Indian Rainfall Data Analysis

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Abstract

Average monthly rainfall data was obtained from Indian Institute of Tropical Meteorology (IITM) for various regions of India. This data was available for 141 years from 1871 to 2011. Out of this data, only the total rainfall during the Southwest Monsoon period of June to September was considered for each region. The data was treated as a time series from Year 1 (= 1871) to Year 141 (= 2011). No trend was observed in the data. The hypothesis was that rainfall exhibits a strong periodic pattern. A periodogram was constructed by transforming to the frequency domain. Periods of 10 to 70 years were considered (i.e., up to half of the total length of time for which data was available). The results show a very strong period of 60 years. This is especially significant since a period of 60 years has astronomical significance: it is the least common multiple of the orbital periods of Mars, Jupiter and Saturn (in addition to Mercury and Venus). It may also be noted that the traditional Indian calendar (known as *panchanga*) has always used a cycle of 60 years (called *samvatsara*s) to name the years and to predict rainfall.

Dataset:

IITM Indian regional/subdivisional Monthly Rainfall data set (IITM-IMR: Contributors - D.A. Mooley, B. Parthasarathy, K. Rupa Kumar, N.A. Sontakke, A.A. Munot and D.R. Kothawale).

Primary Data Source: India Meteorological Department.

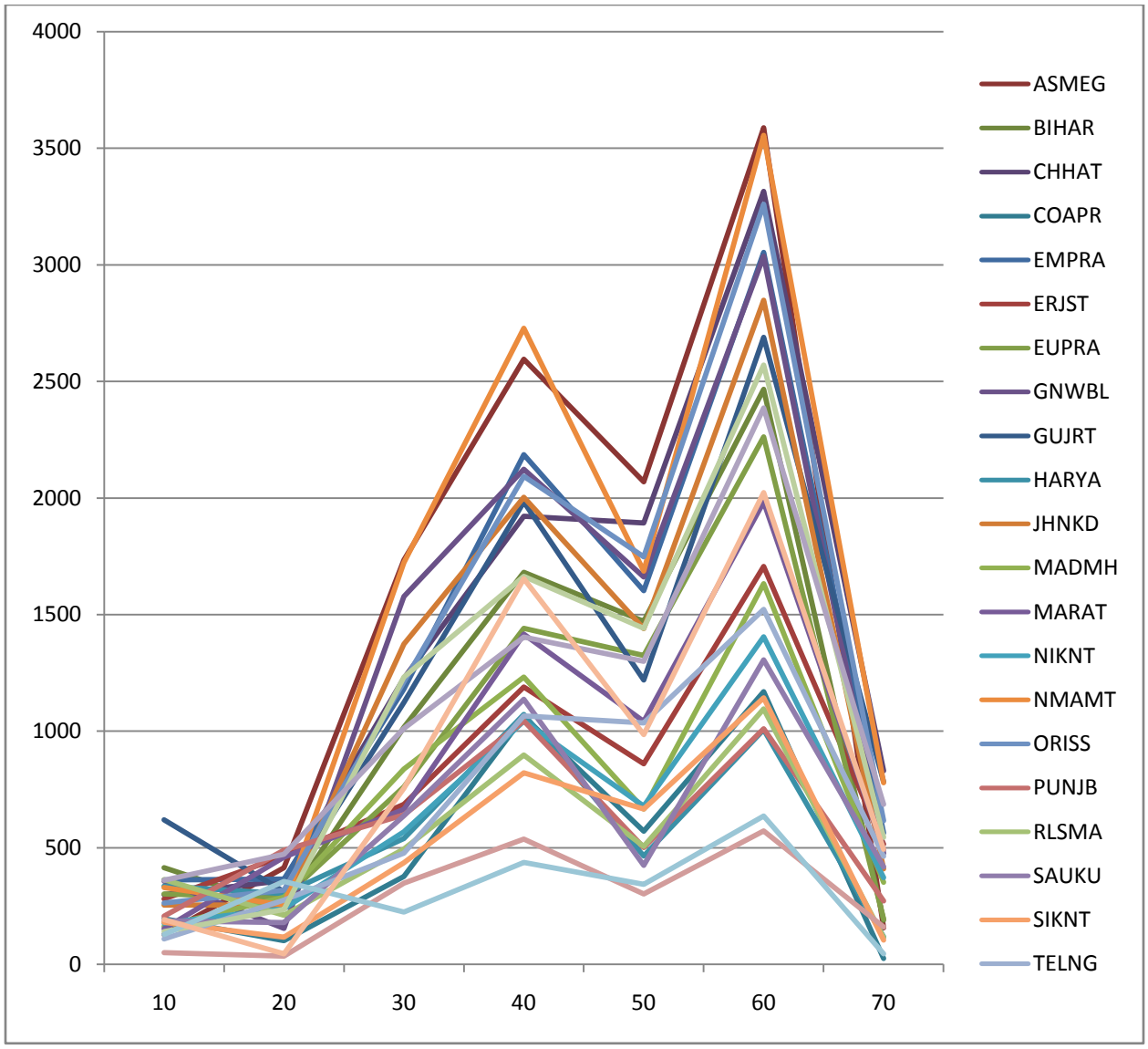

Fig. 1 Periodicity in Monthly Average Rainfall in Regions during Jun-Sep (1871-2011)

– Not Including Regions with Very Heavy Rainfall

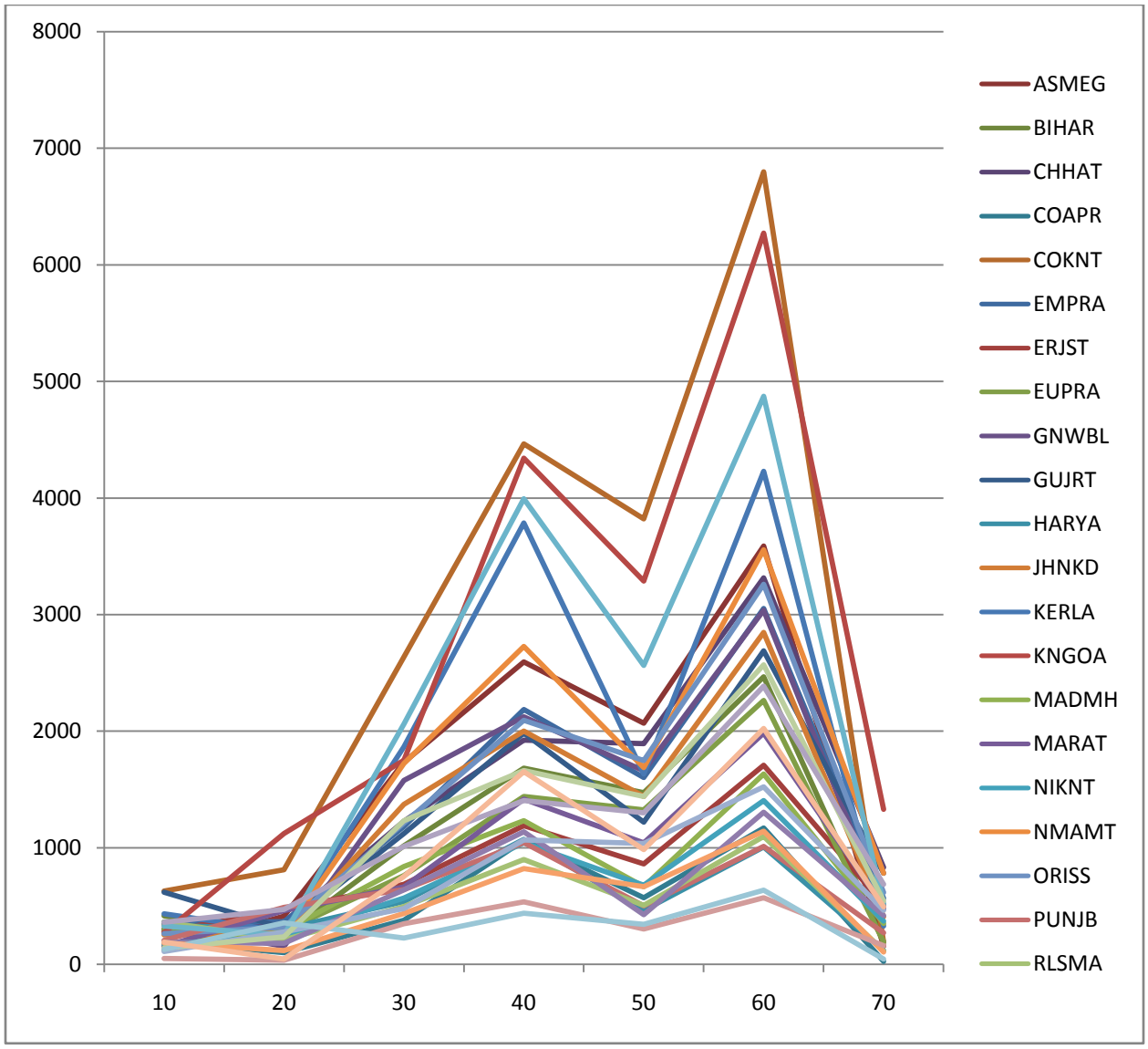

Fig. 2 Periodicity in Monthly Average Rainfall in All Regions during Jun-Sep (1871-2011)

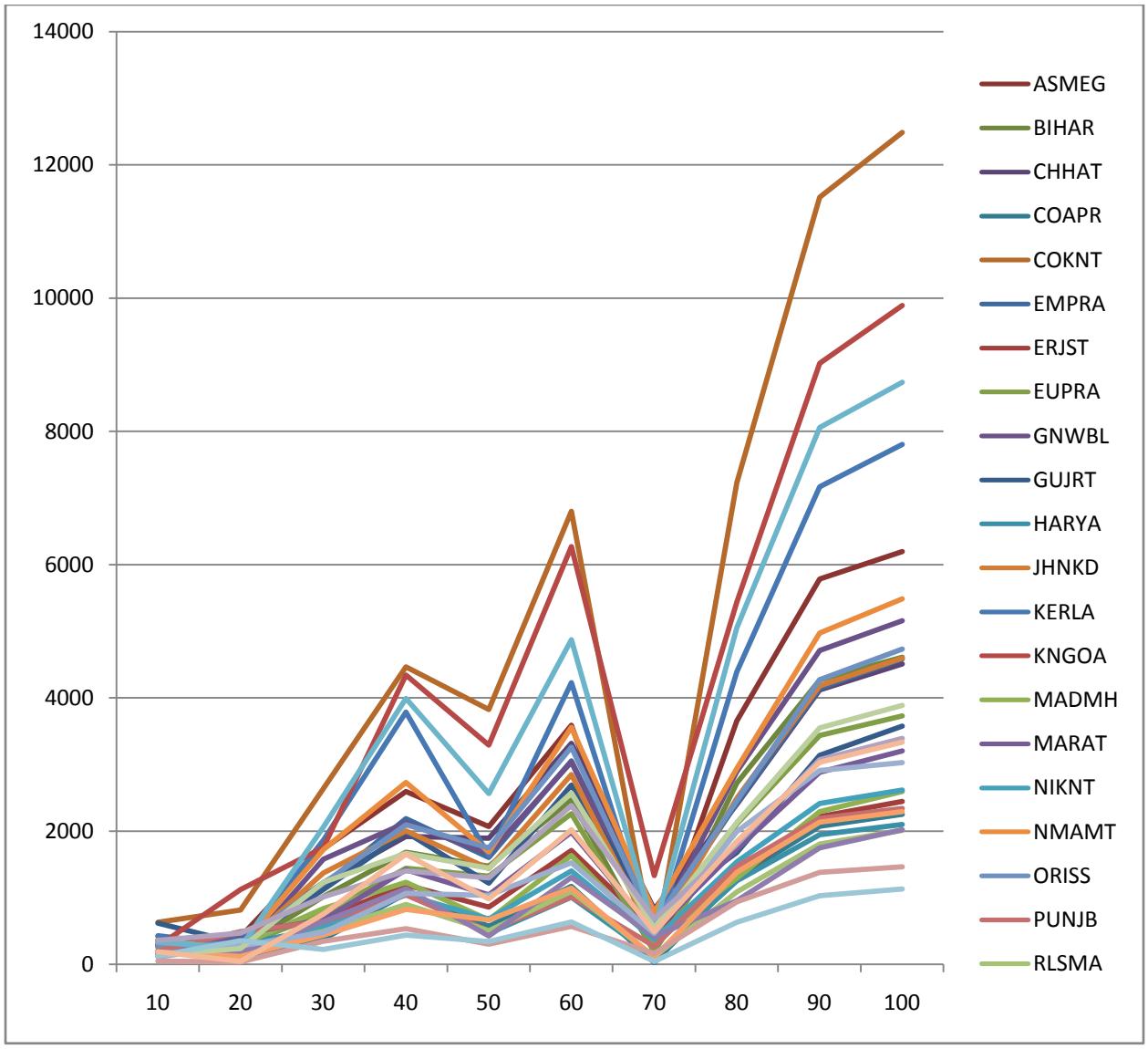

Fig. 3 Periodicity in Monthly Average Rainfall in All Regions during Jun-Sep (1871-2011)

- Trying to Extend for Periods up to 100 Years

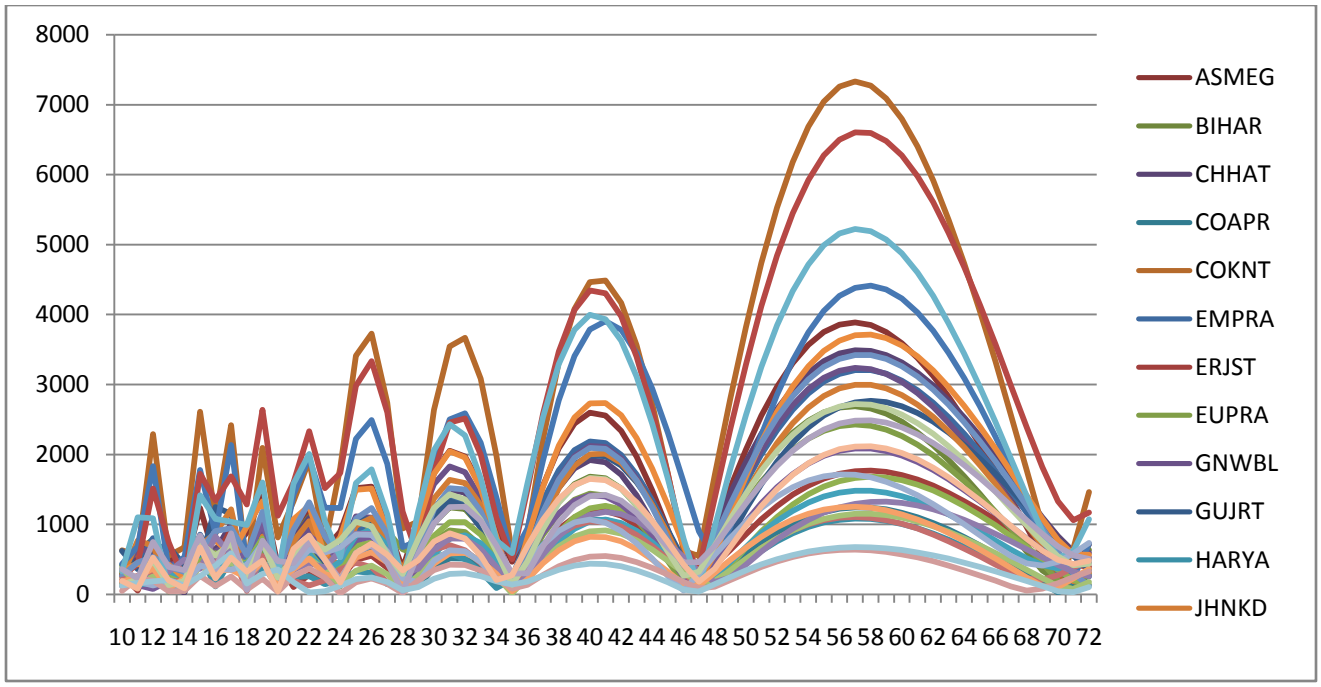

Fig. 4 Periodicity in Monthly Average Rainfall in All Regions during Jun-Sep (1871-2011)

- For Yearly Periods from 10 to 72