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Comparison of Three Interpolation Schemes for Six Parameters

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The European Commission set up the Copernicus Emergency Management Service (EMS), which up to now includes the European Flood Awareness System (EFAS) and the European Forest Fire Information System (EFFIS). Within this framework, the Meteorological Data Collection Center (Copernicus MDCC) collects data from European data providers and supplies regularly gridded and station related analyses as input data for the EMS's EFAS and EFFIS. To identify the optimum interpolation scheme for the six EMS relevant parameters (precipitation total, maximum temperature, minimum temperature, mean vapor pressure, daily mean wind speed, daily total radiation) a comparison of three different interpolation methods using European station observation data on a daily basis covering May 2014 had been conducted. This month featured high precipitation amounts in some areas of Europe, especially in the Balkan states and Italy. Such periods of high precipitation amounts across topographically structured terrain are a challenge for interpolation schemes to represent the entire variability actually taking place, thus most suitable for the comparison. We compared inverse distance weighting (Ntegeka et al., 2013), Spheremap (Willmott et al., 1985) and ordinary kriging (Krige, 1966). Furthermore, the uncertainty information of the gridded product is provided. A leave-one-out cross validation was utilized to assess the quality of the interpolation schemes and different error metrics were calculated, as they focus on different aspects of uncertainties. Yamamoto's approach was used to determine the uncertainty of the gridded fields in order to find the best interpolation scheme (Yamamoto, 2000). This analysis revealed that IDW is the best performing scheme regarding the computational effort. However, Spheremap is more robust against locally higher density of input data and grids generated by Spheremap are more reliable and the overall uncertainty is lower than in the other tested interpolation schemes comparing all parameters. Yamamoto's technique performs better than the leave-one-out cross validation to assess the uncertainty of gridded fields, as it is used for the generation of near-real-time grids and is applicable also to other gridded data sets.