Application of the Solar Wind driven autoregression model for Ionospheric short term Forecast (SWIF) to the DIAS system

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The application of the SWIF (Solar Wind driven autoregression model for Ionospheric short term Forecast) model to the European Digital Upper Atmosphere Server - DIAS is discussed in this paper. SWIF is an empirical method designed to provide alerts and warnings for upcoming ionospheric storm disturbances as well as ionospheric forecasts for the middle latitude ionosphere. It combines historical and real-time ionospheric observations with solar wind parameters obtained in real time at L1 point through the cooperation of an autoregression forecasting algorithm, namely TSAR with an empirical ionospheric storm time model, namely STIM that is triggered by solar wind disturbances. SWIF can be considered as a powerful tool for the development of a full set of ionospheric forecasting services and therefore it can efficiently serve the objectives of the DIAS system (http://dias.space.noa.gr). As a first step towards the application of SWIF in DIAS, the work presented here includes the evaluation of SWIF's performance over all DIAS station locations (Athens, Rome, Ebre, Arenosillo, Chilton, Juliusruh, and Pruhonice) and the determination of its prediction accuracy limits for all possible geophysical conditions based on historical data. The results verify the reliability of SWIF's performance for prediction step up to 24 h ahead for all European locations and drive the upgrade of the SWIF algorithm for the accommodation of the prediction error at each prediction step. Finally, the on-line implementation of the SWIF algorithm in DIAS system leads to the substantial upgrade of all DIAS related products and services (e.g. single station forecasts, European forecasting maps, alerts and warnings). This upgrade will strengthen further the basis of the EURIPOS initiative, since reliable ionospheric forecasts are important for the development of new models and tools towards the successful specification of the ionosphere-plasmasphere system.