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## Modeling of air temperatures using a combination of TBATS and SVM models for various climatic locations in Europe

**Magdalena Gos**<sup>1</sup>, Piotr Baranowski<sup>1</sup>, Jaromir Krzyszczak<sup>1</sup>, Małgorzata Murat<sup>2</sup>, and Iwona Malinowska<sup>2</sup>

<sup>1</sup>Institute of Agrophysics, Polish Academy of Sciences, Department of Metrology and Modelling of Agrophysical Processes, Lublin, Poland (m.gos@ipan.lublin.pl)

<sup>2</sup>Lublin University of Technology, Department of Mathematics, Lublin, Poland

By modelling and forecasting of meteorological time series it is possible to improve understanding of the weather dynamics and fluctuations as a result of climate change. The most frequently used forecasting models are exponential smoothing, ARIMA models (Box and Jenkins, 1970), state-space models (Harvey, 1989) and innovations State Space Models (Hyndman et al., 2008).

The aim of this study was to check the effectiveness of the coupled TBATS and Support Vector Machines (SVM) model, supplied with some measured meteorological quantities to forecast air temperature for six years for four climatic localizations in Europe. The study was calculated from northern (Jokioinen in Finland), central (Dikopshof located in the west part of Germany and Nossen in the south part of Germany) and southern (Lleida in Spain) Europe to present different climatic conditions. Jokioinen city has a subarctic climate that has severe winters, with cool and short summers and strong seasonality. Lleida has a semi-arid climate with Mediterranean. Dikopshof represents maritime temperate climate. There are significant precipitation throughout the year in Dikopshof and Nossen. In the study we study on air temperature dataset collected on a daily basis from January 1st 1980 to December 31st 2010 (11322 days).

For all the studied sites coupled TBATS/SVM models occurred to be effective in predicting air temperature courses, giving an improved precision (up to 25%) in forecasting of the seasonality and local temperature variations, compared to pure SVM or TBATS modelling. The precision of prediction of the maximum and minimum air temperatures strongly depended on the dynamics of the weather conditions, and varied for different climatic zones.

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