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New and Updated Ion Composition Data Products from SWICS

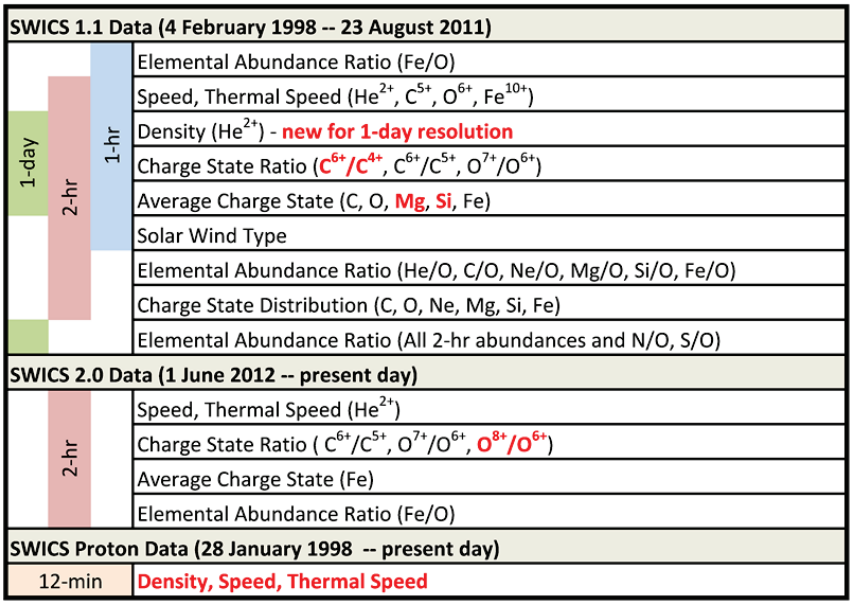
The Solar Wind Ion Composition Spectrometer (SWICS), as part of the ACE and Ulysses payloads, has revolutionized our understanding of the composition of the solar wind. After a brief commissioning period in 1997, ACE/SWICS has become the longest-operating composition instrument in flight, providing unprecedented elemental composition, ionic composition, and dynamic properties of 77 species in the solar wind.

To get the most value out of this investigation, the SWICS team has undertaken an improved analysis of all SWICS data, providing the most accurate and most complete data set available to the community. The new SWICS data are provided in two categories:

- From 4 Feb 1998 to 23 Aug 2011, 'SWICS 1.1', indicates a newer and improved data set than was formerly available. A thorough recalibration has been performed, which involved creating an instrument forward model and ion identification scheme more advanced and precise than that used formerly, allowing for a reanalysis of SWICS data from the beginning of the mission to the present, and the recovery of more ions and data products than were available previously. Most importantly, this novel analysis properly accounts for low flux elements and uses the correct statistical inversion methodology, as described by Shearer et al., ApJ, 789, 2014.
- On 23 August 2011, a radiation- and age-induced hardware anomaly altered the operational state of SWICS, causing an increased level of background to appear in the heavy-ion time-of-flight measurement and creating an instrument that best measures composition in an Energy/charge–Energy mode. To understand and characterize this background, SWICS data delivery was suspended while various alternate instrument settings were tested and a new model for data recovery was developed. The ensuing new operating mode of SWICS is now called 'SWICS 2.0', indicating that it operates as a new and different instrument, delivering a different set of data products than were available previously. SWICS 2.0 data are now available from 1 June 2012 to present day, and SWICS continues to make heavy ion measurements that are not available from any other solar wind composition instrument in flight today.

In addition, the SWICS proton measurements, which are captured in a separate instrument channel and were unaffected by the hardware anomaly, are now delivered at 12-minute resolution for the entire duration of the SWICS investigation.

The figure shows the SWICS data products that are now available from the ACE Science Center, with new data products shown in **bold**. In addition to these, a merged SWEPAM-SWICS solar wind proton data time series is continuing to be delivered as a Level 3 data product. Both the new and the recalibrated SWICS data, along with release notes explaining the analysis and recalibration, and the statistical guidelines for data usage, can be found at http://www.srl.caltech.edu/ACE/ASC/level2/index.html.



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