

CPC New OLR Data Set

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Objectives

- Estimation of OLR made from satellite measurements has been widely used for over 40 years;
- The old AVHRR-based OLR data set has to be terminated;
- Our goal is to construct a homogeneous long-term OLR data set, called CPC Blended OLR (CBO)
 - on *0.25°lat/lon, 1.0°lat/lon, 2.5°lat/lon, and CORE Gaussian global grids and in daily, pentad, weekly, and monthly time resolutions;*
 - for a *30-year+* period from 1991 to the present;
 - updated on a quasi real-time basis at a latency of *less than 18 hours;*
 - by combining retrievals and estimation from multiple sources.

Data and Methodologies [1/2]

- Utilize the **NASA CERES broadband OLR retrievals (Level 2) as the backbone** of the new OLR data set covering a period from 2000 to the (delayed) present;
- Take the **NESDIS NUCAPS hyperspectral OLR retrievals (Level 2) to fill in the real-time gaps for recent months** when the broadband OLR is not available;
- Use the **HIRS OLR retrievals (Level 2) to back extend** the new OLR to historical period before 2000;
- Produce **hourly OLR estimation** from geostationary IR window channel TBB (**GEO OLR**) to quantify the diurnal cycle of OLR;

Data and Methodologies [2/2]

- Both the NUCAPS hyperspectral OLR and HIRS OLR retrievals are calibrated against the CERES broadband OLR through matching the Probability Density Function (PDF) using collocated data;
- PDF matching ensures quantitative agreements in both the mean values and the occurrence frequencies for OLR of various intensities;
- PDF matching is performed with consideration of regional differences and seasonal evolution of the correction coefficients.

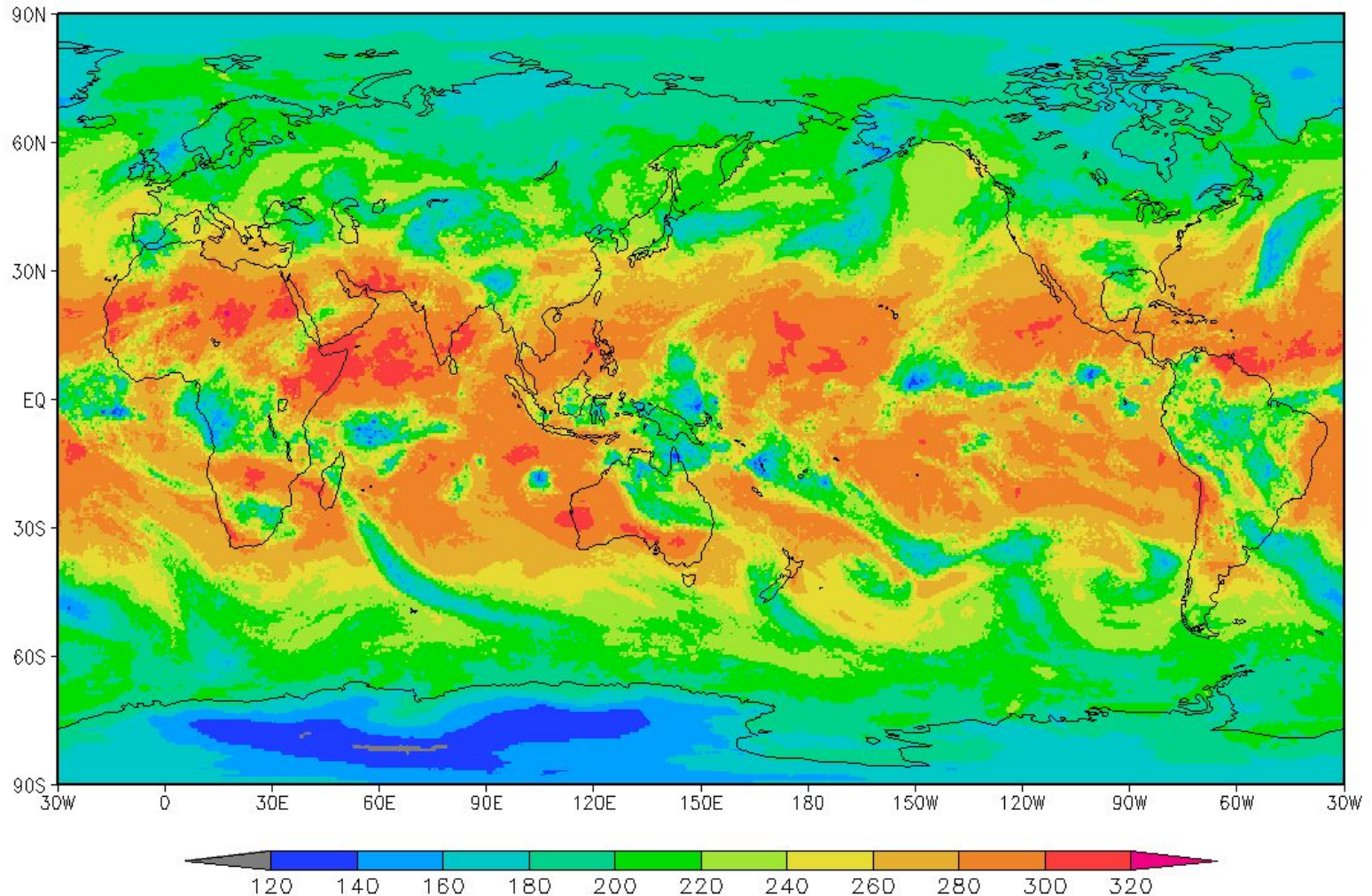
Sample New OLR Products

1) Daily Mean OLR

CPC Blended OLR (CBO) V1 [W/m²]

OLR

0.25deg-DLY 21MAR2024

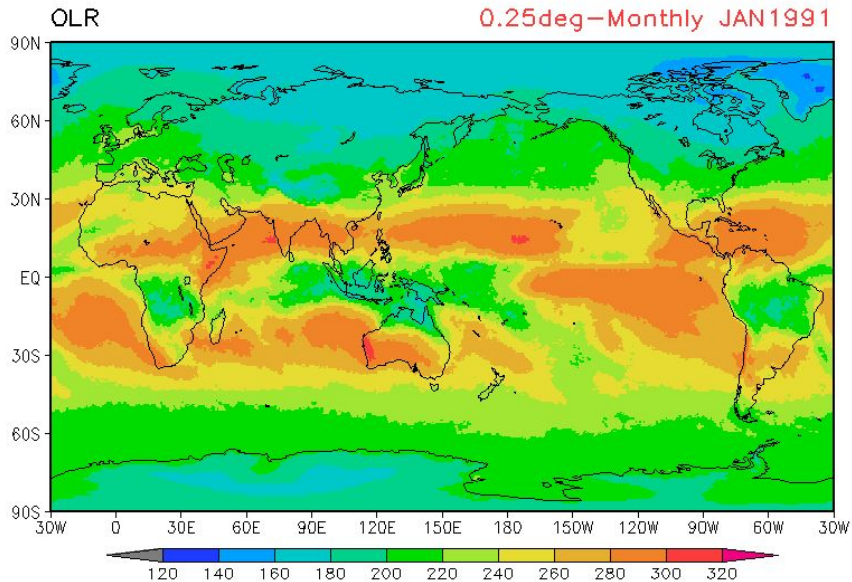


Sample New OLR Products

2) Monthly Mean OLR

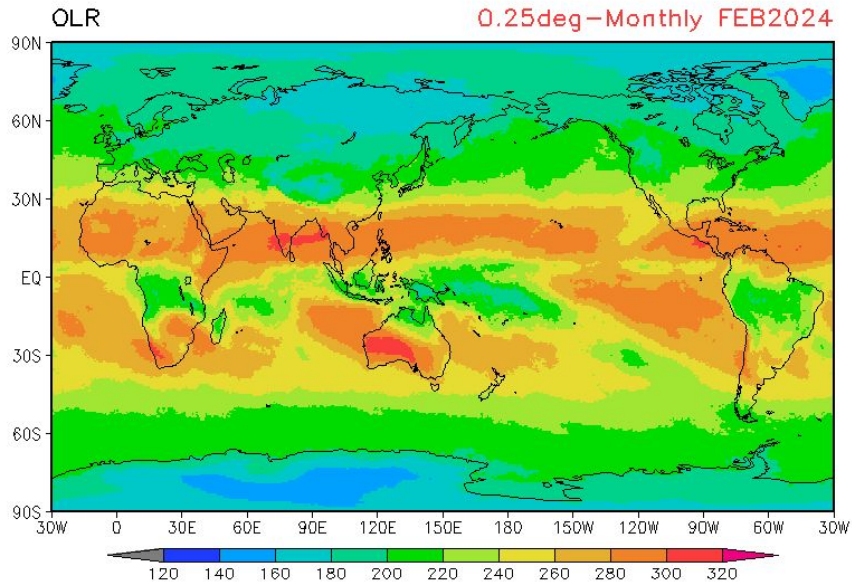
CPC Blended OLR (CBO) V1 [W/m²]

0.25deg-Monthly JAN1991

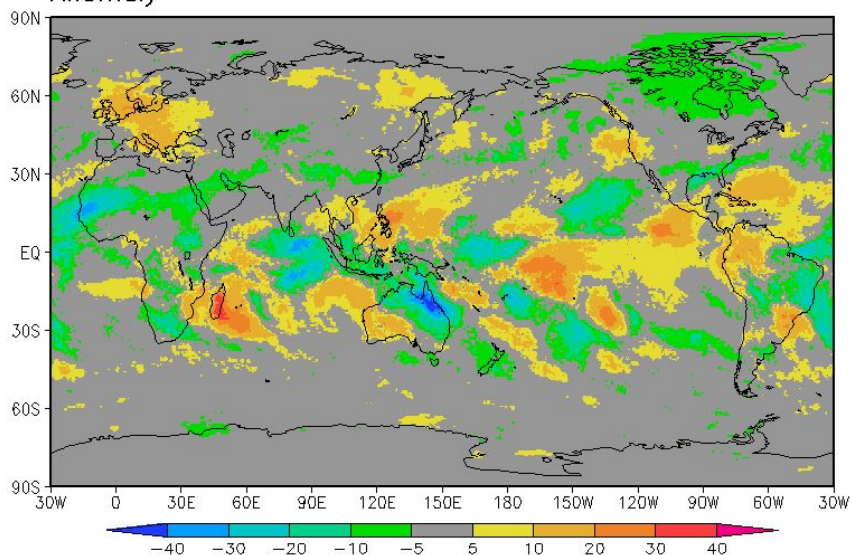


CPC Blended OLR (CBO) V1 [W/m²]

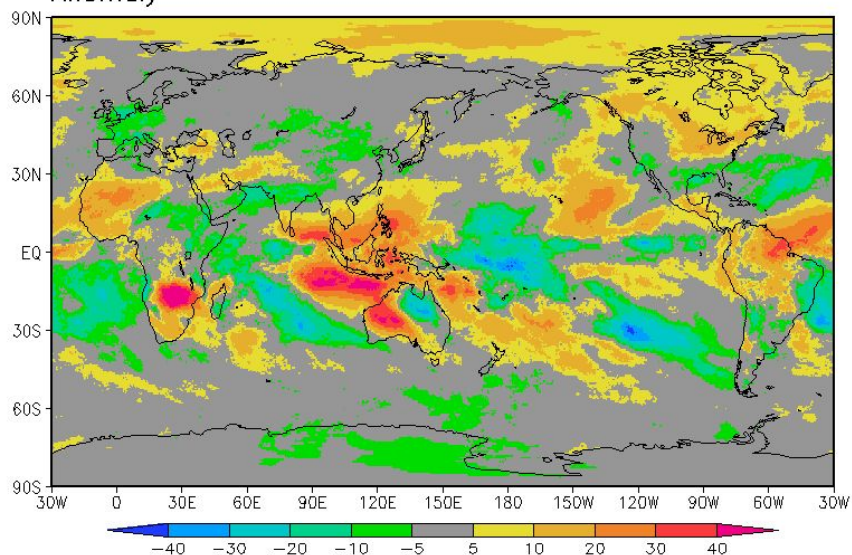
0.25deg-Monthly FEB2024



Anomaly



Anomaly

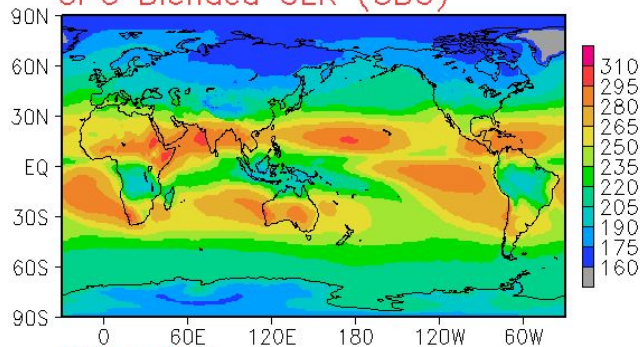


Climatology

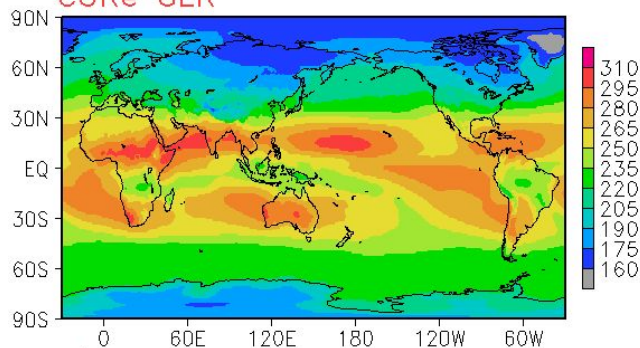
OLR Climatology for January

< 1991 - 2020 >

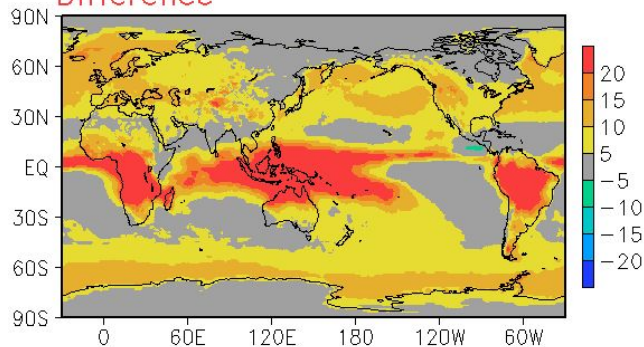
CPC Blended OLR (CBO)



CORe OLR



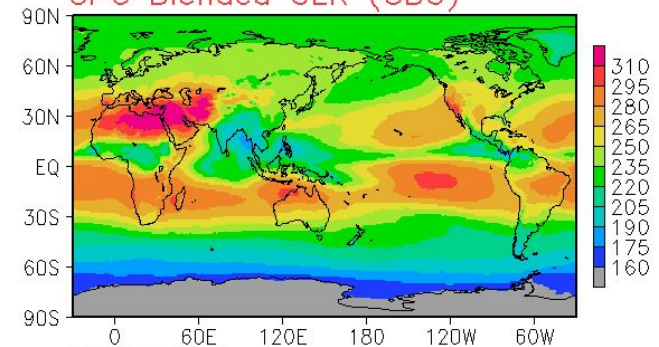
Difference



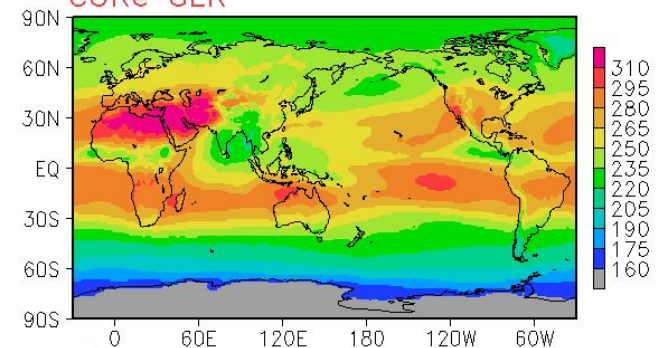
OLR Climatology for July

< 1991 - 2020 >

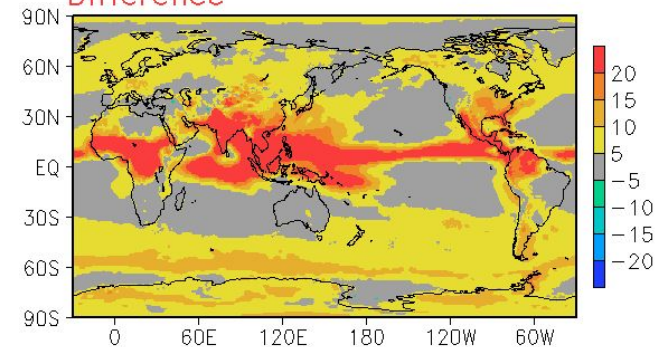
CPC Blended OLR (CBO)



CORe OLR



Difference



Variability

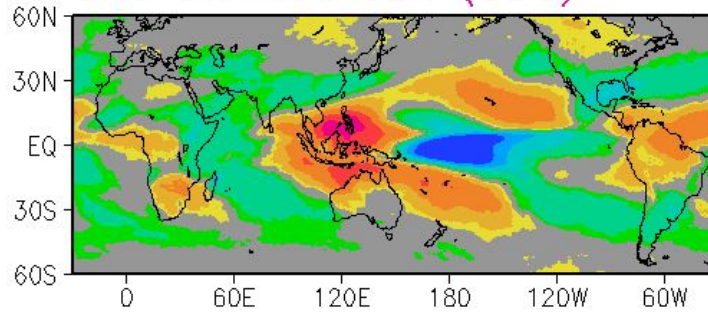
1) ENSO

Regression coefficients to NINO3.4
[1991 - 2022]

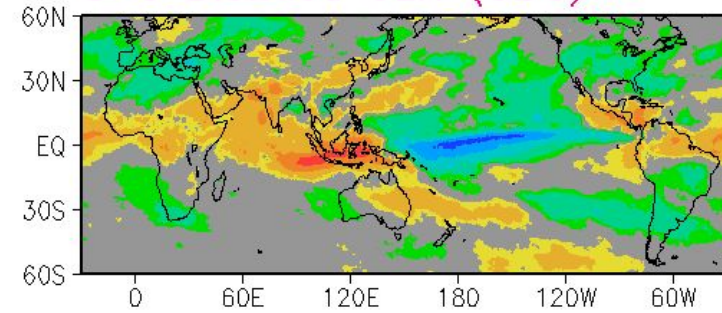
D J F

J J A

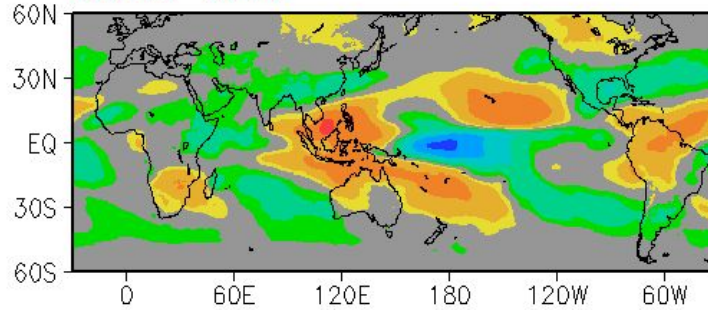
CPC Blended OLR (CBO)



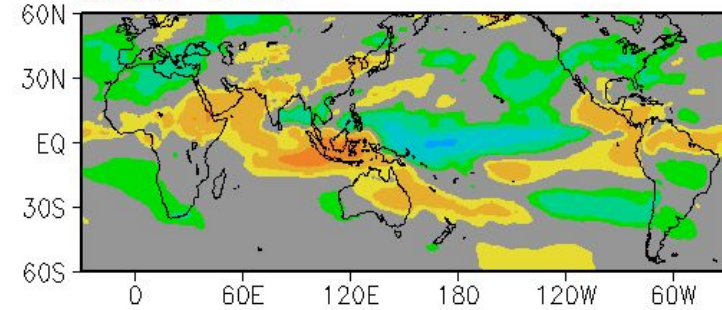
CPC Blended OLR (CBO)



CORe OLR



CORe OLR



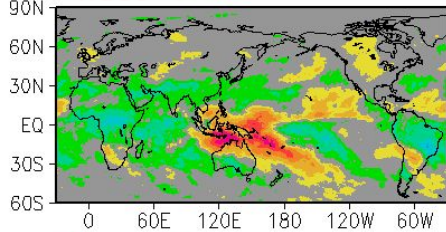
Variability

2) MJO

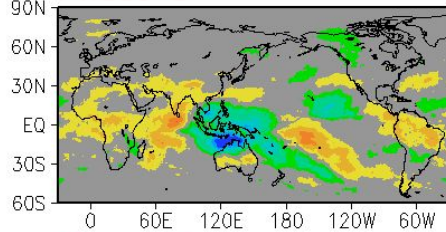
OLR MJO Composite for DJF

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

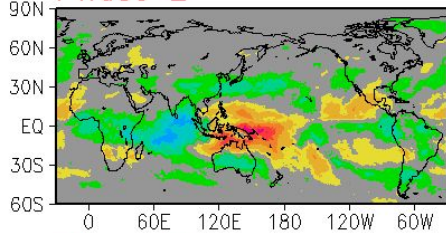
Phase 1



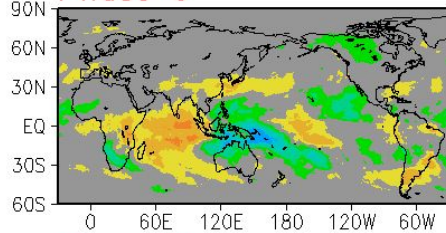
Phase 5



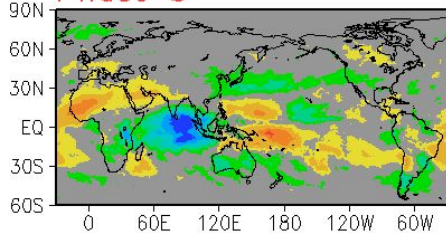
Phase 2



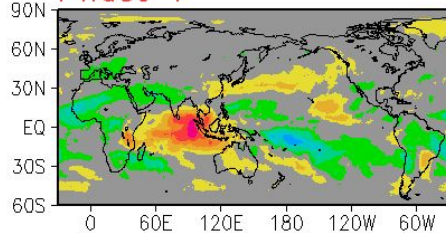
Phase 6



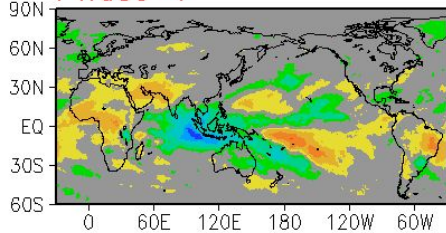
Phase 3



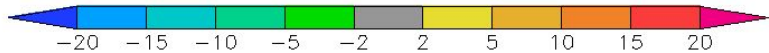
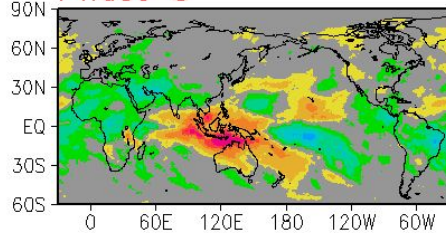
Phase 7



Phase 4



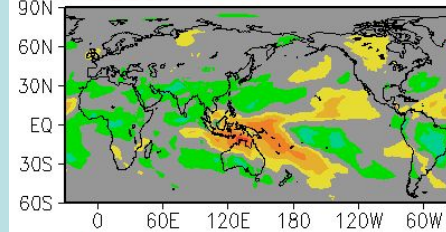
Phase 8



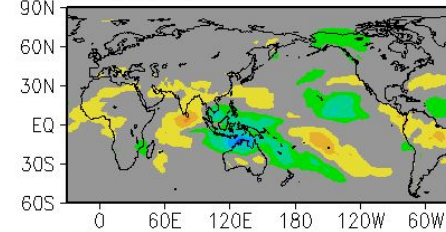
OLR MJO Composite for DJF

[CORE OLR, 1991 - 2022]

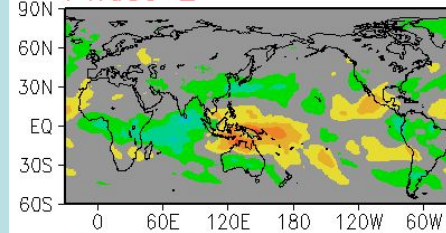
Phase 1



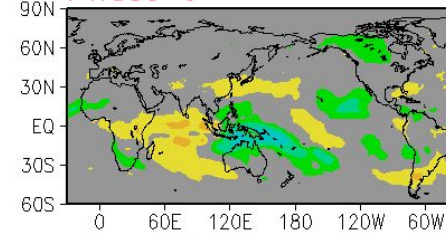
Phase 5



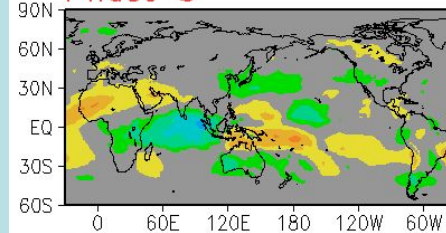
Phase 2



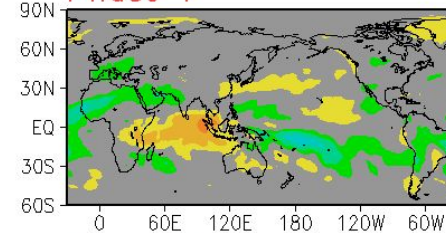
Phase 6



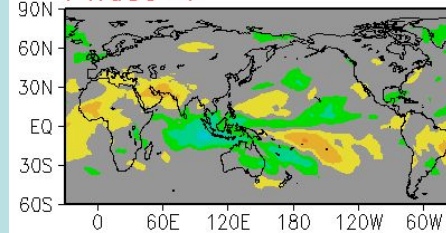
Phase 3



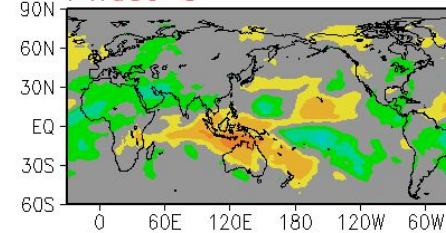
Phase 7



Phase 4



Phase 8



Summary

- A new OLR data set, called CPC Blended OLR (CBO), has been constructed through blending Level 2 retrievals from multiple sources for 1991 to the present and is updated on a quasi real-time basis (available on CPC's ftp site: https://ftp.cpc.ncep.noaa.gov/precip/CBO_V1);
- OLR in the CORE reanalysis agrees quite well with the observation-based CBO in general distribution patterns but presents differences in magnitude (CORE is warmer);
- We're exploring the optimal strategy to extend the CBO back to 1981.

Thank you !