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SEPServer's added value to Solar Energetic Particle (SEP) Research

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SEPServer brings together a wealth of SEP data, analysis methods and diverse but at the same time interconnected solar and heliospheric communities. It thus provides an open tool that advances our understanding of SEP propagation and acceleration. The scientific conclusions of this effort are drawn with the implementation and release to the SEP community of multiple SEP event catalogs based on different spacecrafts and instruments, covering a broad timescale from 1975 to 2013 as well as a variety of distances from 0.3 to ∼5 AU within the heliosphere. SEP events from Helios A & B missions, going back to 1975, at distances 0.3-1 AU, together with their Electromagnetic (EM) counterpart from OSRA data (from Leibniz Institut für Astrophysik Potsdam) are being released for the first time. A catalog covering solar cycle 23 based upon the Solar and Heliospheric Observatory (SOHO)/ Energetic and Relativistic Nuclei and Electron (ERNE) high-energy (∼68 MeV) protons at 1 AU with parallel analysis of SOHO/ Electron Proton Helium Instrument (EPHIN) and Advanced Composition Explorer (ACE) / Electron, Proton and Alpha Monitor (EPAM) data, including the relevant EM associations has also been delivered. Furthermore, the first complete Solar TErrestrial RElations Observatory (STEREO) SEP catalog based on the Low Energy Telescope (LET) protons (6-10 MeV) and the Solar Electron Proton Telescope (SEPT) electrons (55-85 keV) from 2007 to 2012 has been implemented. Moreover, the Cosmic Ray and Solar Particle Investigation (COSPIN) Kiel Electron Telescope (KET) data of 38-125 MeV has been used to identify a new catalog of SEP events observed in and out of the ecliptic plane over solar cycle 23, with simultaneous analysis of electrons recorded by the Heliosphere Instrument for Spectra, Composition and Anisotropy at Low Energies (HISCALE). For selected cases simulation based analysis has been applied in order to identify the timing of the injection history and to provide a cross reference to the EM emissions, leading to a comprehensive treatment of these events and to the corresponding testing of the data-driven analysis methods. Furthermore, the modeling efforts undertaken within SEPServer have led to the development of publicly available software for the analysis of solar energetic particle events (e.g. SEPinversion). This software provides the user of SEPServer the ability to invert SEP events and to deduce the corresponding source of the event as well as the propagation conditions in the interplanetary space. SEPServer is an open tool for data, scientific results and sophisticated software retrieval.