Climate Predictability Tool (CPT) Training

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International Conference on Climate Services - 3
Montego Bay, Jamaica, 04 – 06 December 2013
Workshop Objectives

• To develop the capability to generate a suite of quality-controlled, tailored and consistent seasonal climate forecasts, downscaled to specific locations, or for larger regions.

• To demonstrate the capability to verify past sets of seasonal forecasts.
What is CPT?

Climate Predictability Tool (CPT) is an easy-to-use software package for making tailored and downscaled seasonal climate forecasts.

Versions:

• Windows 95+
• Batch
What is CPT?

CPT is designed to produce statistical forecasts of seasonal climate using either the output from a GCM, or empirical predictors.

Features:

- Model training
- Validation
- Verification
- Flexible forecasts
CPT as a forecasting tool

Predictors + Predictands

Predictions

Predictors

Predictions

75 70 65 60 55 50 45 40

40 45 50

40 45 50 60 65 70 75

Below

Normal

Above
Seasonal forecasting I: empirical

![Graph showing JAS rainfall (mm) and Nino 3.4 index over time from 1970 to 2010. The graph indicates periods of high and low rainfall correlating with fluctuations in the Nino 3.4 index.](graph.png)
Seasonal forecasting II: dynamical
Linear Regression

We can use simple linear regression to predict rainfall using a single predictor such as the Nino3.4 index.

June NIÑO3.4 index as a predictor of Jul – Sep 1971 – 2010 rainfall over the eastern Caribbean

\[ \hat{y} = \beta_0 + \beta_1 \text{NIÑO3.4} \]

\[ \beta_0 = 177 \text{ mm} \]

\[ \beta_1 = -14.3 \]

\[ r = -0.238 \]
Linear Regression

Or we can use the GCM rainfall as the predictor.

\[ \hat{y} = \beta_0 + \beta_1 \text{GCM} \]

\[ \beta_0 = 90 \text{ mm} \]

\[ \beta_1 = 0.31 \]

GCM prediction of Jul – Sep 1971 – 2010 rainfall over the eastern Caribbean

\[ r = 0.492 \]
Statistical options in CPT

In CPT multiple linear regression (MLR) can be used if there are small numbers of predictors and predictands. There are more advanced options suitable for the following situations:

• Multiple predictors, one or only a few predictands (PCR – principal components regression).
• Multiple predictors, multiple predictands (CCA – canonical correlation analysis).
• Suitable for single predictors, or a very small set of known important predictors.

CPT also be used for probabilistic forecast verification (PFV).