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of high flows in the future. The statistical properties of peak flows for overlapping record periods from a set of selected streamflow gauges and model runs from corresponding grid-cells fitting are compared. Model runs consist of nine global impact models (GIMs) fed by five global climate models (GCMs) from the ISI-MIP Project. Further, we compare model fits for the future period (2065-2099) for an appraisal of changes in frequencies from the models. Results indicate a large discrepancy between the distribution of observed and modelled data, suggesting that most models fail to reliably simulate high flows. On the other hand, the evidence for the change in the statistical distribution in the future is not clear-cut. Our results call for caution in the use of model projections for the assessment of flood risk changes and highlight the need for a routine evaluation of the model outputs against observations. Finally, the shortcomings of the routine statistical methods used to assess the presence of differences between the statistical properties of model runs for the present and the future time-window are presented and discussed.

Experimental Evaluation of Temperature Uncertainty Components Due To Siting Condition With Respect To WMO Classification

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Automatic weather stations (AWSs) are one of the biggest sources of essential climate variables (ECVs) data, which are necessary to understand the environmental conditions on the surface of the planet. Detection of climate changes based on observed temperature data can be affected by inhomogeneity arising from temporal variation in microscale environments around stations. Indeed, the surface atmospheric air temperature measurements are influenced by the obstacles close the measurement site itself. The purpose of the present study is a contribution to the improvement of the World Meteorological Organization's document "Sustained Performance Classification for Surface Observing Stations on Land", through data analysis of an in-field experiment, within the European project "MeteoMet, Metrology for Meteorology ". In order to improve the WMO/CIMO siting classification for air temperature measurements, three field experiments were carried out, employing a rigorous metrological approach, to evaluate the effect of the presence of different obstacles (roads, trees and buildings) on the uncertainty in air temperature measurement. This work presents a description of the current situation related to the road siting classification for surface observation stations on land in the WMO/CIMO Guide. In accordance with preliminary analysis's results, a semiparametric model for Delta T – the difference between the temperature recorded by a sensor exposed to the effect of the obstacle and the sensor compliant with the current recommended exposure rules - has been developed. The model features also a seasonal factor and smooth terms for the dependence on meteorological variables and their interaction, applied to road siting. Furthermore, the large amount of acquired data (over 13

million fields in 1 million records) gathered with high frequency allows us to exploit a functional data approach.

A Hidden Markov Approach To the Analysis of Cylindrical Space-time Series

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Motivated by segmentation issues in marine studies, a new hidden Markov model is proposed for the analysis of cylindrical space-time series, that is, bivariate space-time series of intensities and angles. The model is based on a hierarchical mixture of cylindrical densities, where the parameters of the mixture components vary across space according to a latent Markov field, whereas the parameters of the latent Markov field evolve according to the states of a hidden Markov chain. It allows to segment the data within a finite number of latent classes that vary over time and across space and that represent the conditional distributions of the data under specific environmental conditions, simultaneously accounting for unobserved heterogeneity, spatial and temporal autocorrelation. Further, it parsimoniously accommodates specific features of environmental cylindrical data, such as circular-linear correlation, multimodality and skewness. Due to the numerical intractability of the likelihood function, parameters are estimated by a computationally efficient EM-type algorithm that iteratively alternates the maximization of a weighted composite likelihood function with weights updating. The effectiveness of the proposal is tested in a case study that involves speeds and directions of marine currents in the Gulf of Naples observed over time, where the model was capable to cluster cylindrical data according to a finite number of latent classes varying over time that are associated with specific environmental conditions of the sea.

Spatial Sampling With Spreading the Samples in the Auxiliary Variables' Space

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Statistical units selected from a territory are generally spatially correlated which means that two neighbouring statistical units tend to be more similar than two distant statistical units. It is a well-known finding in the literature on sampling from spatial populations that in a situation of this type it is advantageous to select units well spread over the territory. Moreover, when the values taken by some auxiliary variables are known for each unit of the population, the sampling method should be able to take into account both the spatial structure of the population and the available auxiliary information. The aim of this study is the identification of an appropriate sampling technique for the analysis of the seismic vulnerability of the residential buildings in the city of Florence. A census evaluation of the whole town