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Comparison of Different Approaches for the Real Time Forecast of the F10.7 index at the Space Weather Forecasting Centres.

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Solar radio flux measurements at 10.7 cm provide a reliable monitoring dataset of the solar activity over the past six solar cycles. The radiation at 10.7 cm is coming from the upper chromospheric/low coronal layers of the Sun and it is correlated with white light, sunspot number and UV radiation which impacts terrestrial atmospheric layers from the ionosphere till the stratosphere.

The statistically analysis of F10.7 index data set is very robust due to the nature of the ground based measurements which are practically unaffected by the weather conditions. Slow modulations of highly non-stationary F10.7 index data series have strong impact on the terrestrial climate, while fast changes - related to energetic solar events - have immediate impact on high frequency communications and on the satellite drag effect, which is significant for small size satellites.

In this work, we discuss three operational methods for the forecast of F10.7 index currently in use for different operational purposes:

1. SIDC and NOAA currently provides short and long term forecasts for the F10.7 index - based on a manual analysis of the index values during the latest three Carrington rotations. Additional considerations are taken into account when new active regions emerge or flare probability is elevated.
2. A new autonomous tool, the Self-Adjusted Solar Flux Forecasting (SASFF) . The solar radioflux dynamics is modelled by a nonstationary random walk with a variable drift and the forecast of the F10.7 index is based on an adaptive Kalman filter model which is used to identify the a priori unknown drift. SASFF operates autonomously and provides solar flux forecasts including forecasting uncertainties.
3. Modified linear regression which considers dependences of the F10.7 index to other solar indices (e.g sunspot number).

A comparative analysis of the forecasting errors is performed as the function of the solar cycle for every operational method.