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Principal component analysis of global maps of the total electronic content

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Abstract

In this paper we present results of the spatial distribution analysis of the total electron content (TEC) performed by the Principal Component Analysis (PCA) with the use of global maps of TEC provided by the JPL laboratory (Jet Propulsion Laboratory, NASA, USA) for the period from 2004 to 2010. We show that the obtained components of the decomposition of TEC essentially depend on the representation of the initial data and the method of their preliminary processing. We propose a technique for data centering that allows us to take into account the influence of diurnal and seasonal factors. We establish a correlation between amplitudes of the first components of the decomposition of TEC (connected with the equatorial anomaly) and the solar activity index F10.7, as well as with the flow of high energy particles of the solar wind. © 2014 Pleiades Publishing, Ltd.

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