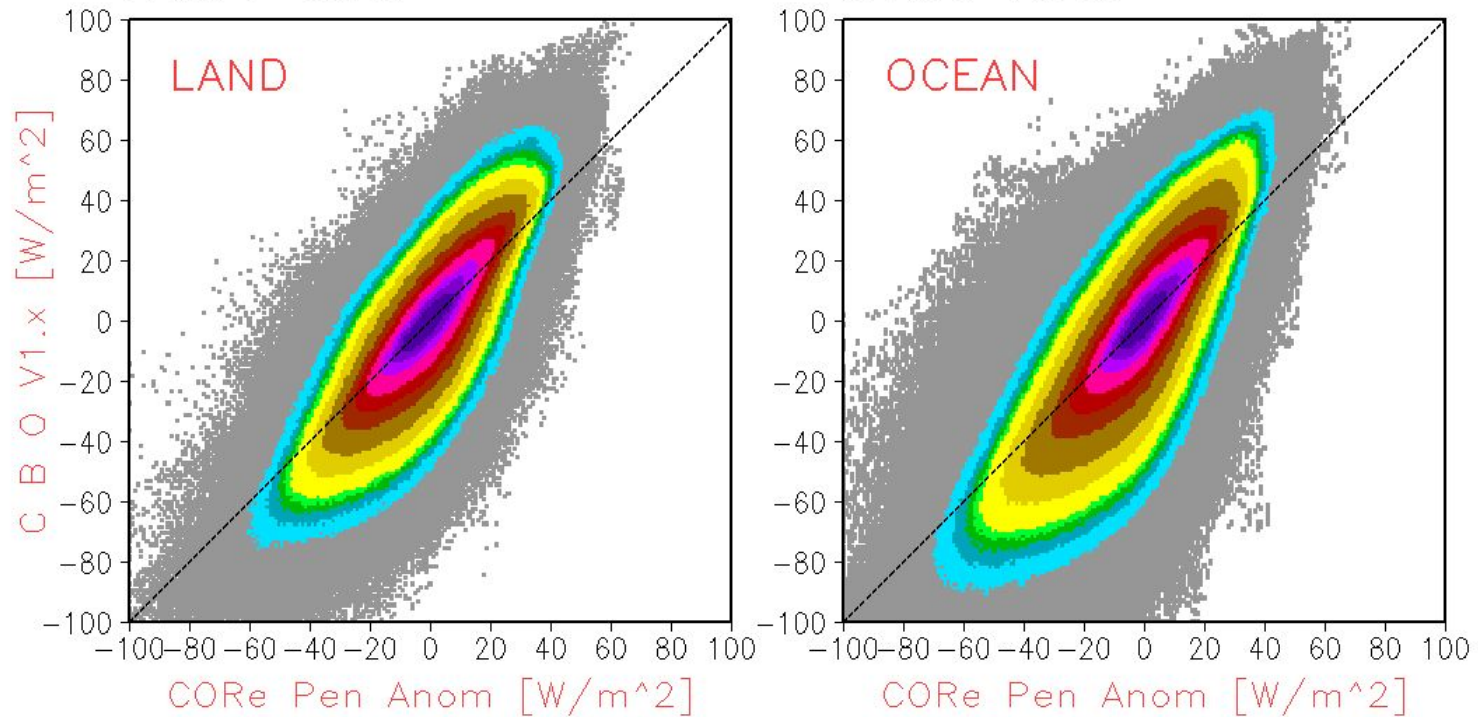
Anomalies

4) Scatter Density Plots of Pentad Anomalies

Comparison of CORe Pentad OLR Anomalies against CBO V1.x
[Jan.1991 – Dec.2022]

CORR : 0.848
RMSE : 7.2 [W/m²]
RATIO : 75.2%

CORR : 0.859
RMSE : 8.3 [W/m²]
RATIO : 70.4%



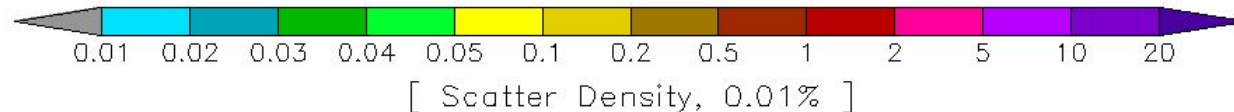
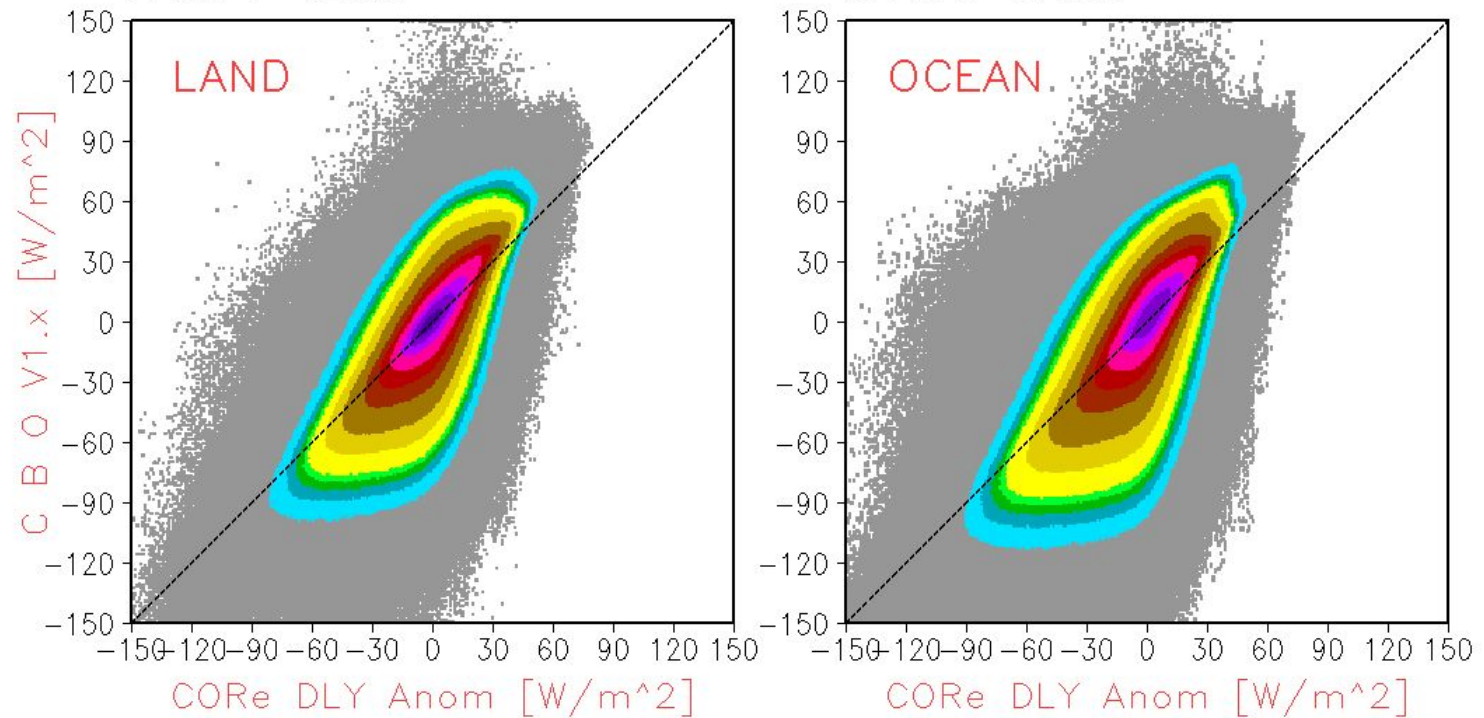
Anomalies

5) Scatter Density Plots of Daily Anomalies

Comparison of CORE Daily OLR Anomalies against CBO V1.x
[Jan.1991 – Dec.2022]

CORR : 0.818
RMSE : 11.1 [W/m²]
RATIO : 68.7%

CORR : 0.843
RMSE : 11.7 [W/m²]
RATIO : 67.5%



Variability

1) ENSO

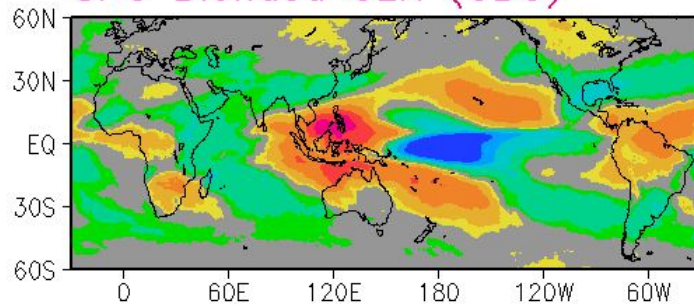
Regression Coefficients to NINO3.4

[1991 - 2022]

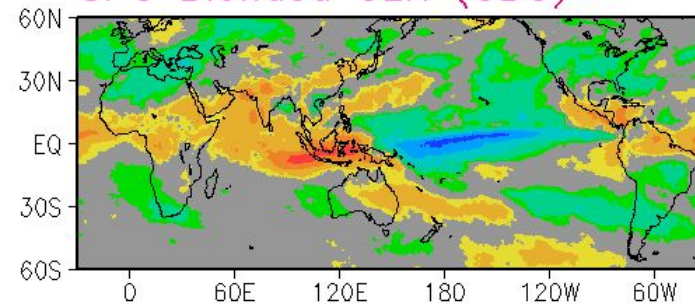
D J F

J J A

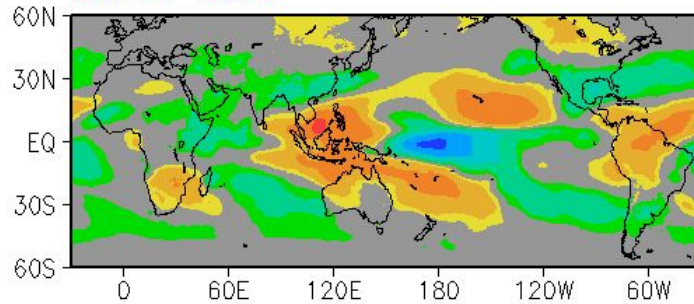
CPC Blended OLR (CBO)



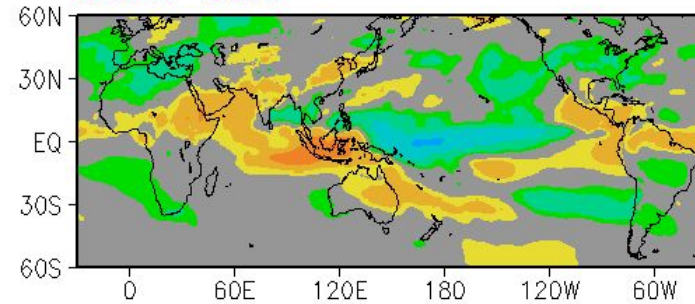
CPC Blended OLR (CBO)



CORe OLR



CORe OLR

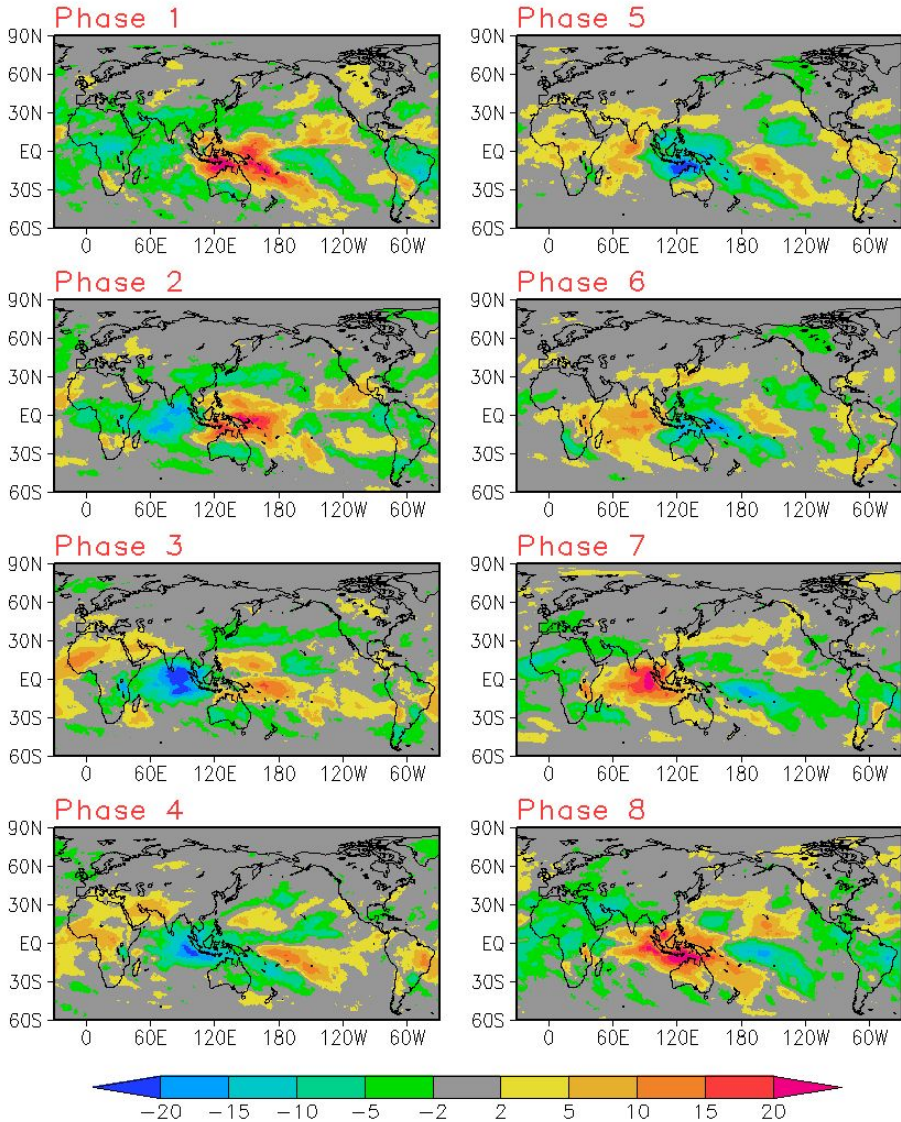


Variability

2) MJO

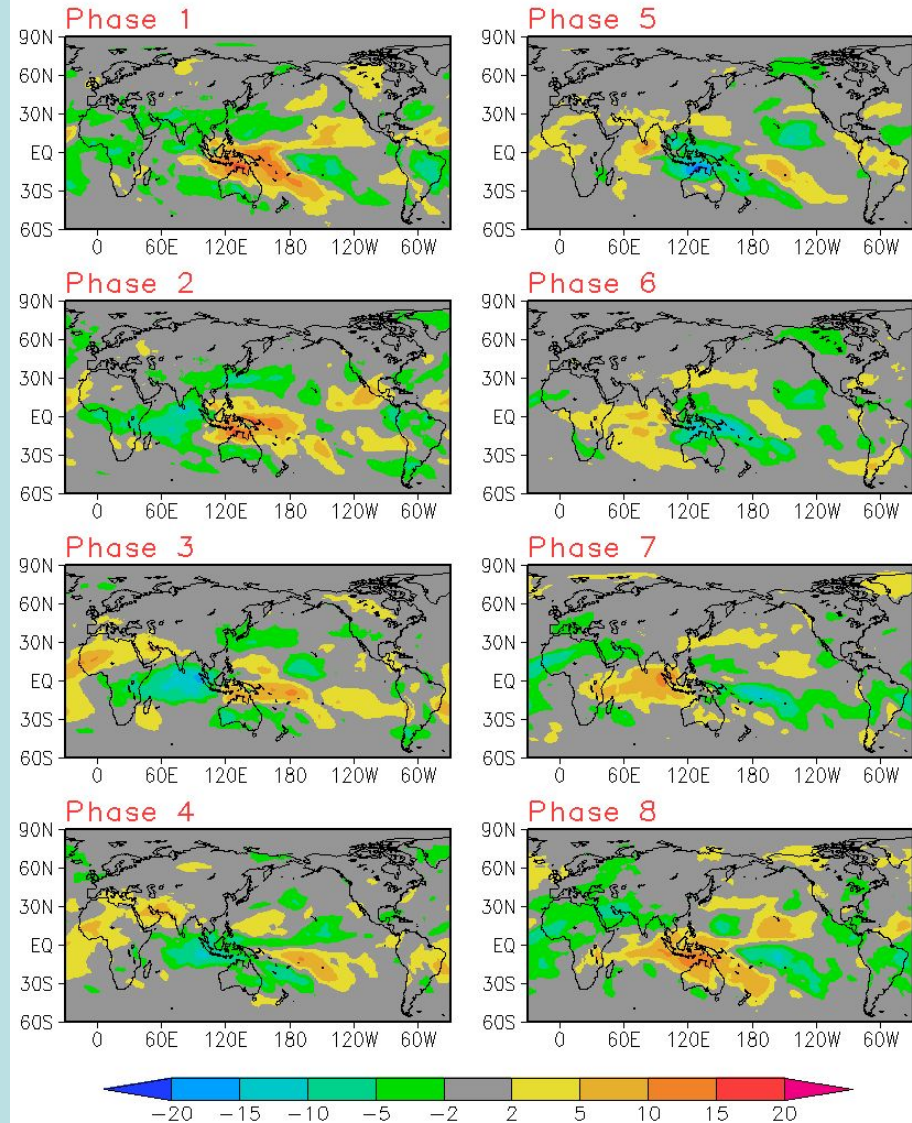
OLR MJO Composite for DJF

[CPC Blended OLR V1.x, 1991 - 2022]



OLR MJO Composite for DJF

[CORE OLR, 1991 - 2022]



Summary

- Overall, OLR in the CORE agrees quite well with that in the observations (CPC Blended OLR, CBO);
- The total OLR in the CORE is warmer than that in CBO, $\sim 8\text{W/m}^2$ in the global mean and $\sim 20\text{W/m}^2$ in the tropical mean;
- Seasonal evolution of OLR in the CBO is well captured by the CORE though the magnitude is under-estimated;
- OLR anomalies are also represented quite well, except over the tropical east Pacific and Africa where anomaly correlation is not high;
- OLR variations associated with ENSO and MJO are also depicted very well, though the magnitude is weaker than that in the observations;