Heliospheric current sheet 中文

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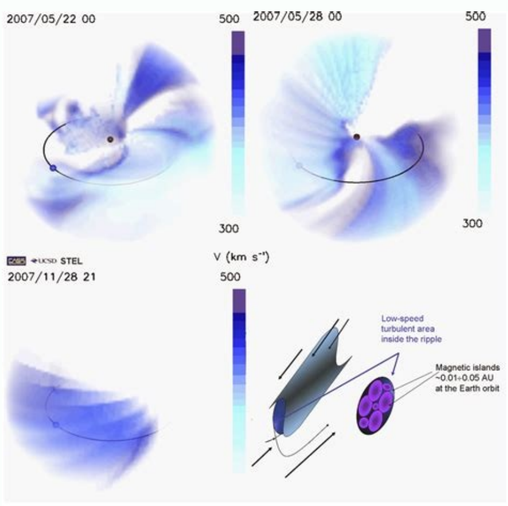
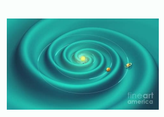
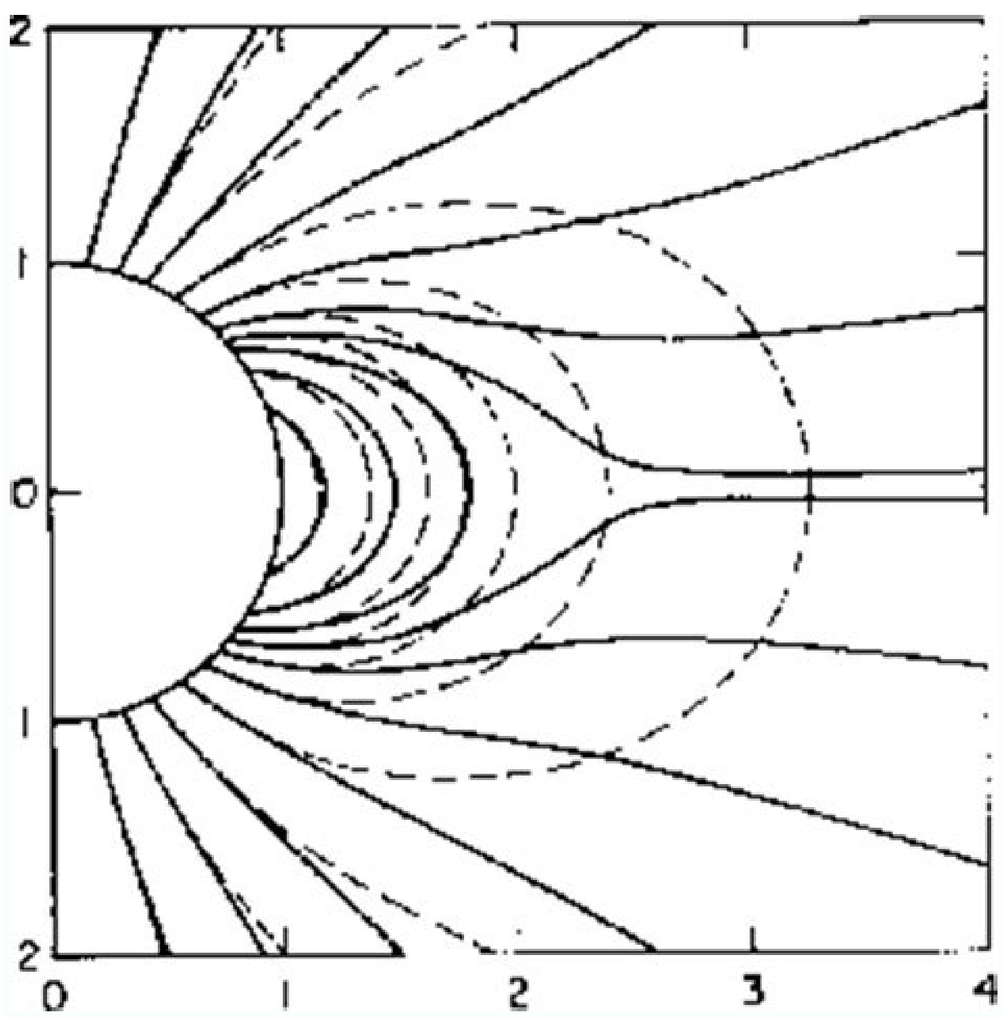

2007/05/22 00
500
300
2007/05/28 00
500
300
V (km s⁻¹)
STEL
2007/11/28 21
500
Low-speed
turbulent area
inside the ripple
Magnetic islands
~0.01-0.05 AU
at the Earth orbit



PAD
712 eV
519 eV
372 eV
272 eV
198 eV
142 eV
102 eV
73.3 eV
clock
ang.,
deg
HCS
Bx, nT
By, nT
Bz, nT
intensity, (cm2 s sr MeV)-1
0.066-0.114MeV
0.114-0.190MeV
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
12:00:00
00:00:00
07 Oct 10
07 Oct 10
07 Oct 11
07 Oct 11
07 Oct 12
07 Oct 12
07 Oct 13



heliospheric current sheet 解釋 current: adj. 1. 通用的，流行的。2. 現在的，現時的，當時的。3. 流暢的；草寫的。n. 1. 水流；氣流；電流。2. 思潮，潮流；趨勢，傾向。3. 進行，過程。sheet: n 1 常 pl 被單；褥單。2 裹屍布。3 （懺悔者穿的）白衣；懺悔服。4 一張（紙）；紙張；（尤指黃色... heliospheric current sheet 例句 目前還沒有heliospheric current sheet例句。 由於太陽自轉，磁場被扭曲成帕克螺旋(Parker spiral)，這是阿基米德螺旋的一種，是由尤金·帕克於1958年提出的[5]，因而得名。電流片將帕克螺旋形狀的磁場一分為二[6][7]。1970年代早期，Schatten發展出一個數學模型，當旋轉的磁場改變極性時會翹曲、變形，形成類似芭蕾舞裙的波浪螺旋形狀[8][9]。進一步的動力學研究表明，太陽如同一位害羞的女芭蕾舞演員，會將高高飄揚的裙擺反覆向下壓[10]。這種芭蕾舞裙形狀的成因有時被稱為"水龍頭效應"或者"橡膠軟管效應"[11][12]，好比一個人手執水龍頭上下揮舞並且快速旋轉。水流好比太陽風不斷向外噴射。 磁場太陽圈電流片隨著太陽的自轉每27天轉一圈，在這期間地球的磁場會穿越其峰頂與谷底，並與之發生相互作用。在靠近太陽表面的地方，由電流片中的徑向電流產生的磁場大約在5×10-6T量級[4]。太陽表面的磁場大小約為10-4T。如果是磁偶極場，其強度與距離的三次方成反比，地球軌道附近的磁場大約為10-11T。而實際上太陽磁場含有多極矩的成分，因此在地球附近實際大小要比這大100倍。 電流太陽圈電流片中的電流向內流動，並與太陽磁場一道在太陽極區附近向外流動的電流構成閉合迴路，總電流大約在3×109安培的數量級[4]，太陽圈中電流密度最大的地方達到了10×-10A/m2的數量級。與其它天體物理過程中的電流片相比，產生地球極光的柏克蘭電流只有大約100萬安培，大小只有太陽圈電流片中電流的千分之一。 研究歷史太陽圈電流片是由翰M. 威爾科克斯和諾曼F. Ness在1965年提出的[13]。漢尼斯·阿爾文等人推測銀河系也存在類似的星系電流片[14]，估計電流大小為1017-1019安培，位於銀河系的對稱平面上。 ^ 新聞:中央研究院天文及天文物理研究所翻譯，《兩個北極的太陽》，中央研究院，2003.4.22^ 2.0 2.1 Dr. Tony Phillips, A Star with two North Poles, Science@NASA, 2003.04.22^ Riley, Pete, Linker, J.A., Mikić, Z., 2002, Journal of Geophysical Research (Space Physics), 107, pp. SSH 8-1. DOI:10.1029/2001JA000299 NASA ADS^ 4.0 4.1 4.2 Israelevich, P.L., et al., 2001, Astronomy and Astrophysics, 376, 288. DOI:10.1051/0004-6361:20010881 NASA ADS^ Parker, E.N., 1958, Astrophysical Journal, 128, 664. NASA ADS^ Schatten, K.H., 1976, Nature, 264, 730. DOI:10.1038/264730a0 NASA ADS^ Schatten, K.H., 1971, Cosmic Electrodynamics, 2, 232. NASA ADS^ Rosenberg, R.L., Coleman, P.J., Jr., 1969, Journal of Geophysical Research, 74, 5611. NASA ADS^ Wilcox, J.M., Scherrer, P.H., Hoeksema, J.T., 1980, The origin of the warped heliospheric current sheet. NASA ADS^ Mursula, K., Hiltula, T., 2003, Geophysical Research Letters, 30, pp. SSC 2-1. DOI:10.1029/2003GL018201 NASA ADS^ Louise, K., Harra, K.O. Mason, Space Science, 2004, Imperial College Press, ISBN 1860943616.^ Smith, E., "The Sun, Solar Wind, and Magnetic Field", July 1999, Proceedings of the International School of Physics Enrico FERMI Varenna, Italy.^ Wilcox, John M., Ness, Norman F., 1965, Journal of Geophysical Research, 70, 5793. NASA ADS^ Alfven, H., Carlqvist, P., 1978, Astrophysics and Space Science, 55, 487. NASA ADS Heliospheric current sheet, the largest structure in the heliosphere. Credit: Werner Heil, NASA artists, developed by Prof. John Wilcox. The Heliospheric current sheet (HCS) is the surface within the Solar System where the polarity of the Sun's magnetic field changes from north to south. This field extends from the Sun's equatorial plane throughout the entire Solar System and is the largest structure in the heliosphere.[1] The shape of the current sheet results from the influence of the Sun's rotating magnetic field on the plasma in the interplanetary medium (Solar Wind).[2] (see also Unipolar generator). A small electrical current flows within the sheet, about 10-10 amps/m2. The thickness of the current sheet is about 10,000km. The underlying magnetic field is called the interplanetary magnetic field, which has an associated interplanetary electric field [3], and the resulting electric current forms part of the heliospheric current circuit.[4] The Heliospheric current sheet is also sometimes called the Interplanetary Current Sheet and Heliospheric neutral sheet. See also "Current sheet". Characteristics Ballerina's skirt shape As the Sun rotates, its magnetic field twists into a Parker spiral,[5] a form of an Archimedean spiral, named after its discovery by Eugene Parker. As the spiraling magnetic sheets changes polarity, it warps into a wavy spiral shape that has been likened to a ballerina's skirt.[6][7] Further dynamics have suggested that "The Sun with the heliosheet is like a bashful ballerina who is repeatedly trying to push her excessively high flaring skirt downward".[8] Magnetic field The heliospheric current sheet rotates along with the Sun once every 27 days, during which time the peaks and troughs of the skirt pass through the Earth's magnetosphere, interacting with it. Near the surface of the Sun, the magnetic field produced by the radial electric current in the sheet is of the order of 5×10-6T.[4] The magnetic field at the surface of the Sun is about 10-4 tesla. If the form of the field were a magnetic dipole, the strength would decrease with the cube of the distance, resulting in about 10-11 tesla at the Earth's orbit. The heliospheric current sheet results in higher order multipole components so that the actual magnetic field at the Earth due to the Sun is 100 times greater. Electric current The electric current in the heliospheric current sheet has a radially component, the circuit being closed by currents aligned with the Sun's magnetic field in the solar polar regions. The total current in the circuit is on the order of 3×109 amperes.[4] As a comparison with other astrophysical electric currents, the Birkeland currents that supply the Earth's aurora are about a thousand times weaker at a million amperes. The maximum current density in the sheet is on the order of 10-10 A/m2 (10-4 amps/km2). It has been noted that: "It is remarkable that the radial component of the spiral structure implies a current the continually flows towards the Sun. The charge accumulating from this process must be removed elsewhere. This occurs most simply via line currents that originate over the Sun's poles"[9] Interplanetary electric field The interplanetary electric field (IEF) extends throughout the interplanetary current sheet, and is generally orientated north-south. The separation of the field is relatively small, but its extent is the same as the heliospheric current sheet which extends throughout the plasmasphere. The interplanetary electric field is caused by ions leaving the Sun, initially flowing along and parallel to the Sun's magnetic field. But as the ions move further outwards, the azimuthal component of the Sun's magnetic field becomes more influential, and protons are deflected to the south and electrons to the north, resulting in an electric field that compensates the magnetic forces.[10] Solar wind "The Solar Wind consists of a hot plasma — an electrically neutral mixture of electrons and ions (principally protons with some heavier atomic nuclei) at roughly 100,000°K. Its source is the Sun's atmosphere, or corona, and it is continually present in interplanetary space. The gas flows radially outwards at a typical speed of 450km per second to at least 70 AU and probably much further. The average speed of the flowing gas is remarkably independent of its distance from the Sun".[11] Solar wind acceleration "The speed of the solar wind away from Sun increases as the distance from the Sun increases. The wind accelerates rapidly in the first few tens of Ro, and accelerates only slowly after this."[12] History The heliospheric current sheet was discovered by John M. Wilcox and Norman F. Ness, who published their finding in 1965 [13]. The image above is a painting by NASA artist, Werner Heil. It was developed by Prof. John Wilcox as a tool for visualizing the surface that separates the two magnetic polarity regions produced by the Sun in the solar system. His concept was that a "baseball seam" shape located near the Sun separates the two magnetic hemispheres of the interplanetary medium; the shape was determined by the large-scale magnetic field at the Sun. That geometrical shape is carried radially outward by the solar wind. As the Sun, and the magnetic field configuration it generates, continue to rotate underneath the structure, the resulting surface becomes the one you see in the painting.[14] Hannes Alfvén and Per Carlqvist speculate[15] on the existence of a galactic current sheet, a counterpart of the heliospheric current sheet, with an estimated galactic current of 1017 – 1019 Amps, that might flow in the plane of symmetry of the galaxy. References ↑ Dr. Tony Phillips, A Star with two North Poles April 22, 2003, via Archive.org ↑ Artist's Conception of the Heliospheric Current Sheet, Wilcox Solar Observatory ↑ Duncan Alan Bryant "Electron Acceleration in the Aurora and Beyond", Published 1999, CRC Press, 311 pages, ISBN 0750305339 (page 176) ACADEMIC BOOK ↑ 4.0 4.1 4.2 Israelevich, P. L., et al, "MHD simulation of the three-dimensional structure of the heliospheric current sheet" (2001) Astronomy and Astrophysics, v.376, p.288-291 FULL TEXT PEER REVIEWED ↑ Parker, E. 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