
Daily extreme temperatures in ERA5-LAND versus in-situ measurements in Poland 1991-2020

Michał Marosz*^{†1}, Michał Kitowski¹, Małgorzata Szwed¹, and Klaudia Kusek¹

¹Institute of Meteorology and Water Management - National Research Institute – 42 Waszyngtona Street, Gdynia, Poland

Abstract

Monitoring and analysing extreme events in high spatial and temporal resolution is one of the most critical tasks facing national hydrometeorological services in the context of present climate change. It is also crucial in contemporary mitigation measures and necessary adaptation actions awaiting in the future. Reanalyses may serve as a tool that allows the monitoring and analysis of meteorological variables' long-term features, thus allowing a proper estimation of probabilistic characteristics of extreme events.

The research aimed to assess the concordance of ERA5-LAND reanalysis data (air temperature) with the resolution of 0.1x0.1 degree (~9km) with in-situ measurements acquired from the network of synoptic stations in Poland (56 stations). The temporal scope of analysis comprises the last normal period 1991-2020. Analysed variables comprised daily maximum and minimum temperatures. Those originated, where possible, from 1h temporal resolution datasets for both ERA5-LAND and in-situ measurements. The analysis covered the biases and the comparison of statistical distributions and characteristics of analysed variables. Additionally, GEV distribution characteristics at selected stations and the resulting differences of return levels for selected return periods were compared. The results show reasonably good concordance of ERA5-LAND reanalysis data with in-situ measurements, making it a suitable tool in long-term climate characteristics analysis.

Keywords: ERA5Land, temperature, extremes, verification, Poland

*Speaker

[†]Corresponding author: michal.marosz@imgw.pl