



A Comparison between a GFDL General Circulation Model and Observations using Harmonic Analysis

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One of the most important features in analyzing the climatology of any region is to study the precipitation and its periodicity of different harmonics in order to investigate the behavior of the observed data. In this study using precipitation values obtained from the 20C3M (run1) experiment of the GFDL general circulation model (CM2.1) and CPC Merged Analysis of Precipitation (CMAP) from NCEP, harmonic analysis has been employed to study the seasonal variation of precipitation over the Middle East (20° - 40° N, 30° - 65° E). The monthly precipitation values were averaged over a 25-year integration, producing a dataset 12 monthly for each grid locations. The annual mean and seasonal variance for each grid obtained from two dataset. Maps of the first, second and third harmonic amplitudes and phases provide a useful source of comparison between model output and observational data. Results show that the method of harmonic analysis allows a more analytical comparison between model predictions and data than the conventional approach of representing the annual march in the form of a curve of mean monthly rainfall amounts. The method delineates regional boundaries of the various precipitation regimes in the Middle East. A comparison of the simulated and observed values indicate that the GCM fails to capture a significant amount of the regional detail in precipitation climatology in the South of Middle East when its results are decomposed by harmonic analysis.