



Relationship between major geophysical events and the planetary magnetic Ap index, from 1844 to the present

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Abstract

In this study, for the first time, we compared the annual magnetic Ap index, taken from original sources, from 1844 to the present day [Svalgaard,2014], with:

- i) sixteen large volcanic eruptions of index VEI5 + recorded by, Smithsonian Institute (Global Volcanism Program),
- ii) three sets of the volcanic aerosols data [Ammann et.al, 2003][Gao;Chaochao;Alan Robock;Caspar Ammann,2008][Traufetter et.al,2004] and
- iii) eight major earthquakes of a magnitude between $8.7 < M < 9.5$, which occurred from 1900 to the present.

We observe that the twenty four major geophysical events which occurred were in proximity to two specific thresholds, or limits, of the annual planetary Ap index. Specifically, in the downward phase of the planetary Ap index, under the annual value of 7 or, in the phase when the annual value exceeded 22. We identified a total of 14 transitions (eight in the solar minimum and six in the solar maxima) each with a period of about two and a half years making a total of almost 35 years of activity during the 169 years under review. During the 14 transitions 18 of the 24 major historical geophysical events occurred from 1844 to the present. Analysis of data shows a clear link between the electromagnetic (EM) dynamics recorded in large historical solar minima (Maunder, Dalton or solar minimum 1880-1920), the large solar maxima (solar cycles 19, 21 & 22) and the energy released during large geophysical events [Casati,2014]. The physical process of solar-terrestrial interaction, also reveal a deep and intrinsic relationship between the EM dynamics of the inner solar system and the temporal occurrence of major geophysical events. The references in scientific literature, in support of this work, are numerous: from empirical evidence, that we find in the late nineteenth century - early twentieth century, to more recent references. Some of which are: [Casey,2010][Charvátová, 2010][Choi, 2010][Duma; Vilardo, 1998][Khachikyan et al,2014][Kolvankar,2008][Kovalyov,2014][Mazzarella;Palumbo,1989][Stothers,1989][Střeščík,2003][Sytinsky,1987,1989, 1998].