



## **Warnings verification at the Meteorological and Hydrological Service of Croatia**

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The role of national meteorological services is increasingly related to the warnings. This is particularly relevant due to the more frequent extreme events and high impact weather. At the Meteorological and Hydrological Service of Croatia various warnings products are issued: from the general public, Civil protection service and MeteoAlarm to different specialized products, such as heat spells, cold spells, forest fire warnings, etc.

Verification of warnings is a relatively complex field, with spurious methods and diverse data. Still, various results of warnings verification will be presented in this paper, mostly through the contingency tables and related verification scores. Major problems will be discussed: for some forecast, such as heat/cold waves the forecasting system exhibits strong oversensitivity on the temperature thresholds that results in significant noise, and unusual number of missed events. Additionally, crucial problem for many forecasted events/parameters is the lack of socio-economic studies (e.g. cost-loss ratio, which is not estimated for most users or events), so the choice of thresholds is somewhat arbitrary.

Particular forecast verification, such as forest fire danger warnings, face difficulties due to improper, mostly nonhomogeneous data, characterized by small samples and contaminated with many non-meteorological components. Furthermore, for extremely hazardous situations where lives or property can be threatened, there is also a psychological pressure on the duty forecaster, that can lead to certain overforecasting.

All these results provide a comprehensive insight to the warning forecasting systems, their properties and give a good feed-back to the forecasters, but also a guidance for the improvement of the forecasts.