Identification of Suitable predictors to Develop a Seasonal Forecasting Model for District Rainfall for the onset of Maha Agricultural Season using Climate Predictability Tool (CPT)

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ABSTRACT

This study is focused upon identification of best predictor to predict the September monthly rainfall in the middle of August for Sri Lanka. Seasonal prediction of probability of receiving September rainfall in advance would help to prevent crop damages and losses in paddy cultivation as well as other short term crop cultivations and also it would help in better managements of water resources in the area because the onset of the main agricultural season " Maha" starts in the month of September.

A variety of challenges have been encountered in the process of producing and providing seasonal prediction to users. One of the major challenges is the accuracy of the prediction. It is important to find out the best predictors that can be used for seasonal prediction. Composite analysis technique was carried out for the large-scale atmospheric variables for anomalous positive rainfall years as well as anomalous negative rainfall years to identify best predictors as well as best domains that could have a significant impact on September rainfall over Sri Lanka.

Statistical downscaling of Climate Forecasting System (CFS) predictions was carried out using Climate Predictability Tool (CPT). For downscaling, Zonal wind and Meridional wind at different atmospheric levels as well as sea surface temperature (SST) from CFS were used as predictors with the hindcast data spanning a period of 30 years from 1982 to 2012 with initial conditions from the 1st week of the August.
Results indicate that SST over the Pacific Ocean (15^0N-15^0S latitude and $160°E-230°W$ longitude) has highest overall predictability with good skill for September Forecast. Predictability skill of the zonal wind and meridional wind components were poor for September forecast.

Key words: Canonical Correlation Analysis (CCA). Downscaling, Climate Predictability Tool (CPT), Zonal wind, Meridional wind, Sea Surface Temperature (SST), Climate Forecasting System (CFS), Hindcast data.

1   Introduction

Seasonal predictions provide useful information in planning various activities that depend on climate information and products. Seasonal predictions commonly tackled either by experimenting with sophisticated General Circulation Models (GCMs) (Palmer and Anderson, 1994) or statistical models based on correlations between predictands (the weather variables to be predicted) and predictors (the weather variables used to produce the prediction) (Vautard, R, 1998). Predicting the future is never easy but over the last few decades, climatologists have improved on this with regards to the climate (Palmer and Anderson, 1994). Due to the climate drift and other problems intrinsic to GCMs (Tracton et al. 1989; Brankovic et al. 1990; De´que´ 1991) in predicting long-term weather behavior it is not surprising that the seasonal skill of GCMs may not necessarily be the best (Van den Dool 1994).