The role of the solar wind on the low-latitude ionosphere during the descending phase of solar cycle 24

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The descending phase of the solar cycle is characterized by the increased occurrence rate of solar coronal holes which emanated high-speed solar wind streams to the interplanetary space. As they propagate in the space they interact with the preceding slow solar wind and form large structures called interaction region or corotating interaction regions. Although these interplanetary structures do not cause intense geomagnetic storms, they are responsible by a variety of phenomena such as: long duration auroral activity, referred as HILDCAAs, electric field-driven effects, such as prompt penetration or disturbance dynamo, particle precipitation, ionospheric storms/neutral composition changes, disturbed equatorward wind system and others. In order to understand the influence of the solar wind on the ionospheric variability, we study the relationship between the distinct features of the coronal holes, solar wind, interplanetary and geomagnetic indices and parameters such as, solar wind speed, Vsw, interplanetary magnetic field, B, auroral electrojet index, AE, symmetric ring current, SymH, and the ionospheric parameters. After that, we analyzed the ionospheric response in the distinct phases of the storms, which is highly variable especially due to the high Alfvenicity of the magnetic field and to the extended recovery phase of the storms. For the purpose of this study, we used instruments including GNSS receivers, ionosondes, magnetometers, and other ground-based systems. This study may be useful for ionospheric modelling and Space Weather forecast models.

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