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How accurate are the weather forecasts for Bierun (southern Poland)?

J. Gawor
Gymnasium no 2 in Bierun, Bierun, Poland (joan.gawor@wp.pl)

Weather forecast accuracy has increased in recent times mainly thanks to significant development of numerical weather prediction models. Despite the improvements, the forecasts should be verified to control their quality.
The evaluation of forecast accuracy can also be an interesting learning activity for students. It joins natural curiosity about everyday weather and scientific process skills: problem solving, database technologies, graph construction and graphical analysis.
The examination of the weather forecasts has been taken by a group of 14-year–old students from Bierun (southern Poland). They participate in the GLOBE program to develop inquiry-based investigations of the local environment. For the atmospheric research the automatic weather station is used. The observed data were compared with corresponding forecasts produced by two numerical weather prediction models, i.e. COAMPS (Coupled Ocean/Atmosphere Mesoscale Prediction System) developed by Naval Research Laboratory Monterey, USA; it runs operationally at the Interdisciplinary Centre for Mathematical and Computational Modelling in Warsaw, Poland and COSMO (The Consortium for Small-scale Modelling) used by the Polish Institute of Meteorology and Water Management.
The analysed data included air temperature, precipitation, wind speed, wind chill and sea level pressure. The prediction periods from 0 to 24 hours (Day 1) and from 24 to 48 hours (Day 2) were considered. The verification statistics that are commonly used in meteorology have been applied: mean error, also known as bias, for continuous data and a 2x2 contingency table to get the hit rate and false alarm ratio for a few precipitation thresholds.
The results of the aforementioned activity became an interesting basis for discussion. The most important topics are: 1) to what extent can we rely on the weather forecasts? 2) How accurate are the forecasts for two considered time ranges? 3) Which precipitation threshold is the most predictable? 4) Why are some weather elements easier to verify than others? 5) What factors may contribute to the quality of the weather forecast?