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Suprathermal ions at 1 AU in solar wind fluxes from near equatorial coronal holes in 2006-09

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Ion energy spectra and abundance ratios were studied in 0.04-2 MeV/nucleon ion fluxes using ACE/ULEIS data during the solar minimum between solar cycles 23 and 24. The unique prolonged minimum of 2006-2009 permitted to select 35 quiet time periods when suprathermal ion fluxes from near equatorial coronal holes (CH) were observed at 1 AU. The values of relative ion abundances indicate the presence of a particle population accelerated in different processes on the Sun or in the interplanetary space and forming suprathermal particle fluxes. Suprathermal C/O and Fe/O ratios from coronal holes were found to correlate with their bulk solar wind values from CH (ACE/SWICS data) whereas suprathermal 4He/O values were about ten times higher than their bulk wind values. 3He, 4He, Fe, C and O ion energy spectra showed that ion intensities depended on solar wind speed and the fluxes were higher inside fast wind streams. The results obtained suggest that the bulk solar wind described by Maxwellian distribution appears to be the source of ions further accelerated to suprathermal energies forming the high energy solar wind tail. The ion spectra obtained here were fitted by power law functions or combined power law-exponential which suggests different mechanisms of acceleration.

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