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Exploring uncertainty estimates in a new high-resolution observed climate dataset for the Tropics

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High resolution climate datasets are required for numerous applications, but whilst any station network can be interpolated to a high resolution grid, the resulting datasets can be misleading in terms of the quality of the information in regions or time-periods where station coverage is sparse. Providing an error estimate for each grid-value allows us to make the most of the information available in the well-gauged regions and time periods whilst communicating effectively the regions or periods which are less well represented.

One such area of research that requires data sets of a high spatial resolution is vegetation modelling. TroBIT (Tropical Biomes In Transition) is a multidisciplinary data and model development project, exploring the role of tropical biome transition in the magnitude and rate of future climate change. One element of this program is the development of a high-resolution, monthly temperature and precipitation dataset which can be applied in vegetation modelling experiments. The TroBIT datasets include monthly grids of precipitation, minimum monthly temperature, maximum monthly temperature and mean temperature for the land areas within the tropics (30˚S to 30˚N) at a spatial resolution of 10 arc minutes. The datasets are based on the CRU station network, with several additional station network sources interpolated using a combination of thin-plate-splines and angular distance weighting (ADW). The interpolated fields will later be merged with satellite observations from the Tropical Rainfall Measuring Mission (TRMM) and temperature observations from reanalysis data.

These datasets will offer the advantage over existing datasets of including comprehensive error estimates for every grid value. Error estimates for each grid value are calculated using a combination of generalised cross validation values, calculated implicitly during the fitting of thin-plate-splines, and an 'interpolation standard deviation', a weighted average of the squared differences between data values and the retained estimate, proposed by Yamamoto (2000) and recently applied to a high-resolution daily European dataset described in Haylock et al. (2008). We examine the distribution of errors in the dataset in time and space, and their relationship with cross validation errors.