



Comparison of ERA-40 reanalysis downscaled temperature and precipitation with observational data over Greece.

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Because of their ready availability, and temporal and spatial consistency, reanalysis data are widely used within the climatological community. This study assesses the reliability of downscaled ERA-40 reanalysis temperature and precipitation data over Greece, for the period 1958-2000. The primary aim of the research is to derive a set of high spatial resolution data by three-dimensional interpolation of daily temperature and precipitation. Previous work revealed weak correlations between reanalysis and observed data, particularly over mountainous areas. Here, high-resolution topography data (1km by 1km) are explicitly incorporated into the downscaling procedure as a third spatial covariate along with the more customary x and y coordinates. The preferred interpolation technique is Thin Plate Spline (TPS) interpolation, and is used to downscale the ERA-40 temperatures and precipitation, at a spatial resolution of approximately 110 km, to the 1 km grid of the topography data.

This study evaluates the downscaling by comparing the downscaled variables with observational data. Daily data of temperature and precipitation for the same period (1958-2000) were collected from six meteorological sites. The chosen stations are distributed over the study region and, importantly for this analysis, contain information from a range of altitudes. Three stations are situated in the elevated Greek mainland, two other mainland stations are close to sea level, and the sixth station has an elevated location on an island. The downscaled reanalysis and the observational data are compared using correlation methods and detailed examination of their time series

and spatial patterns. The results indicate that including the topography improves the downscaling, with the biggest improvements being in the most mountainous areas.