

Remotely sensed of some parameters of the solar wind via a low-latitude Pc 5 index

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Pc 5 geomagnetic pulsations have been reported to be related directly to an externally drive parameters such as solar wind parameters (i.e. solar wind flow speed and pressure); and the Kelvin-Helmholtz instability on the magnetopause is known to play the role of the greatest contributor to the Pc 5 pulsations (band range: 1.7-6.7 mHz) which is observed on the ground at different latitudes. The Kelvin-Helmholtz instability excites as well the body waves that termed as waveguide modes which propagate between the magnetopause and a turning point located in the magnetosphere. Moreover, other internal mechanisms of Pc 5 pulsations have also been reported such as the drift mirror instability and the drift-bounce resonances of ring current ions with standing Alfvén waves. Herein, a low-latitude Pc 5 index is defined in order that it proxy the Pc 5 pulsations amplitudes ranges observed at a low-latitude ground station, and it describes the activity of geomagnetic fluctuations in the Pc 5 range quantitatively. We investigated the reliability of remotely sensed solar wind flow speed and pressure that is by examining the reliability of estimating of both the solar wind flow speed and pressure via our defined low-latitude Pc 5 index. The designated Pc 5 index is composed by using the hourly averaged Pc 5 pulsations amplitudes observed on a ground low-latitude, magnetic data acquisition system (MAGDAS), station and assigning the Pc 5 index values with its corresponding Pc 5 amplitudes ranges; the values of the Pc 5 index are set so that they look similar to those of the Kp index with their same order; and as long as the Kp index describes the accumulative geomagnetic disturbance activity as it is designed for, our Pc 5 index is designed to describe the geomagnetic activity in the Pc 5 band range at low latitudes. The estimation of both solar wind flow speed and pressure via the Pc 5 index shows good agreement with the observed values that was true for the relatively low values of the Pc 5 index which were high in their occurrence distribution compared with the high values of the Pc 5 index which were low in their occurrence distribution. We concluded that it is considerable to rely on one of the usage of the Pc 5 index as a method for remotely sensed the solar wind right away from the ground.

Keywords: solar wind parameter, Pc5 pulsation