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Ionospheric prediction and forecasting in Europe

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The paper reviews the methods and the models for short-term ionospheric prediction and forecasting, developed mainly within the European COST 251 and 271 actions. This review consider the empirical models using a linear regression approach; the models using Neural Network technique remain outside the scope of the paper. The empirical models predict, in general, maps of the ionospheric characteristics foF2, M(3000)F2 measured by the European ionosonde network, as well as TEC, calculated from ionogram traces. The prediction capabilities of the methods examined range from 1 hour (nowcasting) to 3 days lead time. The methods are based either on weighted extrapolation from the past measurements, or on analytical expressions explicitly depending on geomagnetic indices Kp or ap. Prediction accuracy is widely discussed. Some prediction models are further developed to serve as forecasting tools for various applications, providing maps of the ionospheric characteristics over the European area.