

ARRCC Impact Story

Gridding climate observation records in Pakistan



Motivation

Observational weather and climate records in Pakistan are underexploited in climate analysis and modelling because individual records (point data) are not easily compared to gridded (spatially interpolated) climate data (Figure 1). Converting existing weather records into a gridded format allows them to be used alongside other climate data to support climate modelling research. As part of the CARISSA project of the ARRCC programme, we worked with the **Pakistan Meteorological Department (PMD)** to tailor the existing Met Office “Climate Grid” software to enable the conversion of observational data into gridded data in Pakistan.



River and mountains topped by clouds - Chilas, Pakistan.

Our approach

Using a co-development approach:

1) We adapted the “Climate Grid” software to make it suitable for sharing with partners such as PMD.



2) PMD prepared their in-country observation data for gridding (Figure 1).



3) We delivered a training workshop on the Climate Grid software for PMD.



4) PMD are using the adapted software to create gridded observation data.

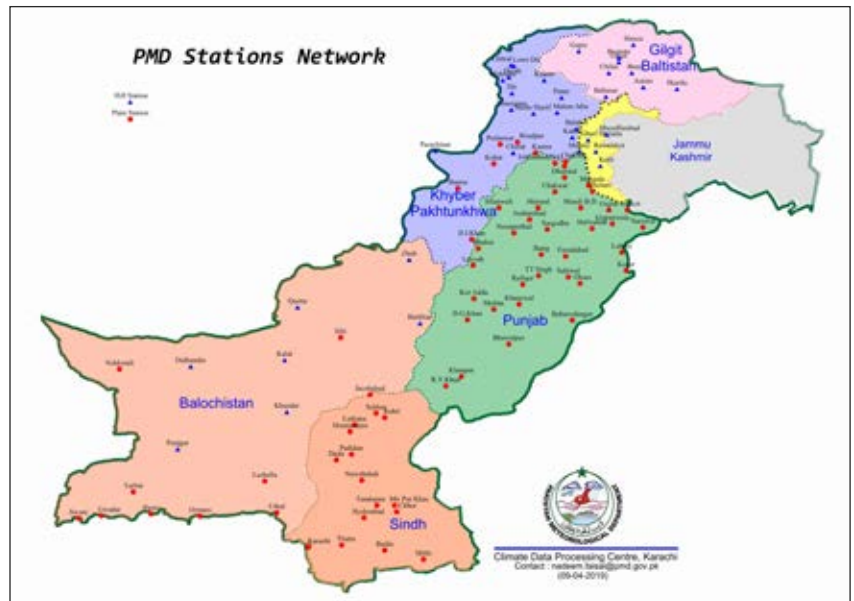


Figure 1. The locations of PMD weather observation stations within the country's main districts. Source: <http://www.pmd.gov.pk/cdpc/Stations%20Network.jpg>

This work was conducted in the Climate Analysis for Risk Information and Services in South Asia (CARISSA) project of the ARRCC Met Office Partnership programme.



Impacts

"[This training] has opened a lot of opportunities to develop and use observed climate gridded datasets for Pakistan. We are going to formulate a plan based upon the suggestions provided by UK Met Office to successfully build a reliable gridded data set for desired parameters in the coming days/months."

Capacity Development: We ran a training workshop with 15 members of the PMD to enable them to use the software to develop their own gridded observation datasets. All of workshop participants reported that they were likely or very likely to use what they had learnt.

Climate Research: PMD will generate climate grids for their observational data allowing them to:

- Monitor climate variability (extremes and long-term trends spatio-temporally)
- Verify climate model performance, satellite products, and other gridded data products
- Apply the data to impact models which simulate factors such as rainfall runoff, streamflow, hydropower, flooding, and ecological, agricultural, and infrastructural resilience. These gridded simulations can then be applied to other areas of research, such as flood management.

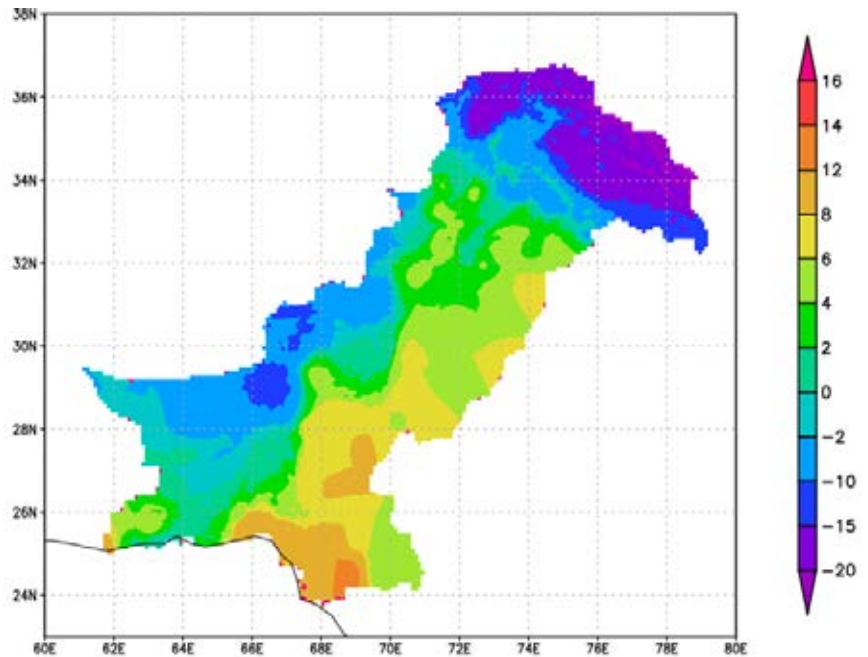


Figure 2. Example of a grid of daily minimum temperature (credit: PMD).

"We would like to use this dataset along with other datasets for performance based studies in different aspects of climate analysis."

What's next?

Collaborative Development: Our collaboration with PMD continues as they develop gridded climate data-sets for Pakistan. Future improvements in Climate Grid will be shareable with PMD and other partners.

Open-source Software: This project has made significant steps to making Climate Grid software ready for open-source in the future which would greatly facilitate the scope of building gridded data-sets from observed data.

Global Application: The software and training resources can be shared with other National Meteorological and Hydrographic Services, provided they have sufficient observation data, meteorological knowledge, and technological capacity. This has global implications for improving the weather and climate capabilities of developing nations.

Mitchell, T.D., Hollis, D., Daron, J. 2021, Development of Climate Grid to facilitate the construction of gridded data-sets of observed climate for Pakistan. For further information, please contact: internationaldevelopment@metoffice.gov.uk

