ECMWF Monthly and Seasonal Forecasts

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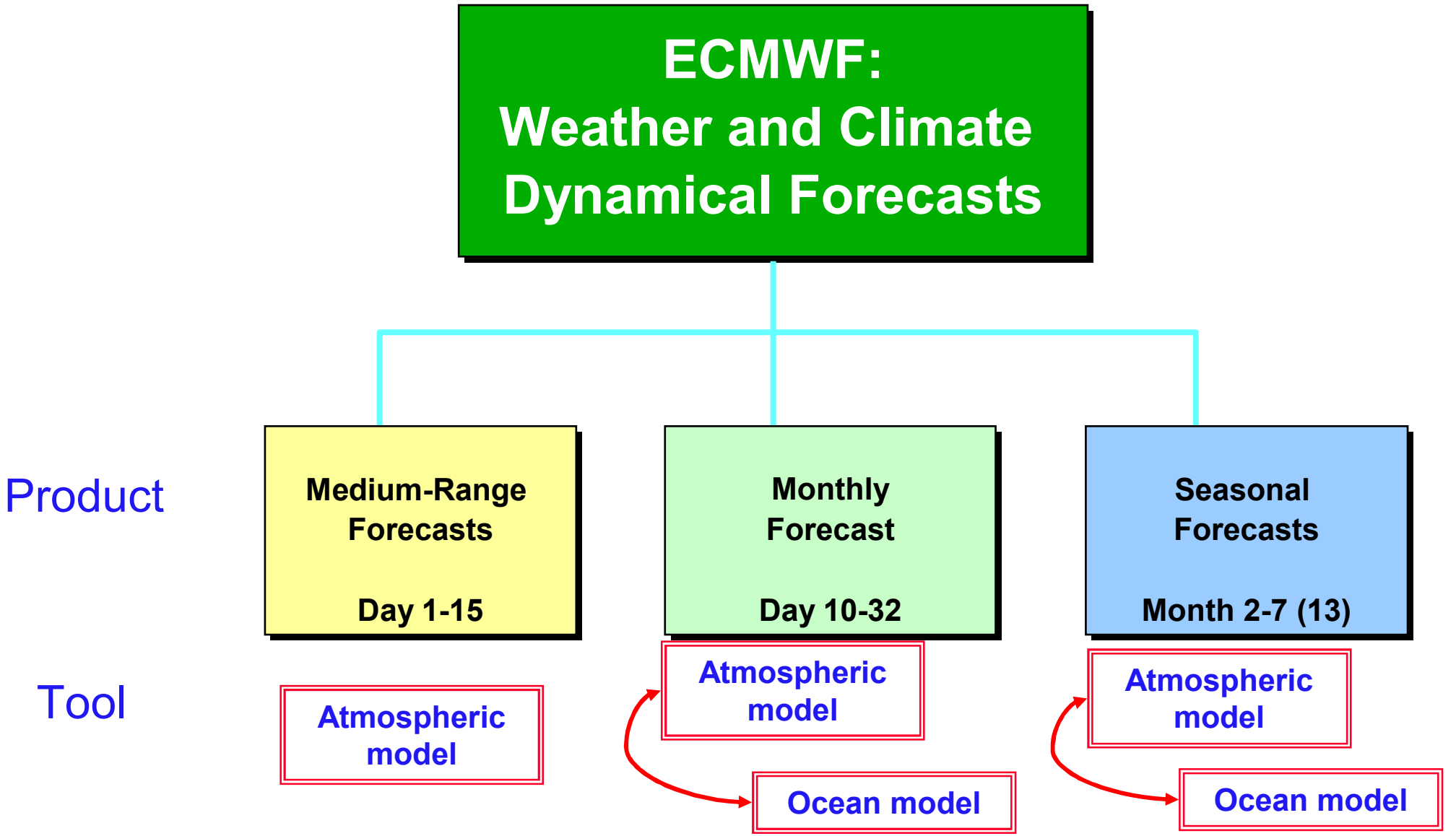
Tim Stockdale, Magdalena Balmaseda

ECMWF

ECMWF: Weather and Climate Dynamical Forecasts



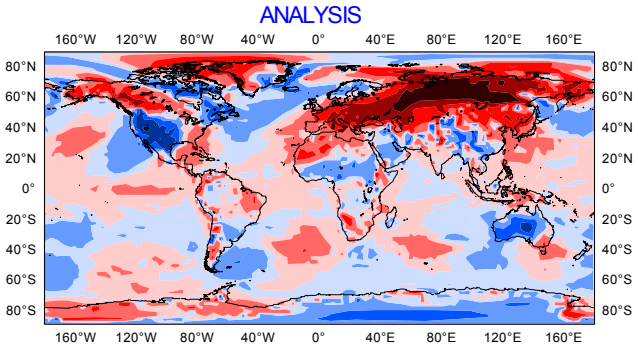
ECMWF

Outline

Products and performance:

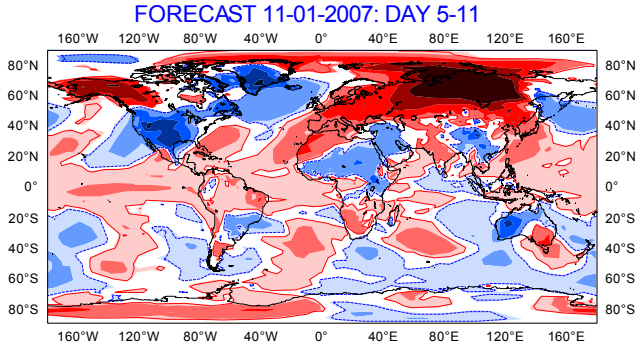
- The current monthly forecasting system
- The next unified system (VAREPS+monthly)
- The seasonal forecasting system
- The EUROSIP multi-model system

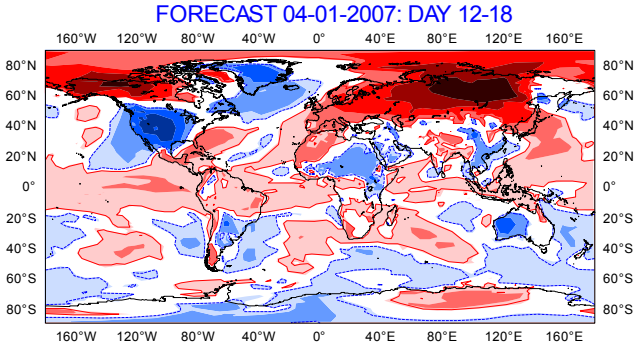
1. Products and performance

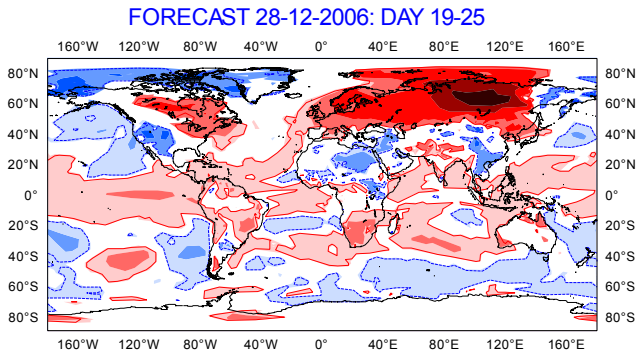


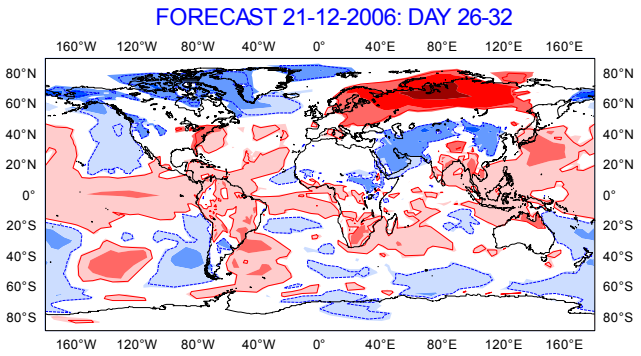
Analysis and ECMWF Monthly Forecasting System
2-meter Temperature anomaly
Verification period: 15-01-2007/TO/21-01-2007

ensemble size = 51 ,climate size = 60
Shaded areas above 90% significance
Solid contour at 95% significance



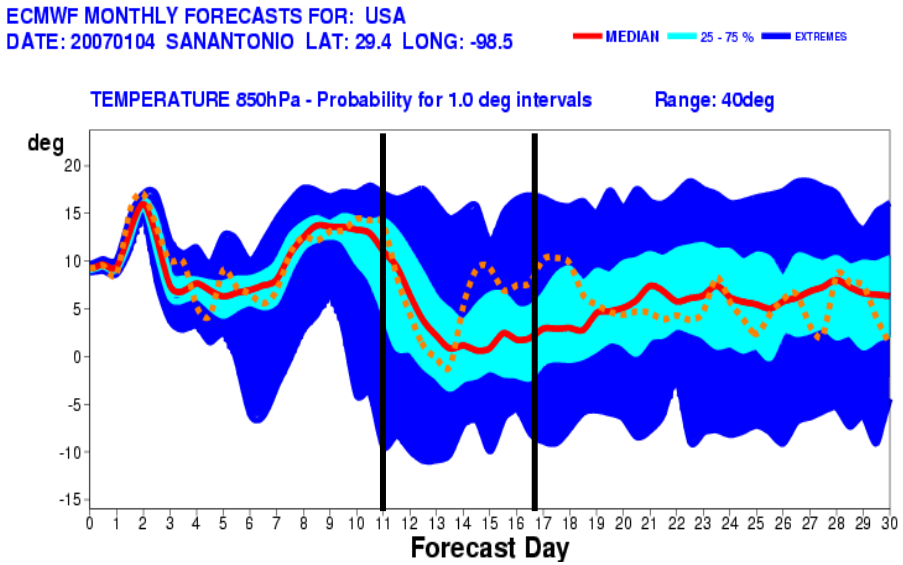




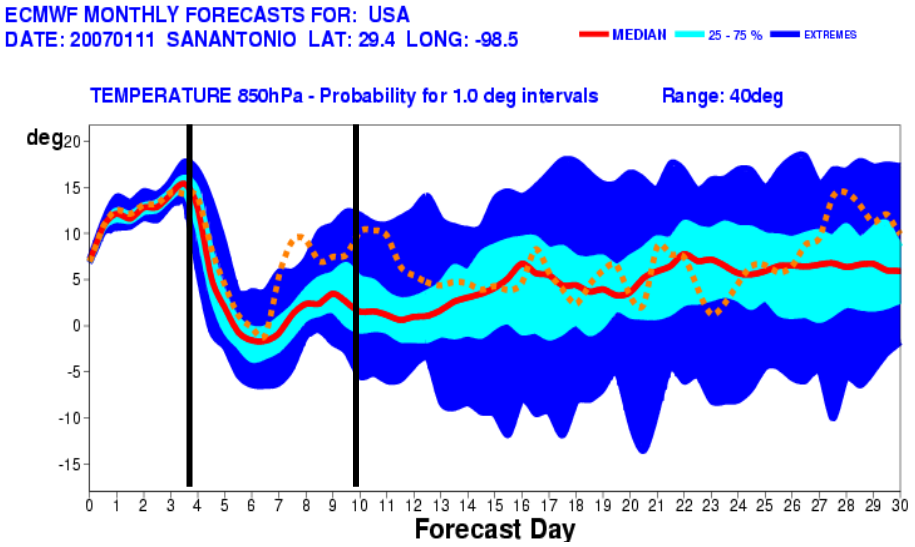


850 hPa Temperature in San Antonio

4 January 2007 monthly forecast

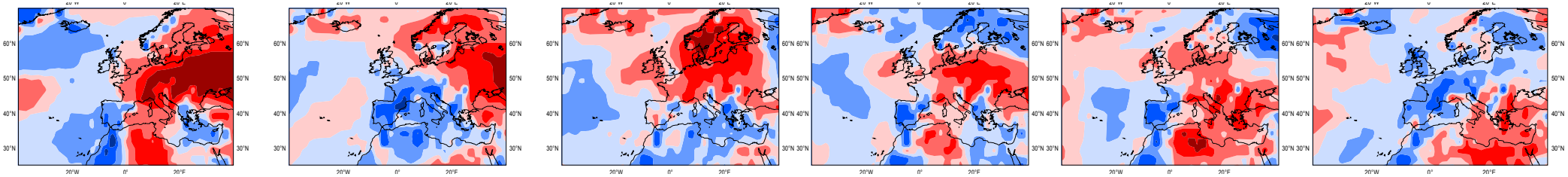


11 January 2007 monthly forecast

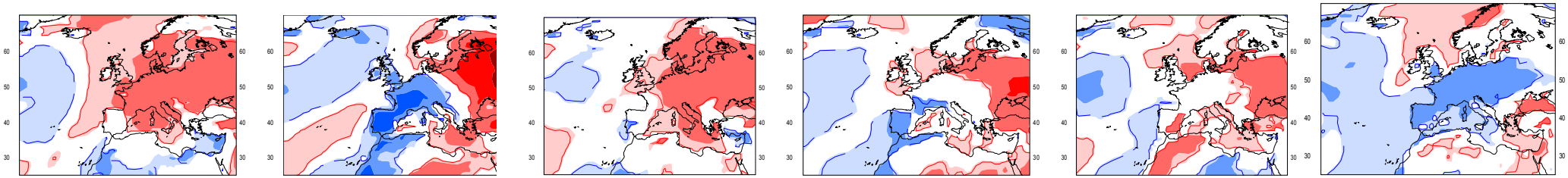


Analysis

21/05-27/05 | 28/05-03/06 | 4/06-10/06 | 11/06-17/06 | 18/06-24/06 | 25/06-01/07



Day 12-18 Monthly Forecast



2m-tm anomalies over EUROPE

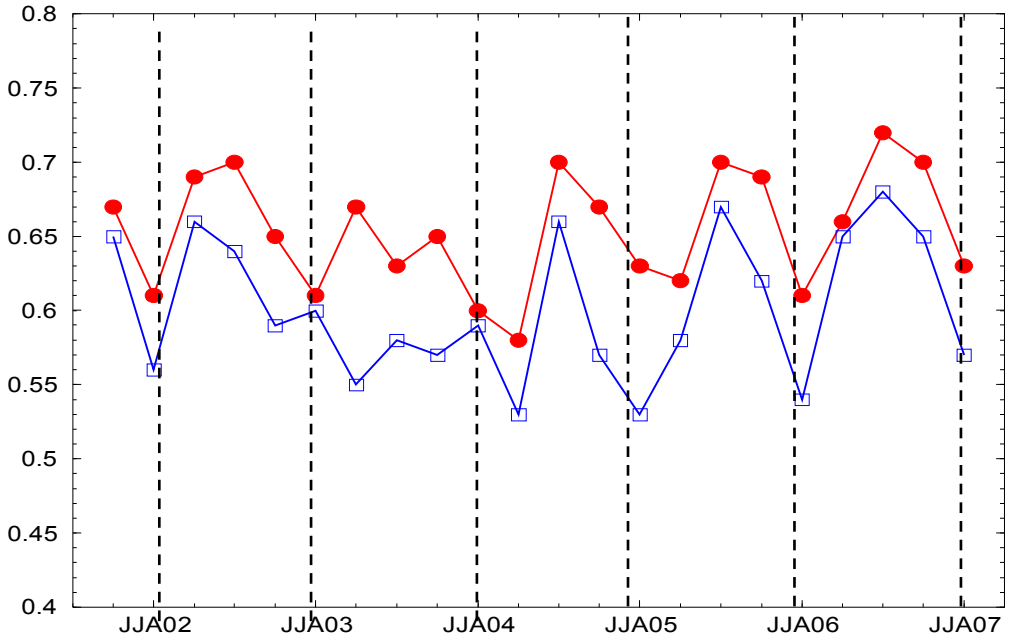
Monthly Forecast: Performance over the Northern Extratropics

ROC area of probability of 2-meter temperature in upper tercile

Monthly Forecast

Persistence of day 5-11

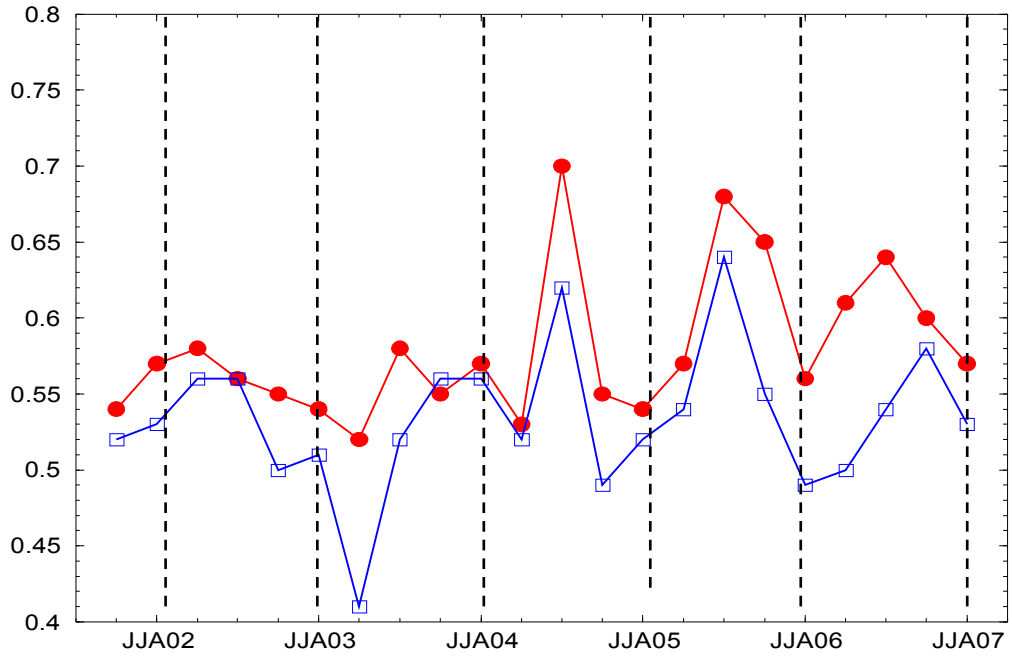
Day 12-18



Monthly Forecast

Persistence of day 5-18

Day 19-32

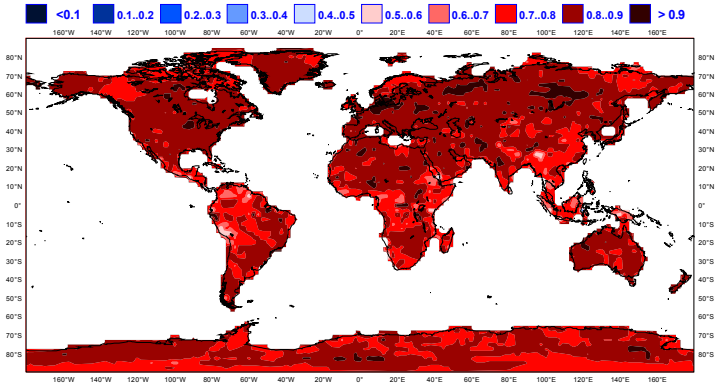


ECMWF

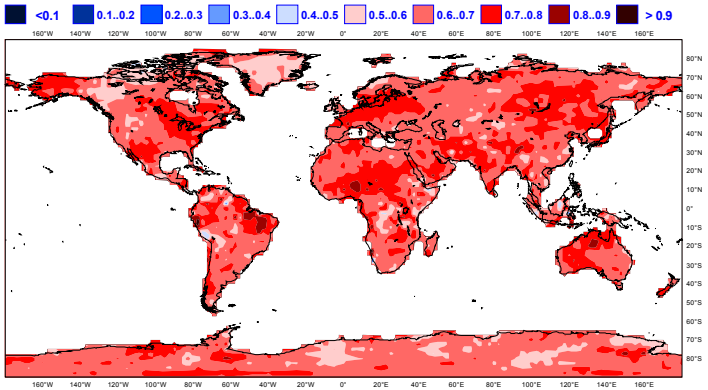
1. Performance of the ECMWF Monthly For. System

ROC score: 2-meter temperature in the upper tercile
135 real-time cases since 07/10/2004

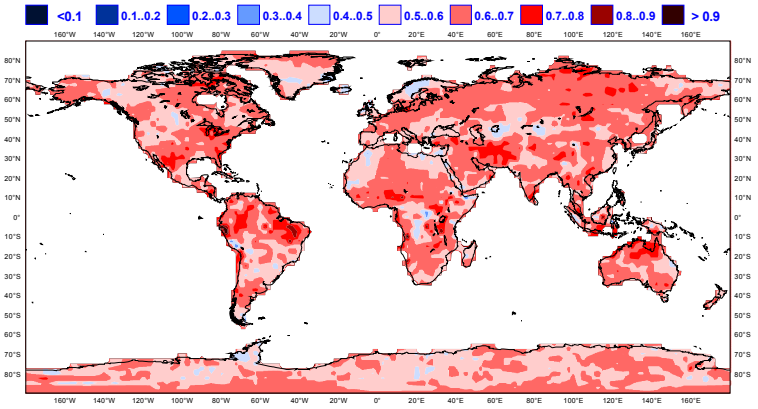
Day 5-11



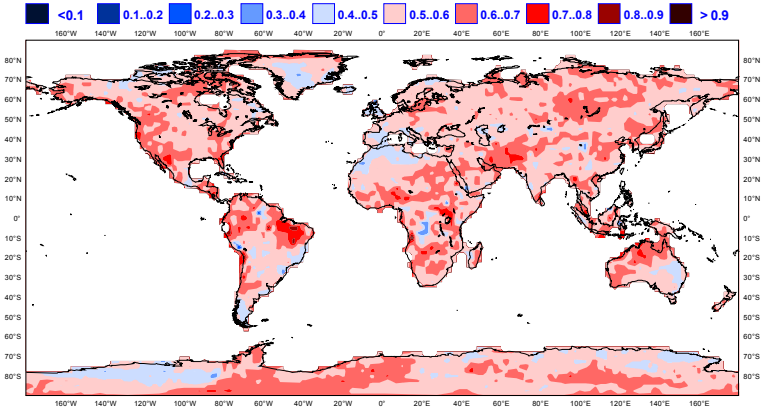
Day 12-18



Day 19-25



Day 26-32

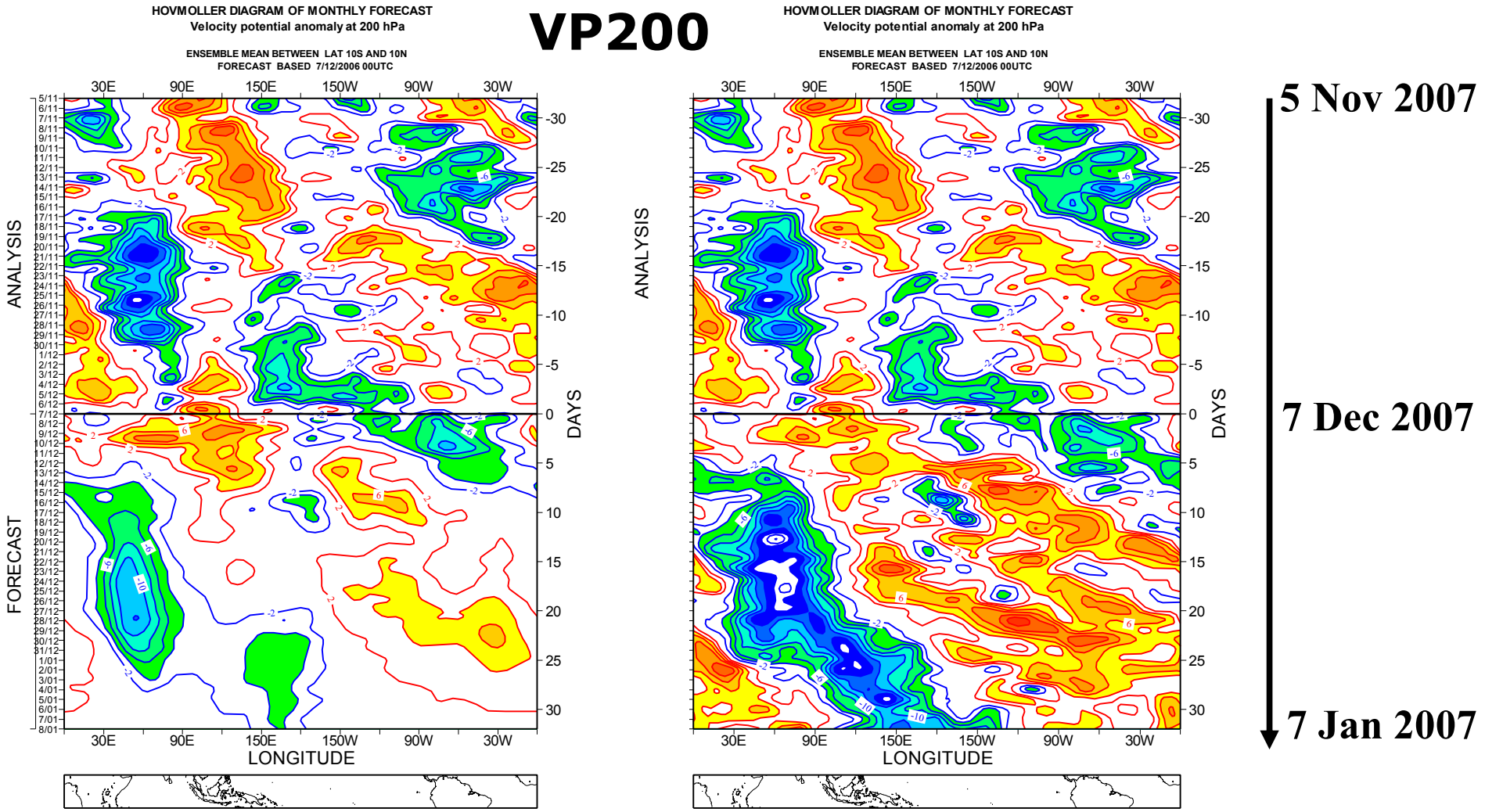


ECMWF

Prediction of the Madden Julian Oscillation (MJO)

Monthly Forecast starting on 7 December 2007

VP200



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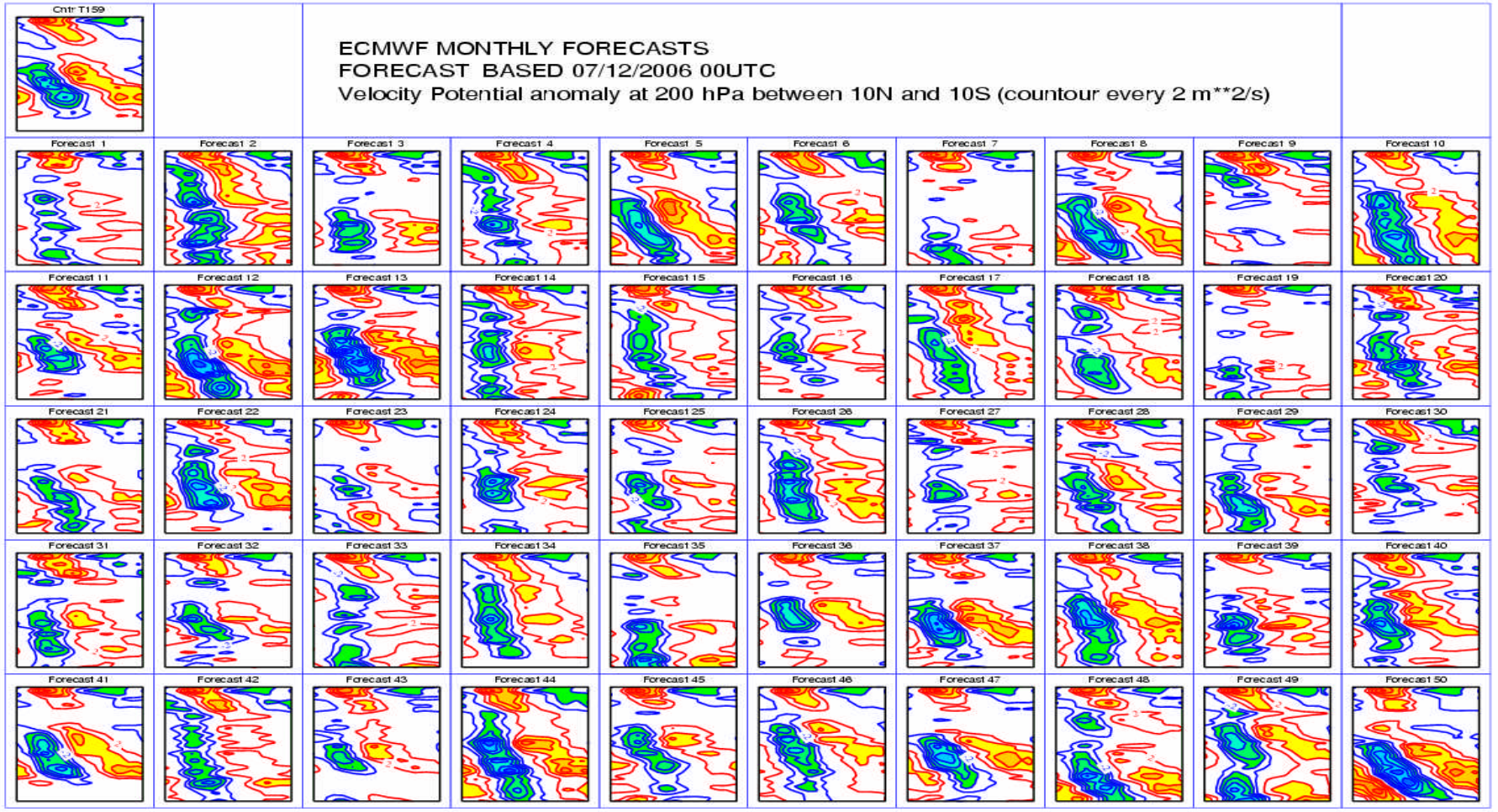
Monthly Forecast starting on 7 December 2007



Outline

Products and performance:

The current monthly forecasting system

The next unified system (VAREPS+monthly)

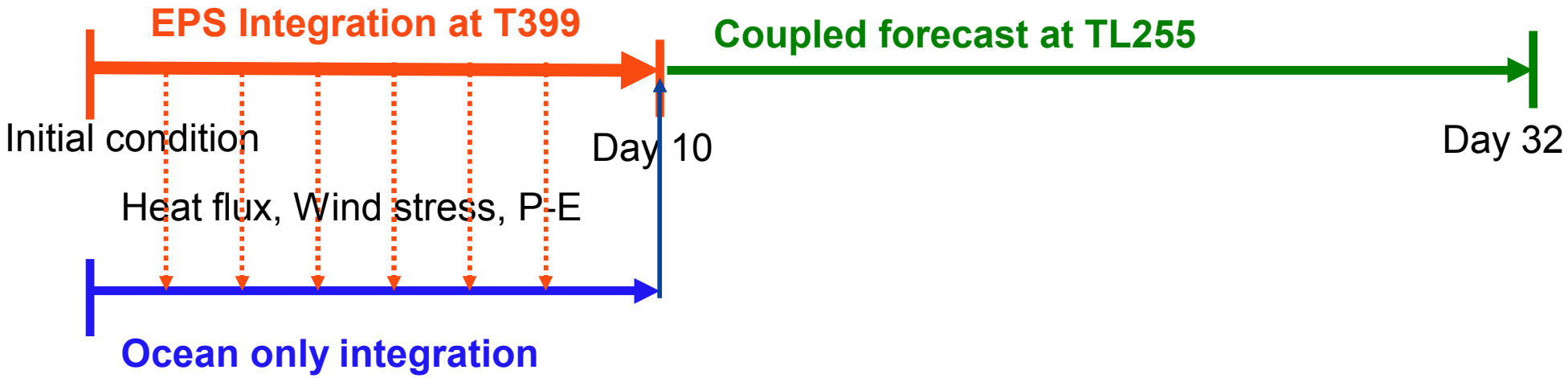
The seasonal forecasting system

The EUROSIP multi-model system

3. Planned unified 32-day VAREPS/monthly system

Present TL159 monthly system:

Future 32-day VAREPS/monthly system:

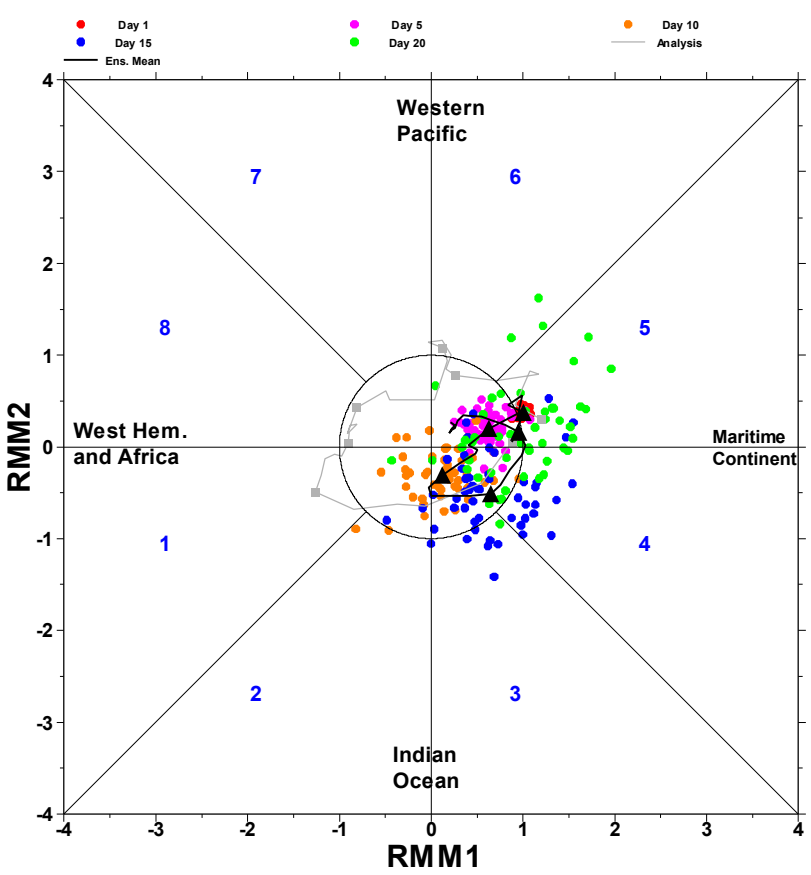


MJO Prediction

[Wheeler and Hendon 2004]

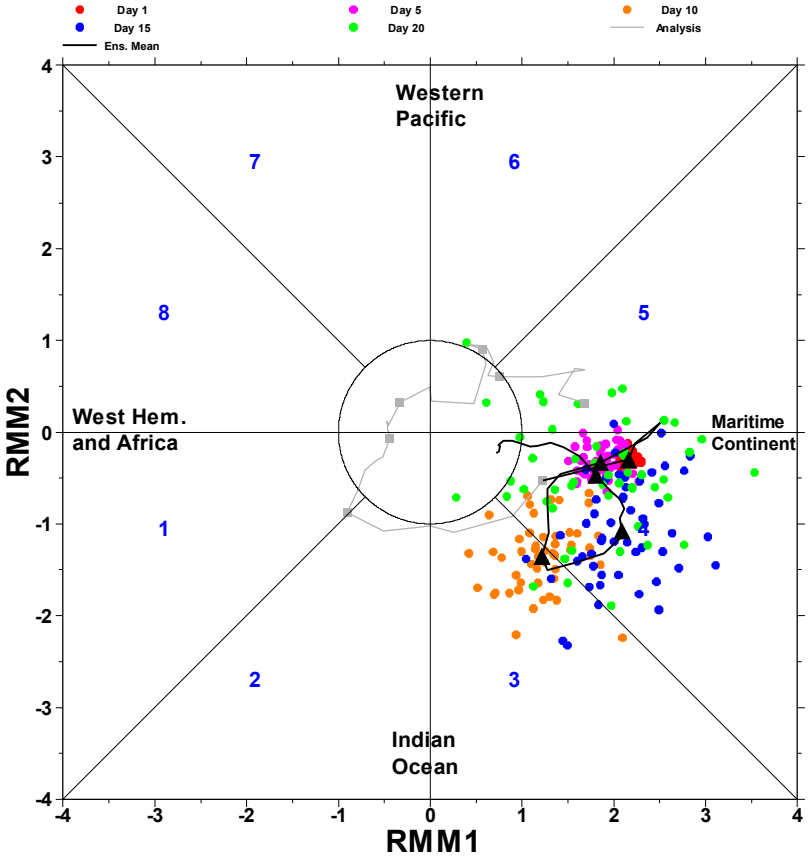
Current system

CY32R2



VarEPS/Monthly +

CY32R3



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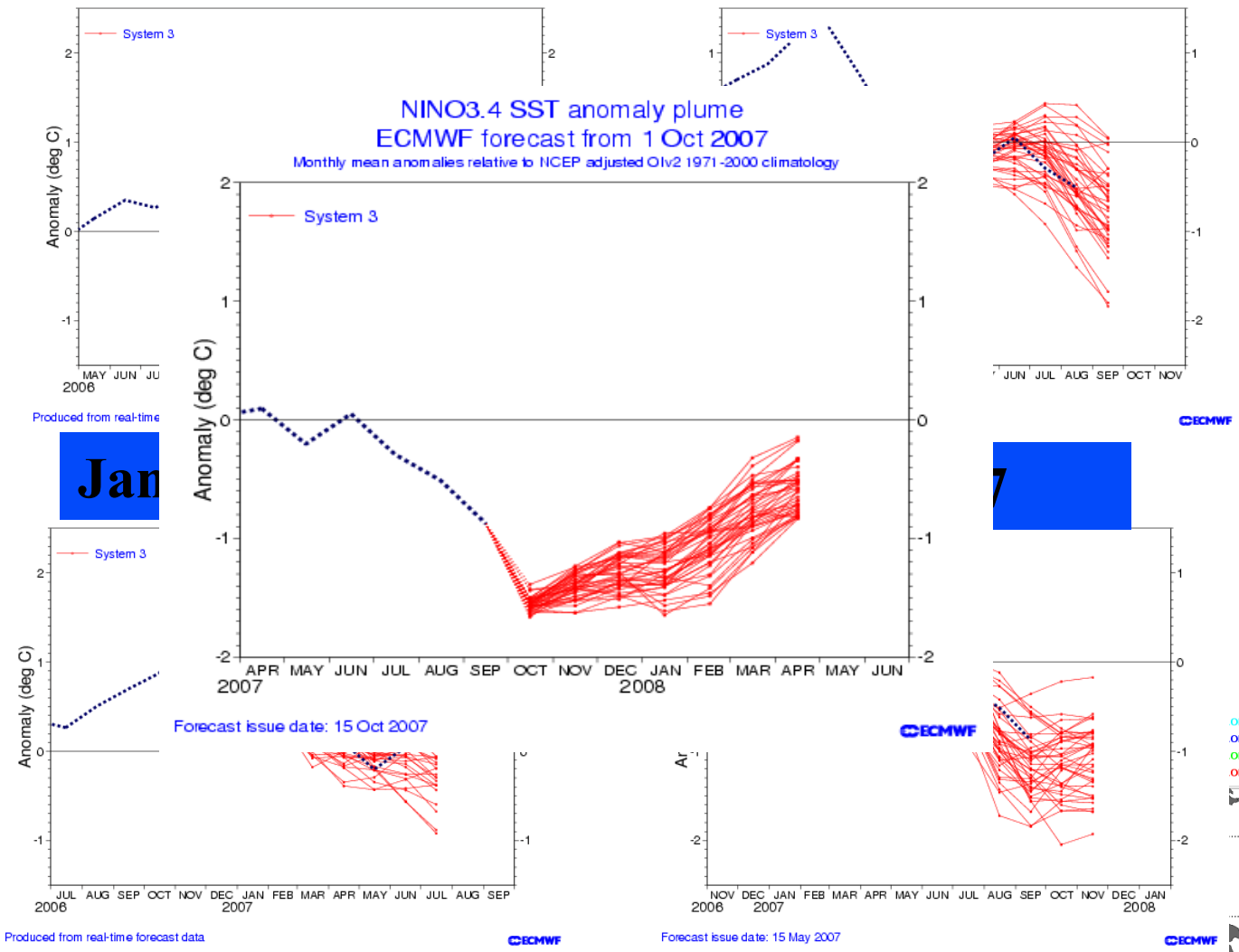
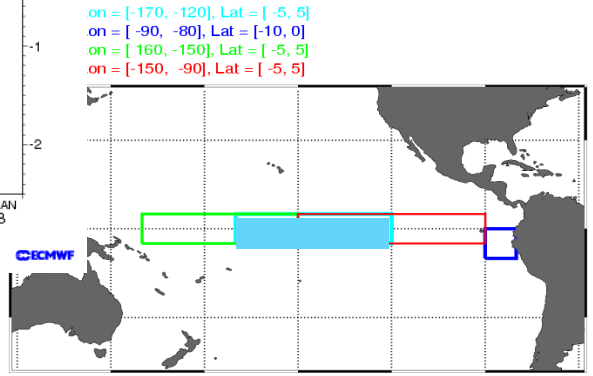
Nino 3.4 predictions:

November 2006

March 2007

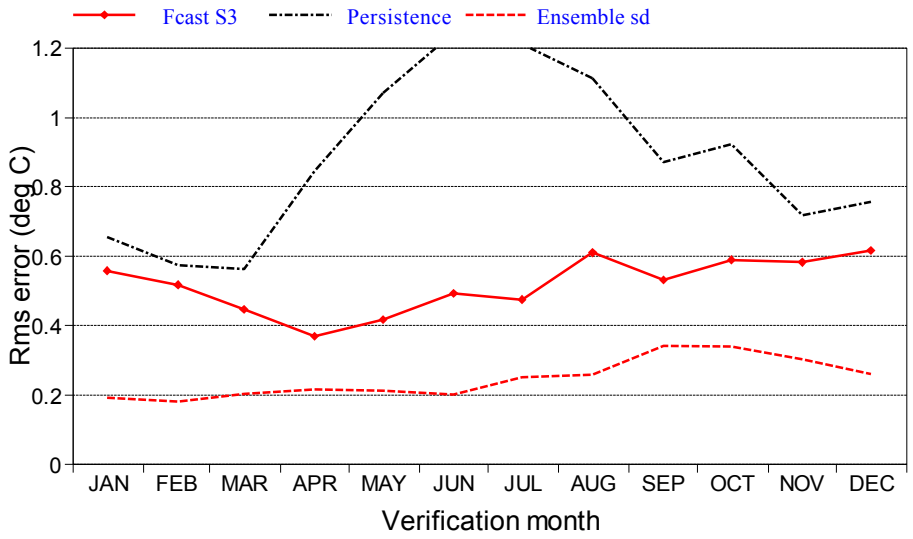
Jan **7**





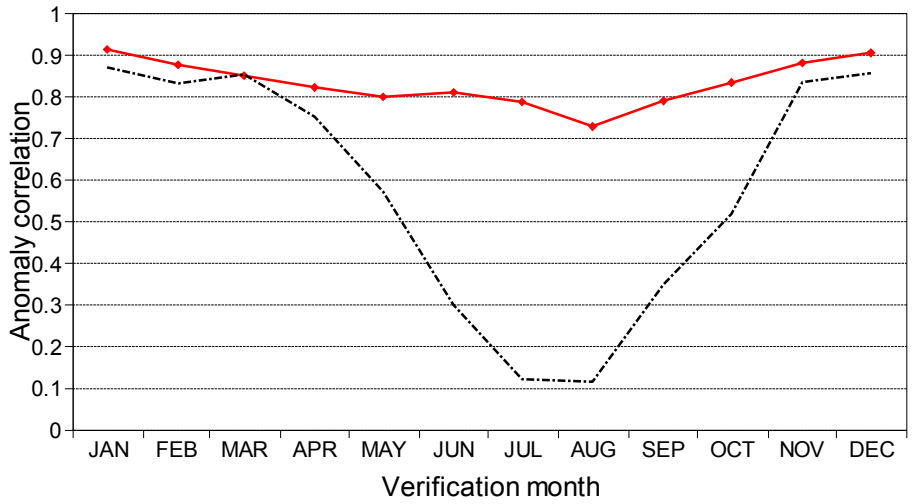
NINO3.4 SST rms errors at 5 months

300 start dates from 19810101 to 20051201
Ensemble size is 11



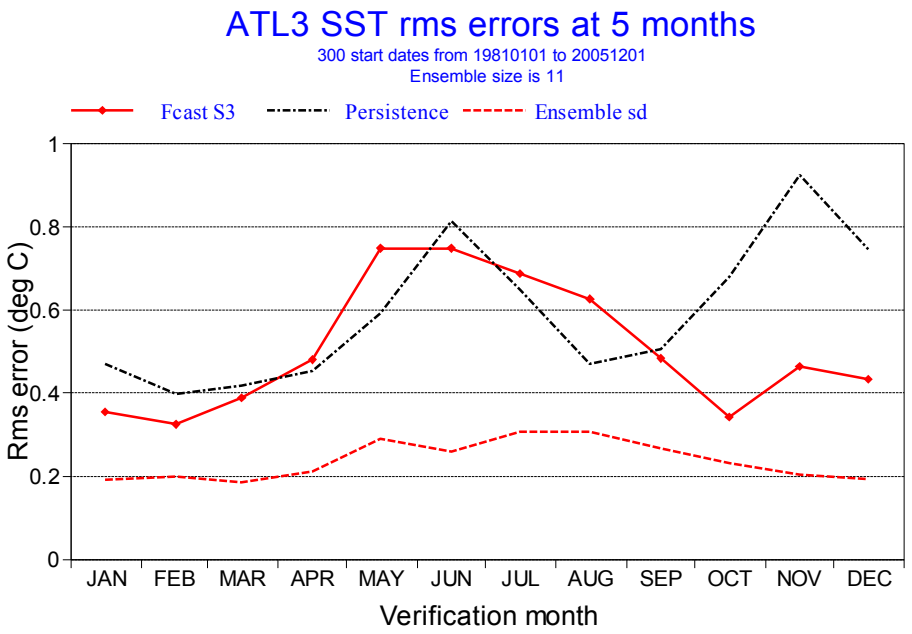
NINO3.4 SST anomaly correlation at 5 months

wrt NCEP adjusted OIv2 1971-2000 climatology



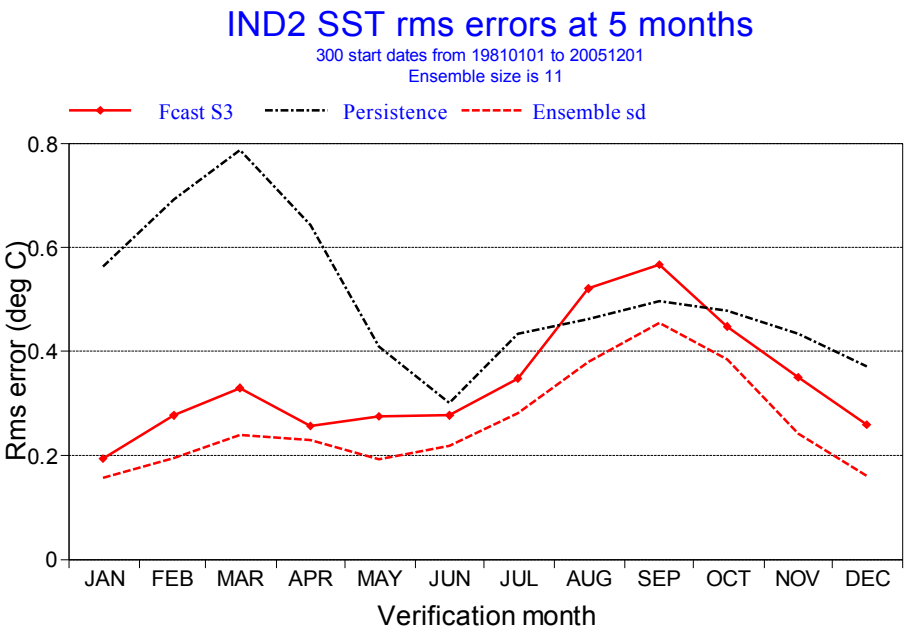
Tropical Atlantic

(20W- 0 , 3N-3S)

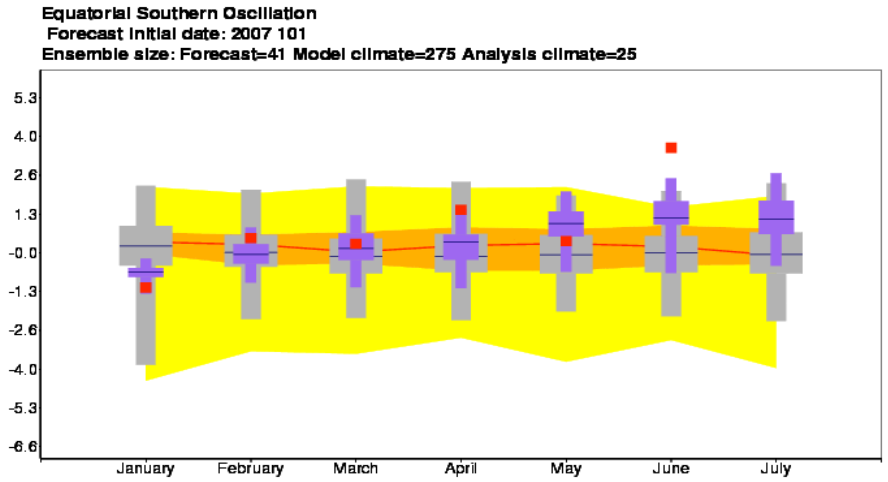


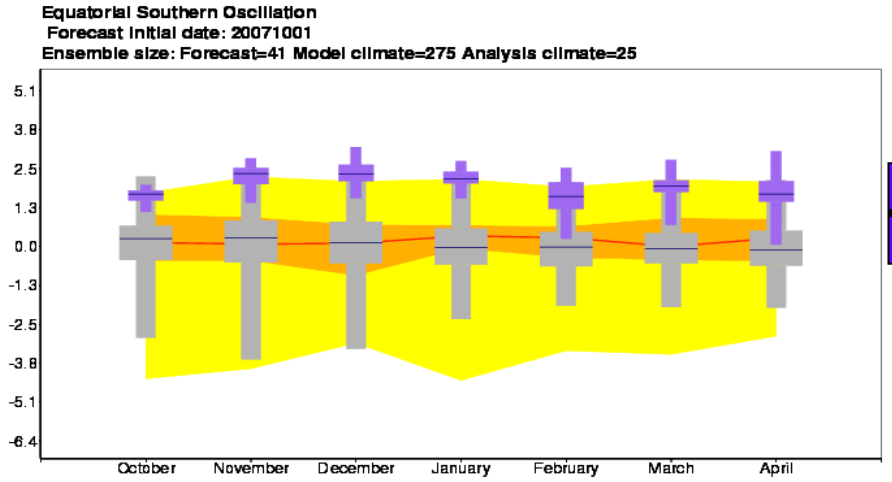
Eastern Indian Ocean

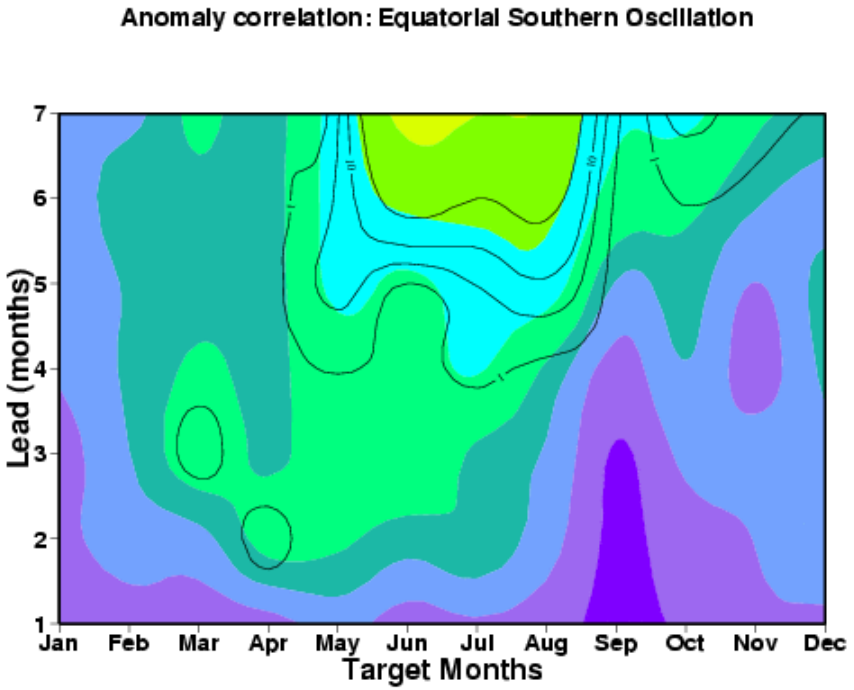
(90-110E , 0-10S)

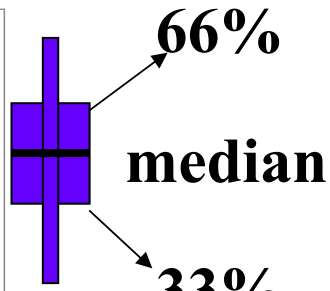


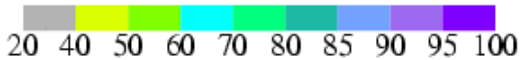
Climagrams : Equatorial Southern Oscillation

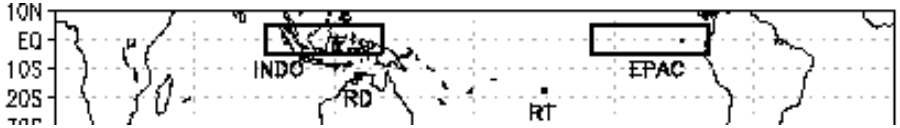




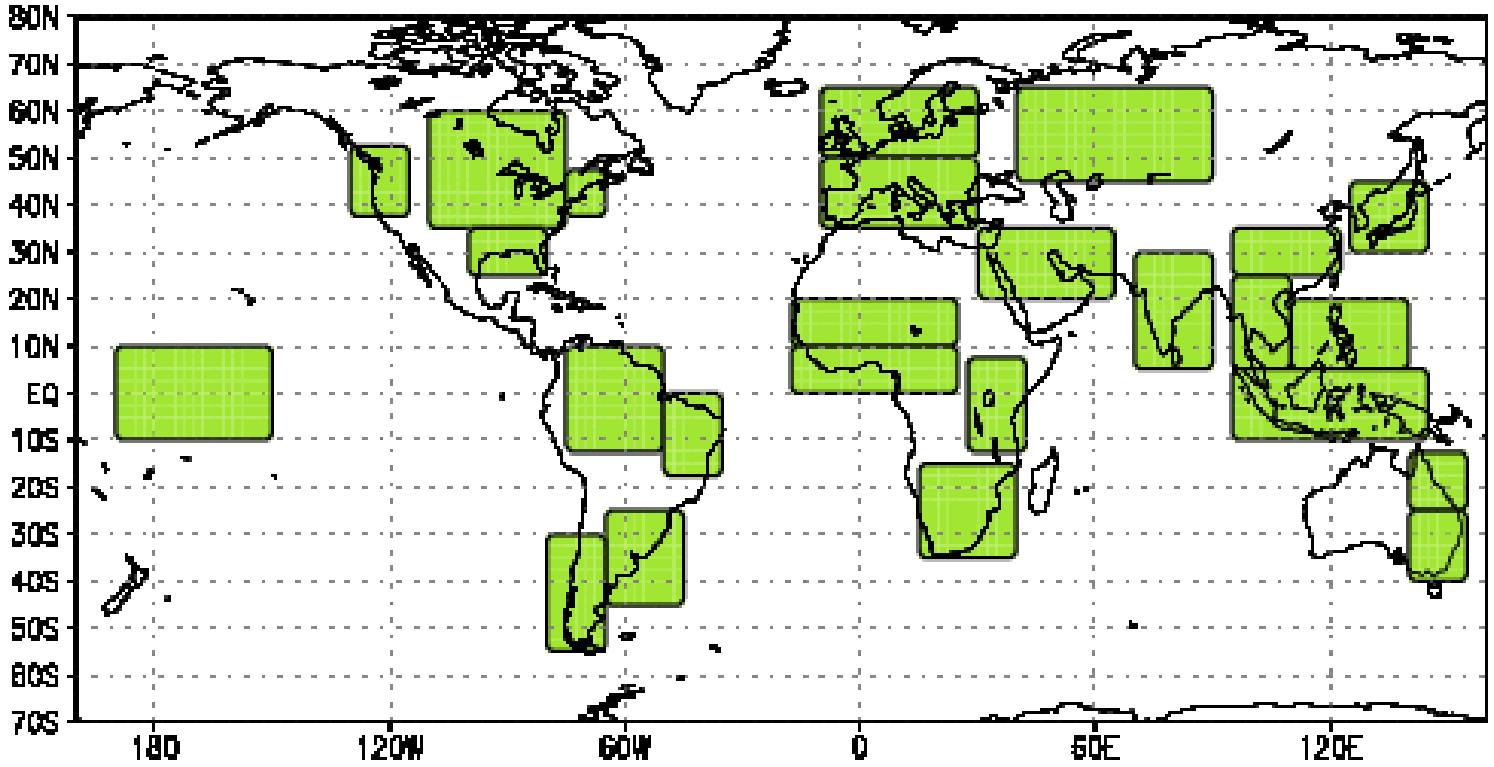




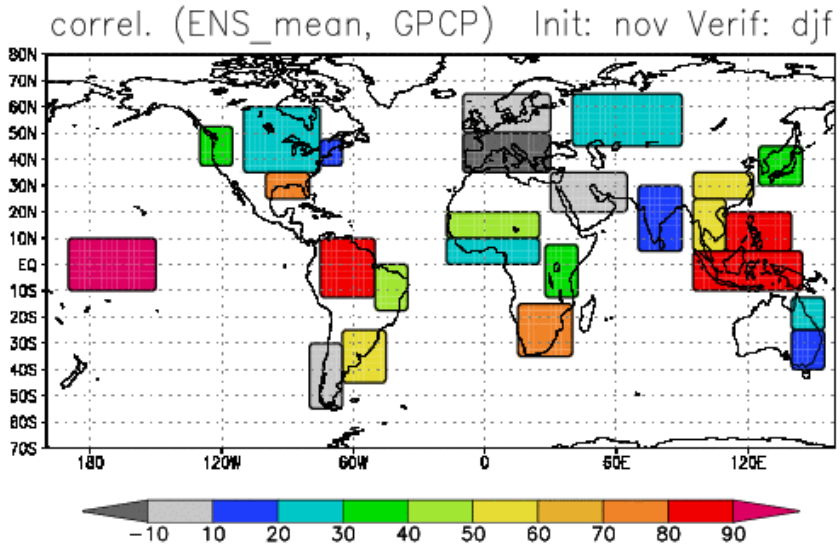


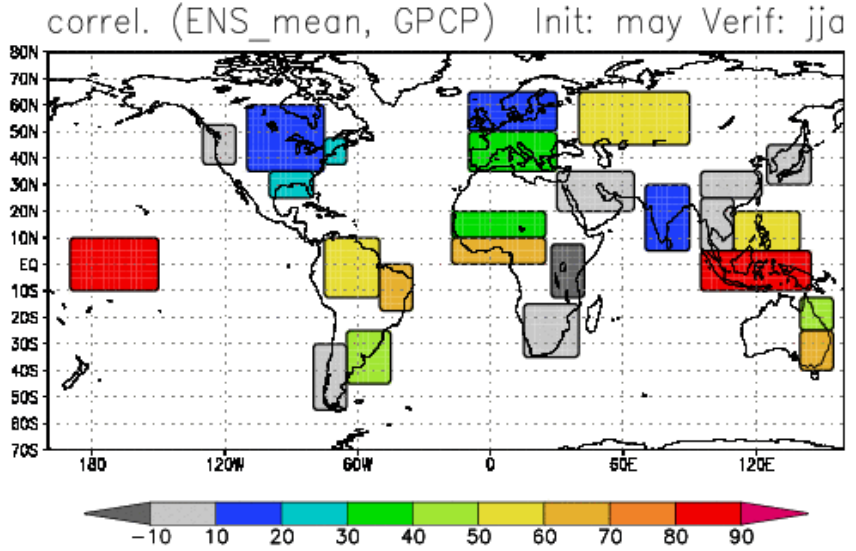


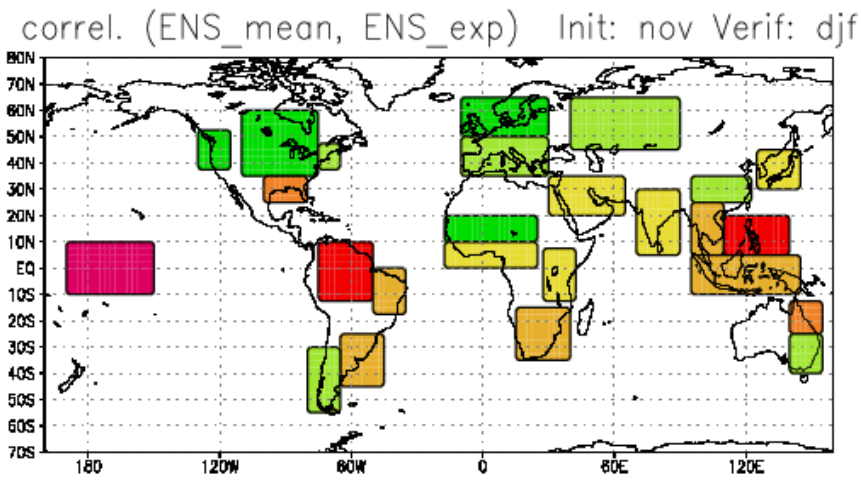
Climagrams : area-averages of 2mT and rainfall

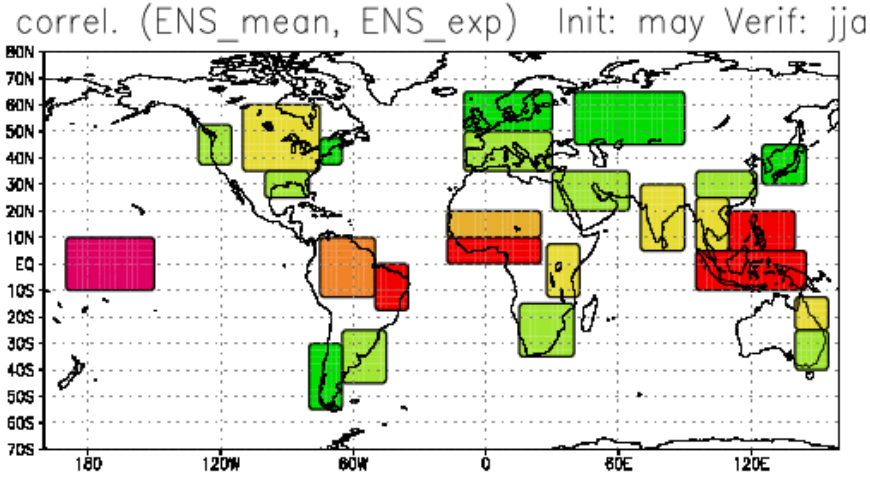


Anomaly correlation of seasonal-mean rainfall

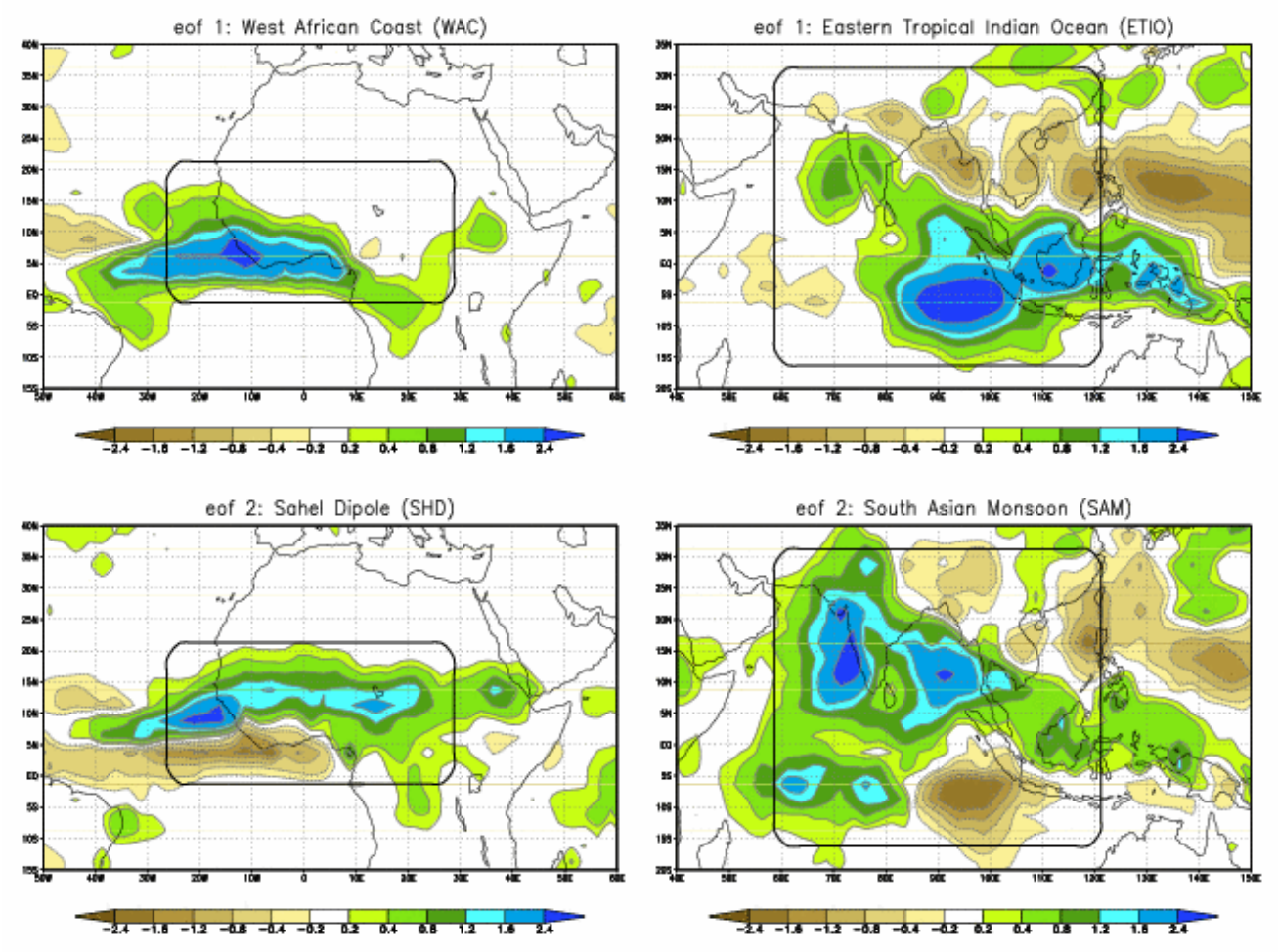


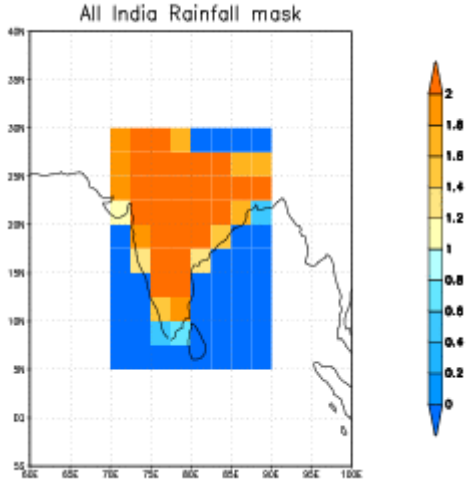




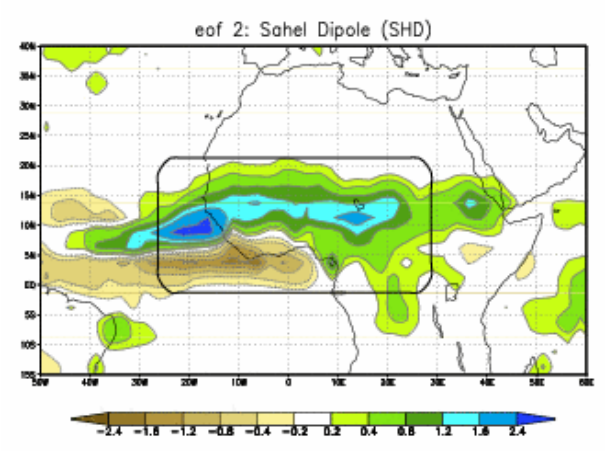


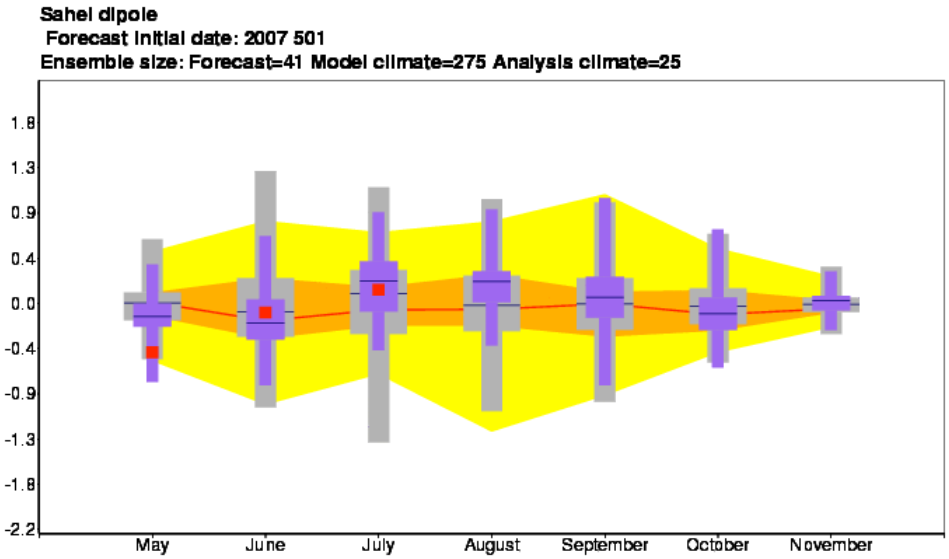
Climagrams :monsoon indices / teleconnections

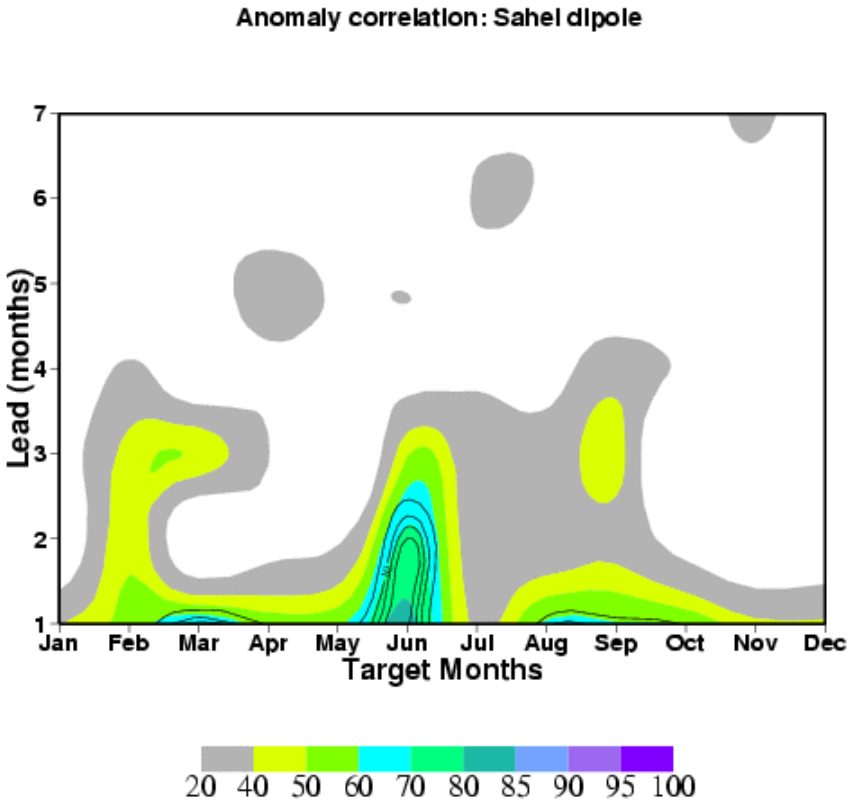




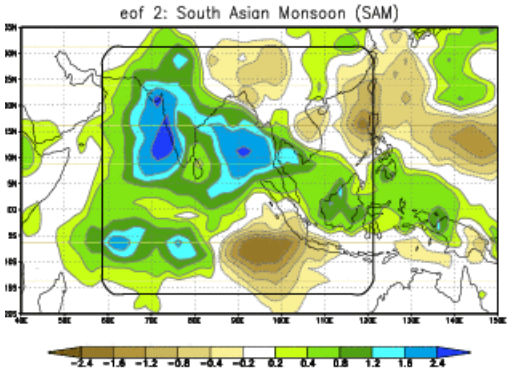
Sahel Dipole:

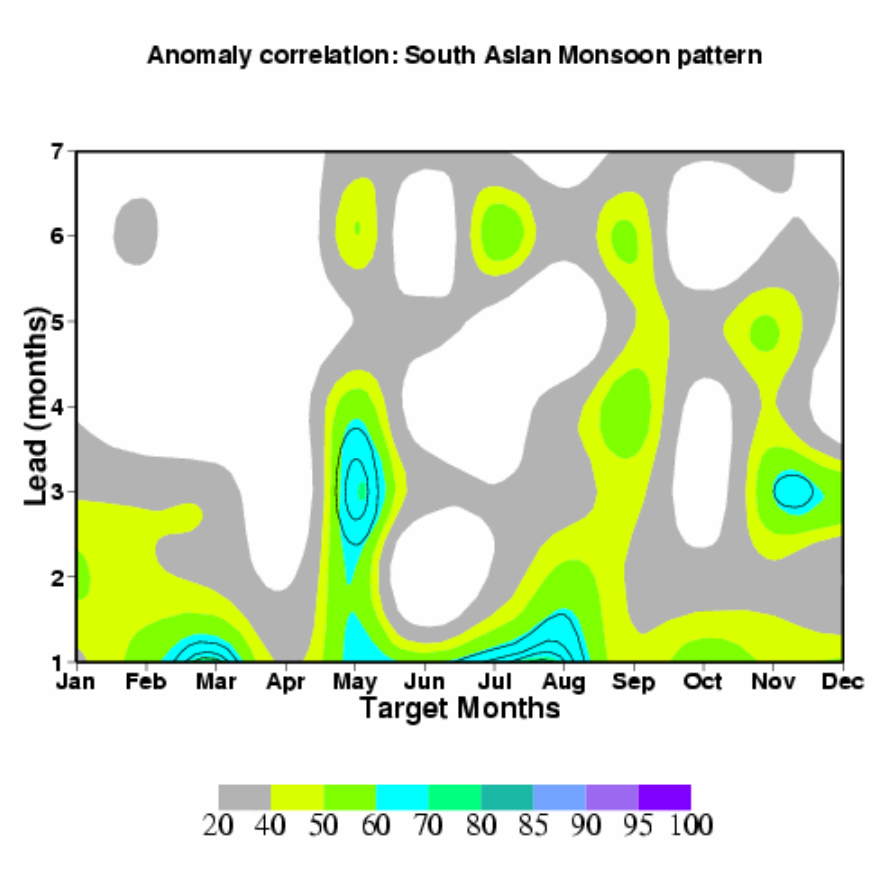




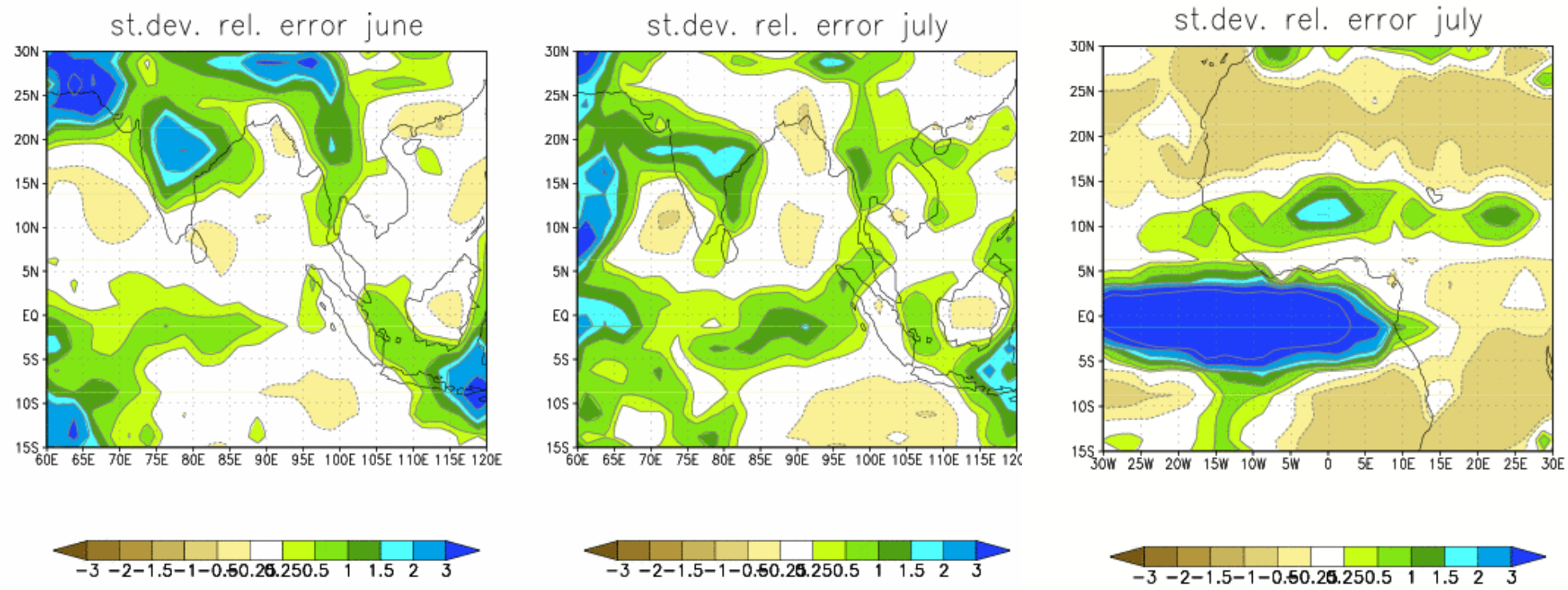


Asian summer monsoon: verification



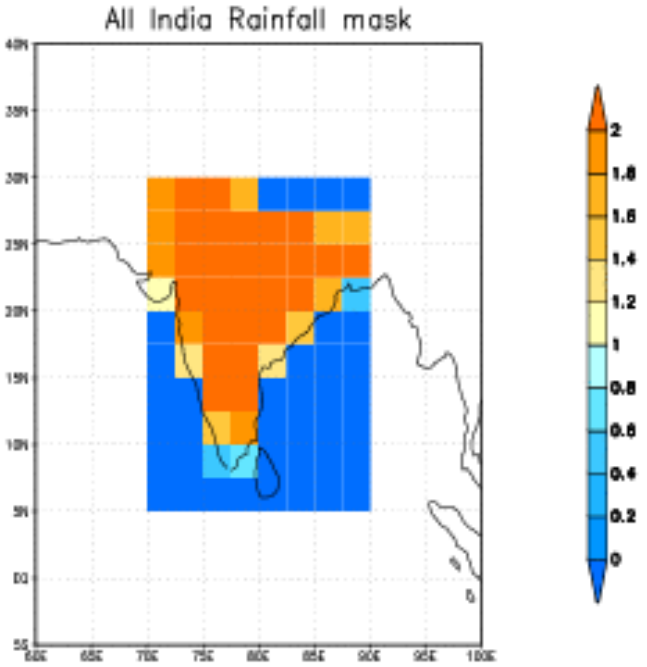


Errors in rainfall standard deviations

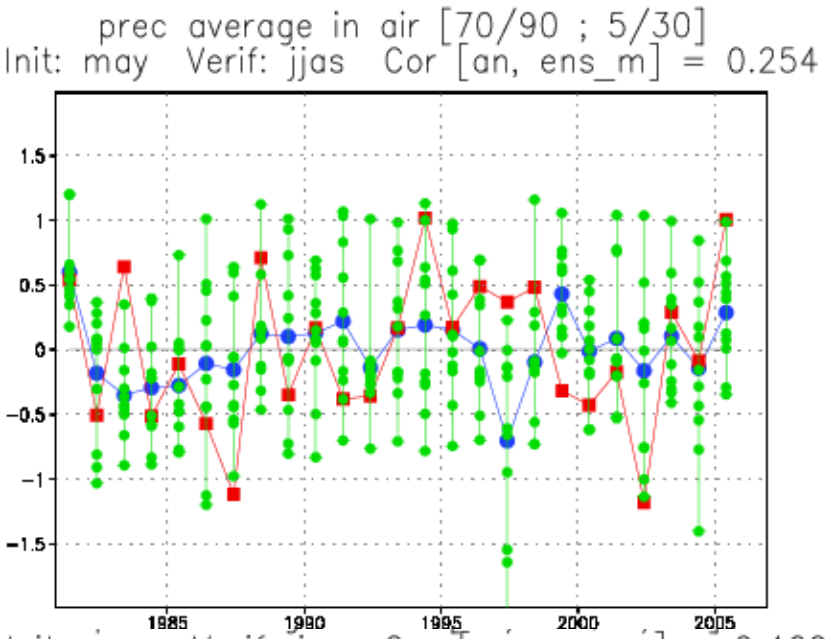


[SD (Sys-3) – SD (GPCP)] / SD (GPCP)

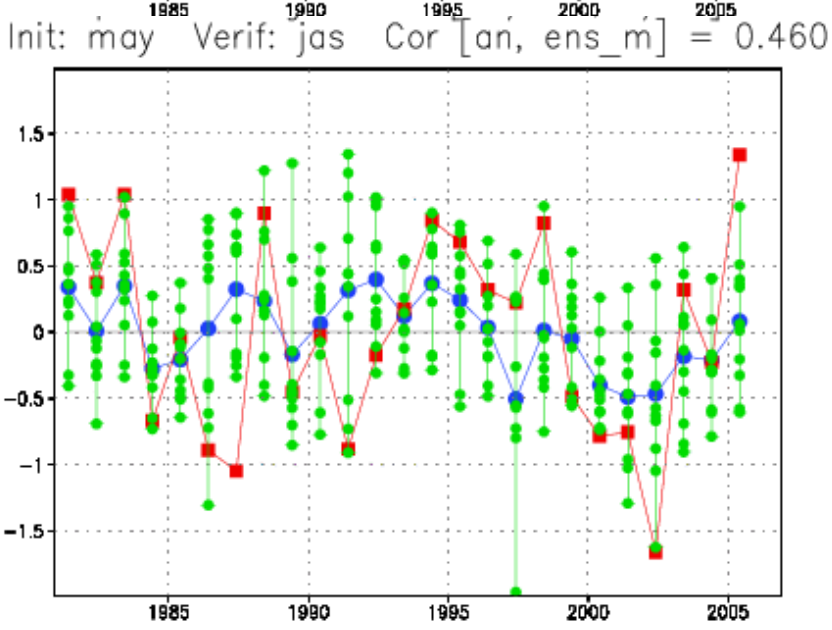
Predictability of AIR in S-3



JJAS
CC = **.25**



JAS
CC = **.46**



Outline

Products and performance:

The current monthly forecasting system

The next unified system (VAREPS+monthly)

The seasonal forecasting system

The EUROSIP multi-model system

EUROSIP multi-model system:

3 Coupled Systems: ECMWF, Météo France, Met Office

Ensemble generation for the 3 systems is different

Hind-cast period: 1981-2005 ECMWF 1987-2001 Met Office and 1993-2004 for Météo France

Met Office and Meteo-France systems are both running at ECMWF

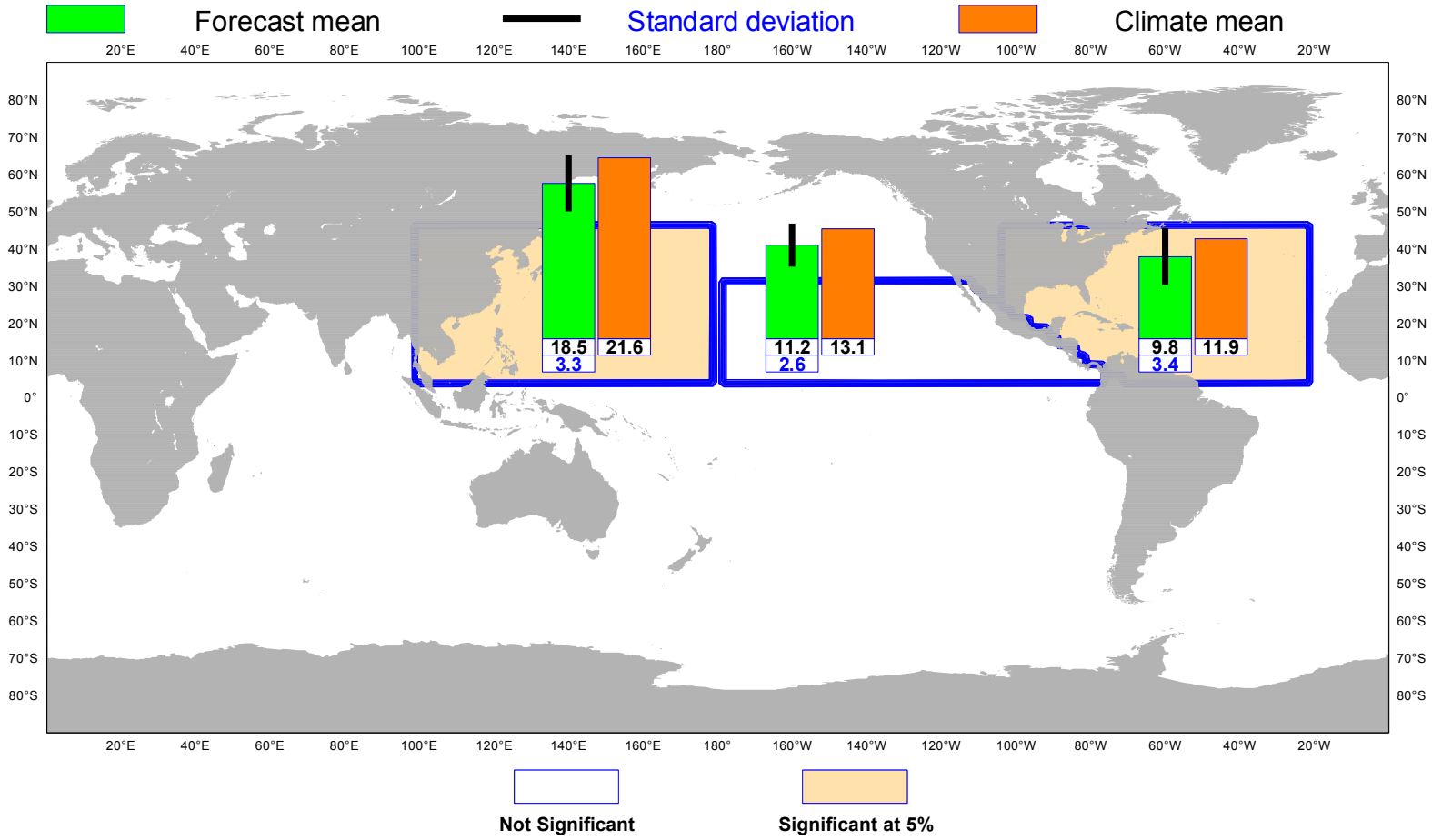
Development of multi-model products is ongoing

EUROSIP products will became available to WMO users

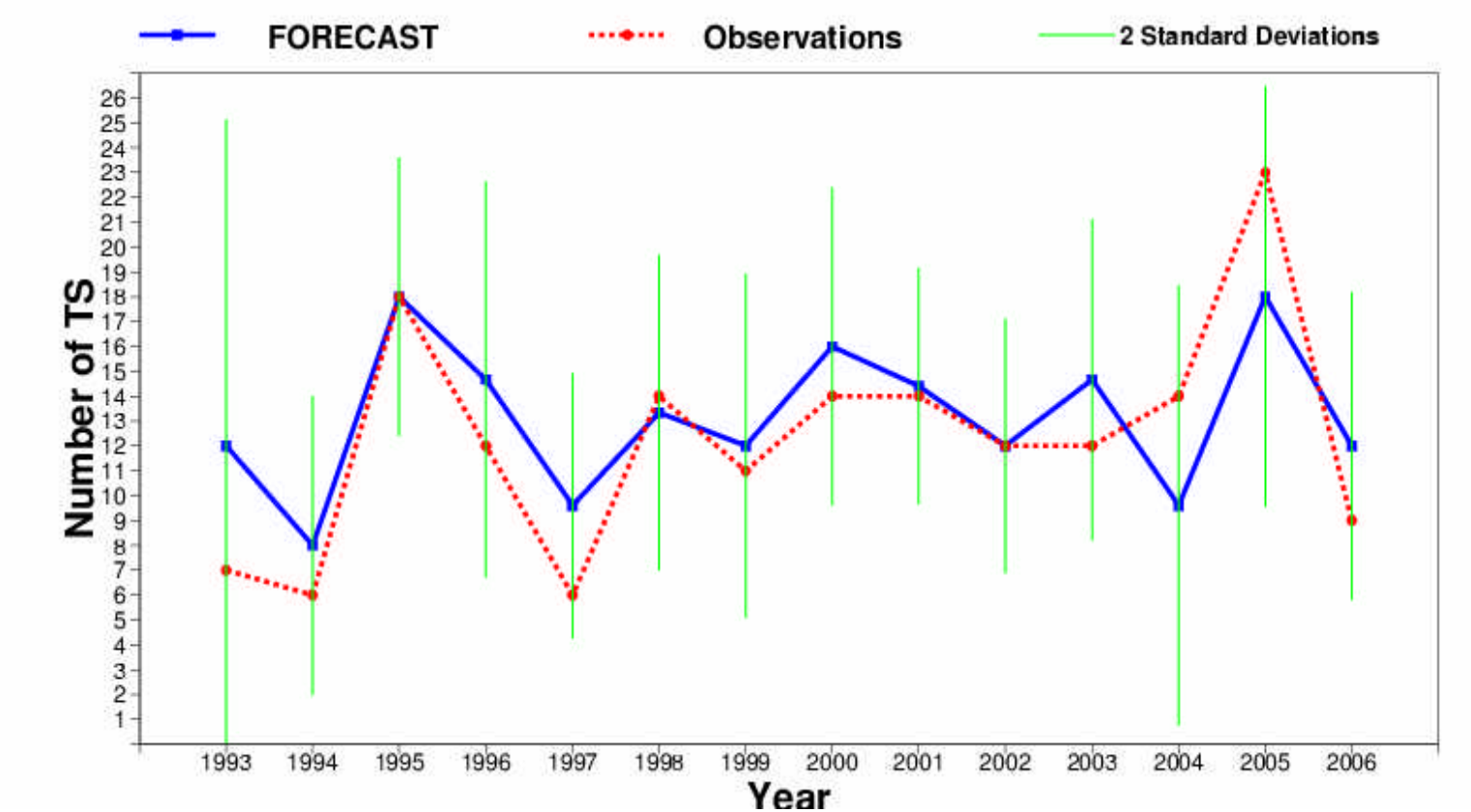
EUROSIP multi-model seasonal forecast
Tropical Storm Frequency

Forecast start reference is 01/06/2007
Ensemble size =123,climate size =476

ECMWF/Met Office/Météo-France
JASON 2007
Climate = 1990-2005



EUROSIP seasonal forecasts of tropical storms
Forecasts starting on 1st June



Summary (Monthly forecasting system):

The monthly forecast provides useful information (better than the persistence) at both forecast ranges: 12-18 days and 19-32.

The forecast skill:

- **is seasonal dependent with larger in winter (DJF) and lower values in summer (JJA).**
- **in predicting the MJO is evident up to about 14 days in advance. However the amplitude of the MJO is significantly reduced after a few days of forecasts. With the recent implementation the amplitude of the MJO will be better represented.**
- **preliminary results indicate that the future unified VAREPS/Monthly system will have enhanced skill than the current one.**

Products from the monthly forecasts are available weekly, every Thursday, up to 31 days. http://www.ecmwf.int/products/forecasts/

Summary (seasonal forecasting system):

SST predictions show high skill particularly in the tropical Pacific however and over western Indian Ocean and tropical Atlantic are still not better than persistence in NH summer.

Substantial model errors affect rainfall variability over tropical land.

Predictive skill for seasonal rainfall is generally good over the Pacific and tropical S. America, poor along the coast of the Indian Ocean in early summer.

Skill for All-India Rainfall increases in the latter part of the monsoon season. This is due to the very low skill of forecasts for June.

Seasonal forecasts over land can be improved by exploiting teleconnections with adjacent ocean regions.

Eurosip multi-model predictions for tropical cyclones show a consistent good performance during the period 1993-2006.