CPTEC operational seasonal forecast documentation:

Forecast model and products description

1) Forecast model

Seasonal climate forecasts are operationally produced using CPTEC Atmospheric General Circulation Model (AGCM) [Cavalcanti et al. (2002); Marengo et al. (2003); Panetta et al. (2006)] with persisted sea serface temperature (SST) anomalies (Reynolds et al., 2002). For example, for a forecast made in January 2009 and valid for the six month period from January to June 2009, the observed SST anomaly of December 2008 is added to the climatological (i.e. long term mean) SST of these six months during the integration of the model. The model resolution is T062L28, which represents triangular truncation of 62 waves in the horizontal coordinate and 28 levels in the vertical sigma coordinate (21 in the troposphere and 7 in the stratosphere). Deep cloud convection is parameterized using the scheme developed by Kuo (1974). Initial conditions for these operational forecasts are obatined from NCEP/NCAR reanalysis (Kalnay et al., 1996). A total of 15 initial conditions from the previous October in the example above, representing 15 different days of October 2008, are used for producing an ensemble of forecasts. Every month CPTEC produces global 1-month lead forecast maps of precipitation, temperature, 500 hPa geopetential height and sea level pressure for the following 3-month season.

2) Forecast products

The following forecast map products are available at CPTEC website:

● Seasonal anomaly: Mean forecast anomaly for precipitation, temperature, 500 hPa geopetential height and sea level pressure. It is an estimate of the central location of the forecast distribution.
● Probability of most likely precipitation and temperature terciles (drier or cooler than normal conditions, normal conditions, wetter or warmer than normal conditions).

3) Verification products

Forecast verification is performed using as observational reference dataset version 2.1 Global Precipitation Climatology Project (GPCP) analysis (Adler et al. 2003) and ERA-40 two metre temperature reanalysis (Uppala et al., 2005). CPTEC predictions are verified using retrospective forecasts (hindcasts) over the 1979-2001 period.

The following verification products are available. All verification scores listed below are described in details in Jolliffe and Stephenson (2003).

a) Verification maps:

- Correlation between forecast and observed anomaly
- Mean Squared Skill Score

- Mean Squared Skill Score (phase error)
- Mean Squared Skill Score (amplitude error)
- Mean Squared Skill Score (bias error)
- ROC Skill Score for the event positive or negative (precip. or temp.) anomaly
- ROC Skill Score for the event (precip. or temperature) in the lower tercile
- ROC Skill Score for the event (precip. or temperature) in the upper tercile
- ROC Skill Score for the event (precip. or temperature) in the lower quintile
- ROC Skill Score for the event (precip. or temperature) in the upper quintile
- Ranked Probability Skill Score for tercile categories
- Ranked Probability Skill Score quintile categories
- Gerrity Score tercile categories

b) Reliability diagrams and ROC plots for aggregated forecasts over the tropics for the events:

- Negative or positive (precipitation or temperature) anomaly
- Precipitation or temperature in the lower tercile
- Precipitation or temperature in the upper tercile
- Precipitation or temperature in the lower quintile
- Precipitation or temperature in the upper quintile

All skill score maps range from -1 to 1. Positive values are displayed in red, orange and yellow and indicate regions where the forecasts have moderate to good skill. Negative values are displayed in blue and indicate regions where the forecasts have poor skill.

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