



Forbush Decrease Prediction Based on Remote Solar Observations

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We study the relation between remote observations of coronal mass ejections (CMEs), their associated solar flares and short-term depressions in the galactic cosmic-ray flux (so called Forbush decreases). Statistical relations between Forbush decrease magnitude and several CME/flare parameters are examined. In general we find that Forbush decrease magnitude is larger for faster CMEs with larger apparent width, which is associated with stronger flares that originate close to the center of the solar disk and are (possibly) involved in a CME-CME interaction. The statistical relations are quantified and employed to forecast expected Forbush decrease magnitude range based on the selected remote solar observations of the CME and associated solar flare. Several verification measures are used to evaluate the forecast method. We find that the forecast is most reliable in predicting whether or not a CME will produce a Forbush decrease with a magnitude $>3\%$. The main advantage of the method is that it provides an early prediction, 1-4 days in advance. Based on the presented research, an online forecast tool was developed (Forbush Decrease Forecast Tool, FDFT) available at Hvar Observatory web page: <http://oh.geof.unizg.hr/FDFT/fdft.php>. We acknowledge the support of Croatian Science Foundation under the project 6212 „Solar and Stellar Variability“ and of European social fund under the project “PoKRet”.