

Meteorological and Hydrological Forecasting:

Applications and Open Problems

Previsioni meteorologiche e idrologiche: applicazioni e problemi aperti

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Riassunto: Lo scopo della presentazione è quello di descrivere brevemente, da un punto di vista soggettivo e individuale e quindi senza alcuna pretesa di completezza o di esaustività, alcune problematiche di idrometeorologia e di climatologia che sono attualmente ad uno stadio di evoluzione tale da potersi avvalere di importanti contributi da parte delle discipline statistiche. Verrà fatto anche riferimento ad alcuni esempi di tali problematiche che nel passato hanno seguito percorsi simili.

Keywords: Meteorology, Hydrology, Geostatistics, Spatio-Temporal Models.

1. Introduction

Aim of this talk is to briefly describe, from a subjective point of view and hence without any claim of completeness and exhaustivity, some problems in hydro-meteorology and climatology which are currently at such a stage of development as to resort to important contributions from statistics. Reference will also be made to some examples of problems which in the past have followed a similar pattern.

A list of potential candidates may be as follows:

1. the models as tools for the interpolation in space and time: at the end of the modelling process, are the data observed or modelled?
2. objective spatio-temporal analysis, optimal interpolation, geostatistical Kriging, uni- and/or multi-dimensional (1 to 4 D-Var) variational assimilation;
3. statistical postprocessing methods of observed and/or modelled data: MOS and Perfect Prog;
4. systematic errors in meteorological, hydrological and climatic models, and their possible corrections;
5. problems involving EOF's and PC's: atmospheric "modes" and seasonal predictions;
6. "ensemble" methods of prediction: EPS, LEPS, SREPS. The estimation of uncertainty: *no forecast is complete without the forecast of the forecast skill*;
7. Kalman filters;
8. epidemiology: mortality and heat waves; interventions as confounders;
9. inverse problems: the use of satellite data.