



New Tools for Comparing Beliefs about the Timing of Recurrent Events with Climate Time Series Datasets

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For climate services to be relevant and informative for users, scientific data definitions need to match users' perceptions or beliefs. This study proposes and tests novel yet simple methods to compare beliefs of timing of recurrent climatic events with empirical evidence from multiple historical time series. The methods are tested by applying them to the onset date of the monsoon in Bangladesh, where several scientific monsoon definitions can be applied, yielding different results for monsoon onset dates. It is a challenge to know which monsoon definition compares best with people's beliefs. Time series from eight different scientific monsoon definitions in six regions are compared with respondent beliefs from a previously completed survey concerning the monsoon onset.

Beliefs about the timing of the monsoon onset are represented probabilistically for each respondent by constructing a probability mass function (PMF) from elicited responses about the earliest, normal, and latest dates for the event. A three-parameter circular modified triangular distribution (CMTD) is used to allow for the possibility (albeit small) of the onset at any time of the year. These distributions are then compared to the historical time series using two approaches: likelihood scores, and the mean and standard deviation of time series of dates simulated from each belief distribution.

The methods proposed give the basis for further iterative discussion with decision-makers in the development of eventual climate services. This study uses Jessore, Bangladesh, as an example and finds that a rainfall definition, applying a 10 mm day^{-1} threshold to NCEP–NCAR reanalysis (Reanalysis-1) data, best matches the survey respondents' beliefs about monsoon onset.