STIP SYMPOSIUM ON PHYSICAL INTERPRETATION OF SOLAR/INTERPLANETARY AND COMETARY INTERVALS

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The University of Alabama in Huntsville

May 12 - 15, 1987

Huntsville Marriott Hotel
Huntsville, Alabama U.S.A.

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STIP SYMPOSIUM ON PHYSICAL INTERPRETATION OF SOLAR/INTERPLANETARY AND COMETARY INTERVALS

Grant No. NAGW-1117

Final Report
For Period April 1, 1987 to September 30, 1987

BY

S. T. Wu
Center for Space Plasma and Aeronomic Research
Mechanical Engineering Department
The Univ. of Alabama in Huntsville
Huntsville, Alabama

For

National Aeronautics and Space Administration
Washington, DC

September 14, 1987

The study of traveling interplanetary phenomena has continued over a period of many years. The STIP Symposium on Physical Interpretation of Solar/Interplanetary and Cometary Intervals was held in Huntsville, Alabama U.S.A. on May 12 - 15, 1987. This meeting is the first held in the United States of America; in the past it has been held in Isreal, Australia, Czechoslovakia, Ireland, and Switzerland.

The symposium's objective was to coordinate and dissiminate new science gained from the recent solar-terrestrial and cometary intervals which can be used to better understand the linkage of physical events from the Sun's vagaries (flares, coronal holes, eruptive prominences) from their initial detection to their consequence.

Fifty-one presentations were made during a four day period. A copy of the program which includes and abstract for each speaker is included in this report as Appendix A. Dr. M. Shea serves as secretary of STIP and is collecting manuscripts from each speaker to be included in the proceeding which will be published in November 1988. A total of ninty people from ten different countries attend the symposium. A copy of the registrars list is include as appendix B. Financial assistance was made available for several participants from both the U.S. and abroad by the National Aeronautics and Space Administration, COSPAR, SCOSTEP, IAU, IUPAP, and The University of Alabama in Huntsville.

Respectfully Submitted,

S. T. Wu
Principal Investigator

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ACKNOWLEDGEMENT

The Technical Program Committee and Local Organizing Committee gratefully acknowledge the financial support from the Earth Science Division of the National Aeronautics and Space Administration/Headquarters, the Scientific Committee for Solar-Terrestrial Physics (SCOSTEP) and the International Halley Watch (IHW) for this Symposium; the NASA Marshall Space Flight Center Public Affairs Office for providing local support; the American Society of Mechanical Engineers - Student Section and Pi Tau Sigma - Delta Upsilon Chapter at the University of Alabama in Huntsville for their help during registration and with the audio visual services. And last, but not least, Mrs. Pat Corder for providing the administrative support of this symposium.

ABSTRACTS

The program abstracts are arranged in the order of presentation.

Tuesday May 12, 1987

8:30 a.m. Registration

9:00 a.m. Introduction
Dr. Shi Tsan Wu

WELCOME: Dr. John C. Wright
President
The University of Alabama
in Huntsville

Mr. J. R. Thompson
Director
NASA/Marshall Space Flight Center

Opening Remarks
Dr. Murray Dryer

Tuesday May 12, 1987

Wednesday, May 13, 1987

Wednesday, May 13, 1987

Thursday, May 14, 1987

Thursday, May 14, 1987

4:00 p.m. Coffee Break

4:20 p.m. STIP BUSINESS MEETING

5:30 p.m. Adjourn
Banquet at the Space and Rocket Center

6:15 p.m. Cocktail Hour
7:30 p.m. Movie
8:15 p.m. Dinner

Friday, May 15, 1987

SESSION I

S1-92
ABS. ONLY
78769
18
A1677778

OVERVIEW OF STIP INTERVALS XV-XIX

M. A. Shea
Air Force Geophysics Laboratory
Bedford, Massachusetts 01731, U.S.A.

M. Dryer
Space Environment Laboratory
NOAA, Boulder, Colorado 80303, U.S.A.

NJ 920944

Five STIP Intervals for special scientific study of solar and interplanetary phenomena were designated between February 1984 and March 1986. The first two intervals were selected retrospectively after unusual periods of solar activity; the remaining three intervals were selected in advance in conjunction with anticipated spacecraft configurations and measurements. In this overview we present the historical background of these STIP Intervals and a summary of the rationale in the selection of these particular time periods for concentrated studies.

S2-92
ABS ONLY 3
98770
18

SOLAR-TERRESTRIAL OBSERVATIONS DURING STIP INTERVAL XV (12-21 FEBRUARY, 1984)

OC 747787

S. R. Kane, Space Sciences Laboratory, University of California, Berkeley

STIP interval XV covered the time period 12-21 February, 1984. Several large solar flares occurred during this period, the most significant being the flare on 16 February (0900 UT). Although this flare occurred about 40^{0} behind the west limb of the sun, both the occulted and unocculted hard X-ray emission was observed by instruments aboard spacecraft. The occulted radio emission and terrestrial effects were observed by several ground-based observatories. The flare produced energetic particles with energies up to several GeV. In spite of the location of the flare far behind the west limb, the high energy particles produced a prompt and rapid increase in the ground-level neutron monitor rates. Observations of the solar-terrestrial effects of this and other flares during STIP interval XV are summarized and some of the implications of these new observations with respect to the acceleration and propagation of energetic solar particles and the role of flare-generated shocks will be discussed.

N1 48337

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18

Overview of the MONSEE UAG Report on STIP Intervals No. XV and XVI: The 24-25 April 1984 Forbush Decrease Period

Helen E. Coffey and Joe H. Allen
World Data Center A for Solar-Terrestrial Physics
NOAA National Geophysical Data Center E/GC2
325 Broadway
Boulder, CO 80303

We review the solar-terrestrial activity of 24-25 April 1984 based on the MONSEE UAG-96 Report "Solar-Geophysical Activity Reports for STIP Interval XV 12-21 February 1984 Ground Level Event and STIP Interval XVI 20 April-4 May 1984 Forbush Decrease", Helen E. Coffey and Joe H. Allen, compilers. A large 3B/X13.0 solar flare at 2356 UT on 24 April 1984 from the S11 E45 solar Active Region (AR) 4474 produced major interplanetary and terrestrial environmental changes. We discuss the solar activity of AR4474, the event itself, and the consequential, though temporary, changes in the interplanetary environment, in the near Earth space environment, and in the Earth's ionosphere and geomagnetic field. For the Study of Travelling Interplanetary Phenomena (STIP) Symposium, emphasis will be placed on the solar, interplanetary, and cosmic ray observations.

S4-92
ABS ONLY
93772
1P.

Low Altitude Flux and Dose Measurements During Two Solar Flare Events

D. H. Brautigam, M. S. Gussenhoven, E. G. Mullen,
and M. R. Oberhardt
Air Force Geophysics Laboratory
Hanscom AFB, MA 01731

A1077778

The dosimeter on board the low altitude polar orbiting DMSP/F7 satellite makes dose and flux measurements for electrons with energies greater than 1.0, 2.5, 5.0, and 10.0 MeV; and for protons with energies greater than 20, 35, 51, and 75 MeV. We illustrate the characteristics and performance of the dosimeter by presenting dose and flux data taken during the solar flare proton events of February 16 and April 26, 1984.

NC999?

S5-92

ABS. ONLY

98773

1P.

THE LARGEST WHITE LIGHT FLARE EVER OBSERVED: 25 APRIL 1984, 0001 UT

AI082613

TJ483023

D. F. Neidig (AFGL/Sacramento Peak), H. Grosser (Univ. Sternwarte, Göttingen), and A. L. Kiplinger (NASA/GSFC and STX)

NC999967

The X13/3B flare of 25 April 1984, 0001 UT, was accompanied by intense white light emission that reached a peak power output $\sim 2 \times 10^{29}$ erg s^{-1} in the optical/near UV continuum; the total energy radiated in the continuum alone approached 10^{32} erg. This was the most powerful white light flare yet recorded, exceeding the peak output of the largest previously known event by more than one order of magnitude. The flare was a two-ribbon type with intense embedded kernels as observed in both Balmer-alpha line and Balmer continuum, and each of these flare ribbons covered separate sunspot umbrae shortly after the maximum of the event. The onset and peak of the white light emission coincided with the onset and peak of the associated E > 100 KeV hard X-ray burst, while the 1-8A soft X-ray emission reached its maximum 4 minutes after the peak in white light.

PROBABLE DETECTION OF SOLAR NEUTRONS BY GROUND-LEVEL NEUTRON MONITORS DURING STIP INTERVAL XVI

M. A. Shea and D. F. Smart
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Hanscom AFB, Massachusetts, 01731 U.S.A.

E. O. Flückiger
Physikalisches Institut, Universität Bern
Sidlerstrasse 5, CH-3012 Bern, Switzerland

The third solar neutron event detected by earth-orbiting spacecraft was observed during STIP Interval XVI. The solar flare beginning at 2356 UT on 24 April 1984 produced a variety of emissions including gamma rays and solar neutrons. The neutrons were observed by the SMM satellite and the neutron-decay protons were observed on the ISEE-3 spacecraft. Between 0000 and 0010 UT on 25 April an increase of 0.7 and 1.7 percent was recorded by neutron monitors at Tokyo (Itabashi) and Morioka, Japan. These stations were located about 42 degrees from the sub-solar point, and consequently, there is approximately 1400 grams of atmosphere between the incident neutrons at the top of the atmosphere and their detection on the earth's surface. Nevertheless, the time coincidence of a small increase in the total counting rate of two independent neutron monitors indicates the presence of solar neutrons with energies > 400 MeV at the top of the earth's atmosphere. The small increases in the counting rate emphasize the difficulty in identifying similar events using historical neutron monitor data.

57-92

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SOLAR ENERGETIC PARTICLES EVENTS OBSERVED BY PROGNOZ-10 INTERCOSMOS /MAY-OCTOBER 1985/.

AA 541527 CM 922564 K 4139488

V. Lutsenko[1], S. Fischer[2], M. Vandas[2], K. Kudela[3], M. Slivka[3],

Intershock the ~~started~~ observations (Solar Energetic Particles) of an SEP event on April 26, 1985, during the tail of ~~SEP~~ increase from the 3B flare of April 24. The following period of observation was quiet with only a few weak increases of low energy protons ~~with~~ of several days duration. Two prominent SEP events occurred on July 9 (start 01:33 UT, position S13, W25) and July 17 (no optical data, type II radio burst 03:33 - 03:48 UT).

~~We study~~ These mass ejections and particles propagation ~~using~~ X-ray, radio and energetic particle emissions. (were studied on the basis of.

Affiliation:

1 - Space Research Institute, Profsoyuznaya 84/32, 117810 Moscow, USSR
2 - Astronomical Institute, Budečská 6, 120 23 Praha 2, Czechoslovakia
3 - Institute of Experimental Physics, Jesenná 5, 040 00 Košice, Czechoslovakia

On 26 Apr. 1985, Intershock began observation of a solar energetic particle (SEP) event, ~~24 Apr 85~~, ~~during the tail of the increase~~ resulting from the 3B solar flare (which began ~~of~~ 24 April.

SESSION II

T 747671

S8-92
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98776
1P

The Large Type IV Radio Burst Event of 24 April 1985 Interpreted by Dynamic Spectral Recordings and Associated Recordings

H. W. Urbarz, Astronomical Institute of Tuebingen University, Weissenau Station 7980 Weisenau, GFR.

The Active region 4647 showed a sudden increase in spot area on 23 April 1985 as well as appearance of the D magnetic configuration. During STIP interval XVII numerous subflares occured in this region but only one very large event which exhibited all signatures of a classical p-event, well separated in time from other large events. The dynamic spectrum was observed by Bleien, Ondrejov and Weissenau, several details are seen. The onset of radiation at m-and dkm-waves is impulsive at dm-waves the preceeding dm continuum rises gradually. The absolute fluxes show very high fluxes of some 10^4 SFU at m-waves and some $5 * 10^3$ at cm waves. High energy particles were observed about a day later by imp 8. A Forbush decrease was seen on the neutron monitors but there was no GLE. The X-ray Fluxes monitors by GOES showed a gradual rise to high fluxes and a slow decrease over several hours. This information was extracted from Gdata but also from numerous letters of other observers and interpreters. More detailed data on the event and on the concommittant active region are to be presented.

S9-92
ABS. ONLY
98277
1P.
ØC 00164

PROPAGATING SHOCKS IN THE CORONA

Yolande Leblanc
Observatoire de Paris
92195 MEUDON, France

We have analyzed high resolution observations performed with the Decametre spectrograph and the multichannel receiver at Nançay, in the range of 25-75 MHz. 60 type II bursts have been selected. In this frequency range, type II events are generally associated with other radio emissions such as storms of type (III - U - I) bursts ; they are preceeded or followed by groups of U-bursts. One third of type II events show a non-uniform frequency drift, usually a steep decrease followed by an abrupt increase. This phenomenum can be explained by the propagation of an extended disturbance through the ambiant corona when the density gradient is enhanced. An empirical coronal model is proposed to interpret these observations. The observations at fixed frequency of type II bursts including fundamental and harmonic components are analyzed. It is shown that the spectrum of the intensity fluctuations differs with the fundamental and the harmonic components. The origin of these differences are discussed.

JS 767253
BJ 145143

S10-92
ABS ONLY
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1P

Change in Interplanetary Shock Acceleration Preceding STIP Interval XVII

R. E. Gold and R. B. Decker (The Johns Hopkins University, Applied Physics Laboratory, Laurel, MD, 20707, U.S.A.), L. J. Lanzerotti and C. G. Maclennan (AT&T Bell Laboratories, Murray Hill, NJ, 07974, U.S.A.)

The intensity and frequency of shock acceleration events in the interplanetary medium decreased dramatically in early 1985. Low energy ions were observed by IMP 8 at 1 AU and Voyagers 1 and 2 at 22 and 16 AU respectively. Voyager 1 was at 25° heliographic latitude while IMP 8 and Voyager 2 were near the solar equatorial plane. The decrease in low energy shock events led to a drop in the average ion flux by a factor of 20 to 50. It started about day 10 of 1985 in the ~ .5 MeV channel on IMP 8 and took ~ 75 days to reach the new, lower, background level. The decrease at the Voyagers started ~ 50 days later. The time delay between the start of the decrease at IMP and at Voyager 2 implies that decrease was convected outward with a velocity of ~ 535 km/sec. The intensity and frequency of interplanetary shock events remained at the lower level for at least 1.5 years.

S11-92
ABS. ONLY
98779

SOLAR MODULATION OF THE COSMIC RADIATION IN THE HELIOSPHERE

1P.

R.B. McKibben
Enrico Fermi Institute
University of Chicago

Cd 455749

Changes in the solar modulation of galactic and anomalous component cosmic rays reflect changes in the structure and magnetic topology of the interplanetary medium. Therefore, to the extent that the modulation process is understood, the cosmic rays can be used as a probe of the medium to infer the extent and structure of the heliosphere in regions not directly sampled by spacecraft. The challenge to modulation theory and observation has been to determine which properties of the solar wind are most important for producing the observed modulation. Significant progress has been made in answering this question during the last solar cycle using observations from spacecraft at radii to 40 AU from the Sun and at latitudes up to 30 degrees with respect to the ecliptic. A brief summary of new results and observations (with specific attention to the STIP intervals XV-XIX) will be presented to illustrate the present state of our understanding of the relation between the solar wind and interplanetary magnetic field and the modulation of the cosmic radiation.

S12-92
ABS. ONLY

98780
1P.

EVOLUTION OF THE SOLAR WIND STRUCTURE IN THE OUTER HELIOSPHERE

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L. F. BURLAGA, Laboratory for Extraterrestrial Physics, NASA-Goddard Space Flight Center, Greenbelt, MD 20771

CH 92-777

NC999967

Shocks and interaction regions play very important roles in the evolution of large-scale solar wind structure in the outer heliosphere. This study is based on (1) plasma and magnetic field data observed from Voyager and Pioneer spacecraft, and (2) a quantitative magnetohydrodynamic simulation model. An interaction regions bounded by a forward and a reverse shock begin to form near 1 AU at the leading edges of a large-scale stream. The total pressure in the region is greater than the ambient pressure by a factor of ten of more. Large jumps in pressure remain as a prominent feature of the interplanetary structure even as the jumps in flow speed become less visible in the outer heliosphere. The propagation of the forward and reverse shocks widens the dimension of an interaction region. As a result, two interaction regions belonging to neighboring streams coalesce to form a merged interaction region (MIR). Collision and merging of shocks take place during the coalescence process. Two MIRs can themselves merge again at greater heliocentric distances. Simulation results agree well with spacecraft observations, and they explain major restructuring of the solar wind in the outer heliosphere.

S13-92

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COMPARISON OF MHD SIMULATION FOR THE FEBRUARY 1986 EVENTS WITH INTERPLANETARY OBSERVATIONS BY THE SPACECRAFT SAKIGAKE

Z. Smith[1], T. Yeh[2], M. Dryer[1], T. Watanabe[3] and K. Oyama[4]

NJ920944 CU503845 NA368417 T1476943

ABSTRACT

During the epoch of 3–10 February 1986 a series of major solar flares occurred on the sun and several intense geomagnetic storms took place on the earth. To examine the causality between the solar activity and the geomagnetic activity in this epoch, an MHD numerical simulation was performed, using a 2½–D numerical code. In that epoch of February 1986, the Japanese spacecraft Sakigake was at 0.84 AU, 57° west of the earth. Besides the in–situ measurements of the interplanetary plasma, Sakigake also provided Doppler scintillation observations. In this paper we present comparisons between the results of MHD simulation and the measurements made by the spacecraft Sakigake.

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[4] Institute of Space and Astronautics, University of Tokyo, Tokyo, Japan

5/14-92
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98782
18.

Two Dimensional Imaging Observations of Meter-Decameter Bursts Associated with the February 1986 Flare Activity

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University of Maryland
College Park, Maryland 20742

MI 915766

We present the analysis of two dimensional imaging observations of a flare observed on Feb. 3, 1986 using the Clark Lake Multifrequency radioheliograph. The flare porduced almost all types of meter-decameter radio emission: enhanced storm radiation, bursts of type III/V, II and IV and flare continuum. The flare continuum had early (FCE) and late (FC II) components and the type II occurred during the period between these two components. Comparing the source positions of type III/V and FCE we found that these bursts must have occurred along adjacent open and closed field lines respectively. The positional analysis of type II and FC II implies that the nonthermal electrons responsible for FC II need not be accelerated by type II shock and this conclusion is further supported by the close association of FC II with a microwave peak. Using the positional and temporal analysis of all these bursts and the associated hard X-ray and microwave emissions, we develop a schematic model for the magnetic field configuration in the flaring region in which the nonthermal particles responsible for these bursts are confined or along which they propagate.

S15-92
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93783
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Mi 915766

MAGNETIC FIELD TWIST DRIVEN BY REMOTE CONVECTIVE MOTIONS: CHARACTERISTICS AND TWIST RATES

Zheng-Zhi Wang and A. B. Hassam, Department of Physics and Astronomy, University of Maryland, College Park, Maryland 20742

It is generally believed that convective motions below the solar photosphere induce a twist in the coronal magnetic field as a result of frozen-in physics. A question of interest is how much twist can one expect from a persistent convective motion, given the fact that dissipative effects will eventually figure. We examine this question by considering a model problem: two conducting plates, with finite resistivity, are set in sheared motion and forced at constant relative speed. A resistive plasma is between the plates and an initially vertical magnetic field connects the plates. The time rate of tilt experienced by the field is obtained as a function of Hartmann number and the resistivity ratio. Both analytical and numerical approaches are considered.

S16-92
ABS. ONLY
98784
1P.

STUDY OF PICKUP OF COMETARY IONS IN TURBULENT SOLAR WINDS

MI 915764

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The influence of moderately strong or strong magnetic turbulence on the ion pickup process near a comet is studied by a test-particle method. The research is motivated by recent observations with ICE and Giotto at Giacobini-Zinner and Halley. In this numerical study, we have modeled the intrinsic hydromagnetic turbulence based on the Giotto and ICE data. The time evolution of the distribution funtion of the newborn ions is investigated. It is found that, when the level of the intrinsic turbulence is sufficiently high, the pickup ions can form a shell distribution function rapidly. The typical time scale for such a process is of the order of a couple of ion gyroperiods. On the other hand, if the turbulence is not strong, the pickup ions usually form an incomplete shell in the initial stage. The results seem to be consistent with available observations.

SESSION III

S17-92
ABS. ONLY
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18P.

SOLAR ORIGINS OF CORONAL MASS EJECTIONS

N94-33529

Stephen Kahler

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The large scale properties of coronal mass ejections (CMEs), such as morphology, leading edge speed, and angular width and position, have been cataloged for many events observed with coronagraphs on the Skylab, P-78, and SMM spacecraft. While considerable study has been devoted to the characteristics of the CMEs themselves, their solar origins are still only poorly understood. Recent observational work has involved statistical associations of CMEs with flares and filament eruptions, and some evidence exists that the flare and eruptive-filament associated CMEs define two classes of events, with the flare-associated events being generally more energetic. Nevertheless, we have found that eruptive-filament CMEs can at times be very energetic, giving rise to interplanetary shocks and energetic particle events. The size of the impulsive phase in a flare-associated CME seems to play no significant role in the size or speed of the CME, but the angular sizes of CMEs may correlate with the scale sizes of the 1-8 Å X-ray flares. At the present time, He 10830 Å observations should be useful in studying the late development of double-ribbon flares and transient coronal holes to yield insights into the CME aftermath. The recently available white-light synoptic maps may also prove fruitful in defining the coronal conditions giving rise to CMEs.

S18-92
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1 P.

ON THE ASSOCIATION OF ERUPTING MAGNETIC FIELDS WITH ERUPTIVE PROMINENCES AND CORONAL MASS EJECTIONS

W 8368098

Bogdan Rompolt
Astronomical Observatory of the Wroclaw University,
Wroclaw, Poland

A number of space and groundbase observations give evidence that the eruptive prominences, coronal mass ejections (CMEs) and the associated shocks are generated by a common cause - eruption of magnetic field from the sun. About 60% of the observed CMEs are associated with the eruptive prominences. We suspect that in reality a much better correlation should be between these events because of observational limitations and of the effect of "partial eruption". Some recent results on the formation and evolution of the quiescent and the active region prominences give an idea on the early phase of eruption of the magnetic field with the prominence plasma frozen in. In the later phase of eruption the magnetic field lifted high into the corona is seen (as manifested by the cold plasma frozen in) as a system of huge loops - evidently the result of some reconnections at lower heights. The legs of these erupting loops interact sometimes with the local magnetic field - it often appear to be an active region. In consequence of this interaction the activation of prominences and generation of flares can take place at some occasions as well as ejection of surges and sprays.

S19-92
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Radio Studies of Large Scale Structures of the Sun's Corona and Transient Activity

MI 915766

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College Park, Maryland 20742

We discuss the use of meter-decameter wavelengths imaging observations for four different kinds of studies of solar coronal activity. (1) Large scale structure of the upper corona, including coronal holes. Daily imaging observations permit us to compare the radio images with white light images from space and ground, and to generate synoptic charts similar to white light coronagraph synoptic charts, and compare radio brightness enhancements and deficiencies with bright coronal streamers and coronal holes. (2) Relative positions of type III burst sources and coronal streamers as observed by Solwind experiment on P78-1 satellite and by HAO C/P experiment aboard SMM; infer the paths of type III emitting electrons in dense coronal streamers, and from multi-frequency observations derive electron density distributions above active regions near the limb. (3) Non-flare associated type II/type IV bursts associated with coronal streamer disruption events. Such type IV sources have a rather slow velocity ($\lesssim$ 200 Km/sec) and they are associated with slow ($\lesssim$ 100 Km/s) CME's. (4) Meter-decameter microbursts. These are short duration (2-10 seconds) weak type III-like bursts, produced at the fundamental plasma frequency by plasma radiation processes which have important differences from the standard mechanisms used to explain the strong type III bursts.

S20-92
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1P.

Observations of the brightness temperature distribution of the quiet solar corona at decametric wavelengths.

Ch.V.Sastry
i D453124

Indian Institute of Astrophysics
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and

Raman Research Institute
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India

RG 705812

The brightness temperature distribution of the quiet solar corona at a wavelength of 8.9 Meters is measured with two types of radio telescopes: (1) A "T" type array with a resolution of 26'x38' and (2) A fan beam interferometer with an E-W resolution of 3'. It is found that the persistent bright regions do not have any angular structure on scales of 6' or less. The daily variations of the brightness temperature of different regions are studied and the possible interpretation is discussed.

521-92
ABS. ONLY
98789
1P.

Meterwave Observations of a Coronal Hole

MI 915764

Z. Wang, E.J. Schmahl, and M.R. Kundu
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Univsity of Maryland
College Park, MD 20742

are presented

~~We present~~ M meterwave maps showing a coronal hole at 30.9, 50.0 and 73.8 MHz using the Clark Lake Radioheliograph in October 1984. The coronal hole seen against the disk at all three frequencies shows interesting similarities to, and significant differences from its optical signatures in HeI λ10830 spectroheliograms. The 73.8 MHz coronal hole, when seen near disk center, appears to coincide with the HeI "footprint" of the hole. At the lower frequencies (30.9 and 50 MHz) the emission comes from higher levels of the corona, and the hole appears to be displaced, probably due to the non-radial structure of the coronal hole. The contrast of the hole relative to the quiet Sun is much greater than reported previously for a coronal hole observed at 80 MHz ~~(Dulk et al, Solar Phys. 52, 349, 1977)~~. The higher contrast is certainly real, due to the superior dynamic range, sensitivity and calibration of the Clark Lake instrument. is derived Using ~~the~~ model of coronal holes, ~~given by Dulk et al~~, ~~we derive~~ the electron density from ~~the~~ radio observations of ~~the~~ brightness temperature. is found ~~We find~~ A very large discrepancy between the derived density and that determined from Skylab EUV observations of coronal holes. This discrepancy suggests that much of the physics of coronal holes has ~~not~~ yet ~~been~~ (to be elucidated.

S22-92
ABS ONLY
98780
1P

Coronal and Interplanetary Type II Radio Emission

NC 999967

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Goddard Space Flight Center, Greenbelt, MD 20771

Several observations suggest that the disturbances which generate coronal (meter wavelength) type II radio bursts are not driven by coronal mass ejections (CMEs). A new analysis using a large sample of metric radio bursts and associated soft X-ray events provides further support for the original hypothesis that type II-producing disturbances are blast waves generated at the time of impulsive energy release in flares. Interplanetary (IP) shocks, however, are closely associated with CMEs. The shocks responsible for IP type II events (observed at kilometer wavelengths) are associated with the most energetic CMEs.

S23-92
ABS. ONLY
98791
18

Coronal Mass Ejections: The Long-Term Variation of Their Occurrence Rate and the Solar Wind Mass Flux

EU 585529

David F. Webb
Physics Research Division
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Solar Coronal Mass Ejections (CMEs) from the Sun are an important aspect of coronal physics, and a potentially important contributor to the solar wind mass flux. However, despite significant progress in studies of CMEs since their discovery in the early seventies, questions remain about their effects on the interplanetary medium. ~~I report on~~ A study is done of the long-term variations of the occurrence rates of CMEs, of activity tracers related to CMEs, and of the solar wind particle flux. CMEs are most directly detected by scattered electron radiation in white light. To estimate their long-term occurrence frequency and their contribution to the in-ecliptic solar wind mass flux, observed CME rates must be corrected for instrumental duty cycles, detection efficiency out of the plane of the sky, mass detection threshholds, and geometrical considerations. ~~We evaluate~~ These corrections are evaluated using data on solar CMEs from the spaceborne Skylab, SMM and SOLWIND coronagraphs and on interplanetary plasma clouds from the HELIOS white light photometers. ~~We then estimate~~ The variation in the CME rate and the contribution of CMEs to the solar wind mass flux are estimated over nearly a complete solar activity cycle. The main results are: 1) The occurrence rate of CMEs tends to track the activity cycle in both amplitude and phase; 2) The duty-cycle and visibility corrected CME rates determined with different instruments are not inconsistent; 3) In terms of long-term averages, no one class of solar activity tracer related to CMEs is better correlated with CME rate than any other; 4) Although the annual CME rate is not well correlated with the bulk solar wind mass flux, the ratio of the CME to the solar wind mass fluxes tends to track the solar cycle. The maximum proportion (at solar maximum) of 15-20% is considered potentially significant, since this applies to bulk, long-term averages and the short-term influence on the interplanetary medium of localized CME activity must be considerably greater.

S24-92
ABS. ONLY
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18.
A10 7777 8

Was the Eclipse Comet of 1893 a Disconnected Coronal Transient?

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The comet-like feature observed in the solar corona by the Lick Observatory eclipse expedition to Chile in 1893 bears an interesting resemblance to the "disconnection" coronal transient reported by Illing and Hundhausen (J. Geophys. Res., 88, 10210, 1983). I review reports of possibly-related limb activity to see whether a pre-discovery observation of a relatively rare type of coronal mass ejection was mis-interpreted. The goal of this study is to learn more about the morphology of mass ejections by examining observations that extend down to the low corona of a disconnection event.

SESSION IV

SOLAR EVENTS AND THEIR INFLUENCE ON THE INTERPLANETARY MEDIUM

S25-92
ABS. ONLY
98793
NJ920944 1P.

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are reviewer

~~This talk reviews some of the~~ Aspects of a workshop on "Solar Events and their Influence on the Interplanetary Medium" held in September 1986. The goal ~~of the meeting~~ was "to foster interactions among colleagues, leading to an improved understanding of the unified relationship between solar events and interplanetary disturbances." The ~~international scientists attending selected one~~ of three working groups: 1)flares, eruptives, and other near-sun activity, 2)coronal mass ejections, or 3)interplanetary events. ~~Instead of formal presentations~~, each group ~~openly~~ discussed topics distributed in advance by the group leaders. ~~Also, pairs of groups met together on a prearranged schedule to ask questions and discuss common problems. For some topics there was group consensus, but other topics were contentious. For example~~, the flare/eruptives group members agreed that pre-event energy is stored in stressed/sheared magnetic fields, but could not unanimously concur that flares and other eruptive events (e.g. eruptive solar prominences) are aspects of the same physical phenomenon. In the coronal mass ejection group, general agreement was reached on the presence of prominences in CMEs, and that CMEs have a significant three-dimensional structure. Some topics identified for further research were the aftermath of CMEs (streamer deflections, transient coronal holes, possible disconnections), identification of the leading edge of CMEs, and studies of the range and prevalence of CME mass sizes and energies. ~~The interplanetary events group identified a number of questions, but very few answers~~. General topics requiring more work included a comprehensive understanding of magnetic structures observed in interplanetary space near Earth, how they relate to properties close to the sun, and the particular solar sources of interplanetary disturbances. It was recognized that already available interplanetary data should be analyzed on a priority basis. A second session of this Workshop is planned for March, 1988.

workshop consisted

S26-92
ABS. ONLY

98794
1P.

Solar Activity, Magnetic Clouds, and Geomagnetic Storms

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ND 736801

Associational aspects of magnetic clouds and solar activity and of magnetic clouds and geomagnetic storms are described. For example, recent research has indicated associations to exist between the launch of magnetic clouds directed earthward from the Sun and, in particular, two forms of solar activity: flare-related, type II metric radio bursts and disappearing filaments (prominences). Furthermore, recent research has indicated an association to exist between the onset of magnetic clouds at Earth and the initiation of geomagnetic storms. Based on these findings, STIP Intervals XV-XIX are examined for possible occurrences of earthward-directed magnetic clouds.

S27-90
ABS. ONLY

98795
1P.

DYNAMICS OF MAGNETIC CLOUDS IN INTERPLANETARY SPACE

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ABSTRACT

Magnetic clouds observed in interplanetary space may be regarded as extraneous bodies immersed in the magnetized medium of the solar wind. The interface between a magnetic cloud and its surrounding medium separates the internal and external magnetic fields. Polarization currents are induced in the peripheral layer to make the ambient magnetic field tangential.

The motion of a magnetic cloud through the interplanetary medium may be partitioned into a translational motion of the magnetic cloud as a whole and an expansive motion of the volume relative to the axis of the magnetic cloud. The translational motion is determined by two kinds of forces. One of them is the gravitational force exerted by the Sun. The other is the hydromagnetic buoyancy force exerted by the surrounding medium. On the other hand, the expansive motion is determined by the pressure gradient that sustains the gross difference between the internal and external pressures and by the self-induced magnetic force that results from the interaction among the internal currents. The force resulting from the interaction between internal and external currents is a part of the hydromagnetic buoyancy force, which is manifested by a thermal stress caused by the inhomogeneity of the ambient magnetic pressure.

S28-90

ABS. ONLY

THE EXPANSION OF MAGNETIC CLOUDS

98796

18.

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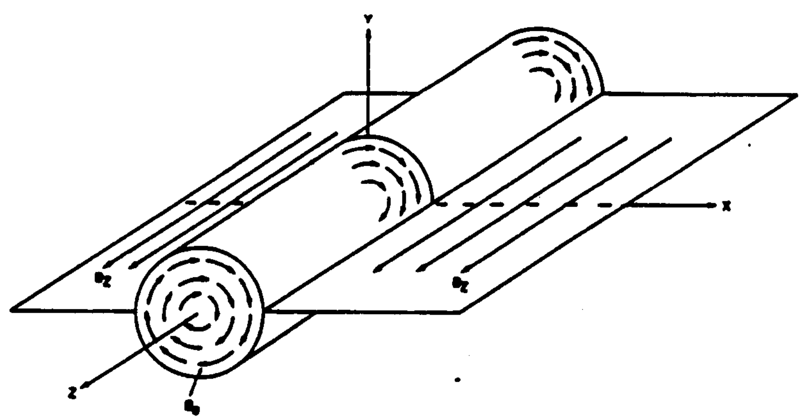
ND736801

Magnetic clouds are a carefully defined sub-class of all interplanetary signatures of coronal mass ejections whose geometry is thought to be that shown below. Klein and Burlaga (1982) found that the total magnetic pressure inside clouds is higher than the ion pressure outside and concluded that clouds are expanding at 1 AU at about half the local Alfven speed. This conclusion was supported by indirect evidence and bolstered by direct evidence in later publications. However, the geometry of clouds is such that even though the magnetic pressure inside is larger than the total pressure outside, expansion will not occur because the pressure is balanced by magnetic tension - the pinch effect (Suess, 1986).

The evidence for expansion of clouds at 1 AU is nevertheless quite strong so another reason for its existence must be found. It will be shown here that the observations can be reproduced by taking into account the effects of geometrical distortion of the low plasma beta clouds as they move away from the sun.

Klein, L. W., and Burlaga, L. F., 1982, J. Geophys. Res., 87, 613.
Suess, S. T., 1986, EOS, 67, 1141.



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AM 584056
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S29-92
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A Numerical Study of Transient, Thermally-Conductive Solar Wind

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S.T. Wu, Center of Space Plasma and Aeronomic Research, University of Alabama in Huntsville, AL
M. Dryer, Space Environment Lab, NOAA/ERL, Boulder, CO

A numerical analysis of transient solar wind starting at the solar surface and arriving at 1 AU is performed by an implicit numerical method. The model hydrodynamic equations include thermal conduction term for both steady and unsteady simulations. Simulation results show significant influence of thermal conduction on both steady and time-dependent solar wind. Higher thermal conduction results in higher solar wind speed, higher temperature but lower plasma density at 1 AU. Higher base temperature at the solar surface gives lower plasma speed, lower temperature but higher density at 1 AU. Higher base density, on the other hand, gives lower velocity, lower temperature but higher density at 1 AU.

W84-97552 AM 584056

~30-72 ABS. ONLY

98798 1P.

A TWO-FLUID MODEL FOR SOLAR WIND FLUID WITH HIGHER ORDER MOMENTS

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ABSTRACT-A spherically symmetric two-fluid model for the solar wind with higher-order moments is presented. In this model, continuity, momentum, temperature and heat flux equations for two components (electrons and protrons) in steady solar wind states are simultaneously solved by using a time-depentent method. This work is used to compare solutions of the steady-state solar wind with and without higher order moments and study the effects of thermal conduction. The coupling between electrons and protrons is also given special attention. The numerical solutions of the steady-state solar wind in both subsonic and supersonic regions between the sun and 1AU are obtained and graphically illustrated.

S31-92 ABS. ONLY

98799 18.

N94-36351

INTERACTION OF INTERPLANETARY SHOCKS WITH NONUNIFORM AMBIENT SOLAR WIND

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National Central University
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ABSTRACT

Three interplanetary shock wave events are selected from the plasma and magnetic field data of Helios 1 and 2, IMP-8, and Voyager 1 and 2 for study of the interactions of a weak interplanetay shock with a nonuniform ambient solar wind. These events occurred during the periods November 22-26, 1977, January 1-7, 1978, and April 2-5, 1979, respectively. It is found that the shock surfaces of these events are highly distorted. In addition, a portion of the shock surface may be degenerated into a disturbance which does not satisfy the Rankine-Hugoniot jump conditions.

SESSION V

S32-90
ABS. ONLY
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1P.

An Overview of STIP Interval 18: September 1985, the G-Z Encounter

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L4405312

The primary time period of interest during September 1985 is the few days surrounding the ICE encounter with comet Giacobini-Zinner (G-Z) which occurred at 1102 UT on 11 September. To place into perspective the actual in situ observations measured during the comet encounter it is necessary to understand the prevailing solar and interplanetary conditions. Starting two solar rotations prior to and extending through the rotation after the encounter the interplanetary stream structure was very uniform, similar to the 1973-4 long lived structure. Prior to the arrival of the corotating high speed stream at 5 UT on 11 September, ICE was already measuring the effects of G-Z on the surrounding interplanetary medium. An overview of available solar, interplanetary, and ICE data for the cometary interval will be highlighted.

533-90
ABS. ONLY

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1P.

COMPARATIVE PLASMA TAILS OF VENUS AND COMETS

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Ensenada, Baja California, Mexico

A review of the current models of solar wind flow in the plasma tails of weakly magnetized bodies is presented. The measurements conducted with the Mariner 5 spacecraft, the Venera 9 and 10 and the PVO orbiters in the Venus tail, and with the ICE spacecraft in the tail of Comet Giacobini-Zinner, reveal common plasma properties which suggest that similar physical processes are operative in the plasma environment of both bodies. Most notable is the observation of decreased flow velocities and enhanced plasma temperatures in the vicinity of their plasma tails. In Venus, the measured velocity and temperature fields are consistent with the effects of frictional forces between the mass-loaded ionosheath flow and the ionosphere along the (magnetic) polar regions of the ionopause. It is argued that similar conditions exist at a cometary ionopause and that the distribution of magnetic fluxes in a cometary tail is controlled by the entry of plasma fluxes from the (magnetic) polar regions of the comet's ionospheric obstacle. This question is further addressed in connection with the two-step shape of the magnetic profile measured across the tail of Comet Giacobini-Zinner. It is suggested that the low intensity outer increases of the magnetic lobes are associated with the draping of the interplanetary magnetic field lines around the comet's ionospheric obstacle, and that the higher intensity increases seen in the inner regions of the magnetic lobes are due to an additional compression of magnetic fluxes produced by the entry of plasma particles into the tail.

S34-75
ABS. ONLY
93802
18.

Overview of Plasma Observations during the Halley Flybys

E6889478

R. Reinhard, Space Science Department of ESA, ESTEC
Noordwijk, The Netherlands

In-situ observations made by the various plasma experiments onboard Giotto, Vega 1 and 2, Suisei, Sakigake and ICE during the Halley flybys will be summarised and discussed, starting with the phenomena furthest away (pick-up ions, plasma waves) and ending with the phenomena closest to the nucleus (magnetic cavity).

S35-90
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E186538

The Status of the International Halley Watch

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Jet Propulsion Laboratory
California Institute of Technology
Pasadena, CA, USA

Jürgen Rahe*
Dr. Remeis Sternwarte
Astronomisches Institut der Universität Erlangen-Nürnberg
Bamberg, FRG

More than 1000 professional astronomers worldwide actually observed Halley's comet from the ground. Preliminary logs from the observers indicate that 20-40 Gbytes of data were acquired in eight professional disciplines and as much as 5 Gbytes in the amateur network. The latter will be used to fill in gaps in the Archive and to provide a visual light curve. In addition roughly 400 Mbytes of data were taken on Comet Giacobini-Zinner. Data will be accepted for archiving until early 1989. The permanent archive will consist of a set of CD-ROMs and a set of books, publication of both to be completed by mid-1990. Data from the space missions will be included but only on the CDs. From every indication, the ground-based effort and the space missions complimented each other beautifully, both directly in solution of the spacecraft navigation problems and indirectly in the solution of scientific problems. The major remaining concern is that scientists submit their data to the Archive before the 1989 deadline.

*Currently on leave at Jet Propulsion Laboratory, California Institute of Technology and the National Aeronautics & Space Administration

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LARGE-SCALE INTERACTION OF THE SOLAR WIND WITH COMETS HALLEY AND GIACOBINI-ZINNER.

John C. Brandt, Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO, and Malcolm B. Niedner, Jr., Laboratory for Astronomy and Solar Physics, NASA/Goddard Space Flight Center, Greenbelt, MD

the

In situ measurements of comets Halley and Giacobini-Zinner have confirmed ~~our~~ view of the basic physics of the comet solar-wind interaction. ~~The ideas of Biermann as extended by Alfven are correct;~~ the solar-wind magnetic field is captured by the comet through the mechanism of field-line loading by cometary ions and the field lines drape around the cometary ionosphere.

Some ... is reviewed

With this basic model in hand, ~~we review~~ the large-scale structure of the plasma tail as revealed by submissions to the Large-Scale Phenomena Network of the International Halley Watch. The turn-on and turn-off of plasma activity seem consistent with ~~the~~ theory. ~~by Mendis and Flammer (1984).~~ ~~Approximately~~ 16 obvious disconnection events (DEs) have been recorded. Preliminary results indicated agreement with the sector-boundary model of Niedner and Brandt (1978); a detailed analysis will be required for all DEs in order to make a definitive statement. A study ~~by Niedner and Schwingenschuh (1986)~~ of plasma activity around the time of the VEGA encounters provides strong support for the sector-boundary model and illustrates once again the power of simultaneous remote and in situ measurements.

Estimates of ~~the final~~ large-scale phenomena archive indicate a total of more than 5000 images with coverage from November 1985 to June 1986. This data base should provide a firm observational footing for our physical picture of the solar-wind interaction with comets and the large-scale structure and evolution of plasma tails.

S37-90
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18.

THE GLOBAL INTERACTION OF COMETS WITH THE SOLAR WIND

MX 270710

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University of Michigan, Ann Arbor

The recent in situ measurements of the plasma-neutral gas environment of comet Halley by the GIOTTO and VEGA spacecraft have confirmed the global theory of the comet-solar wind interaction presented at the last STIP meeting by Flammer, Mendis and Houpis. The ionopause, cometopause and bow shock distances are the primary predictions of the model, although various momentum collisional cross-sections can also be estimated. With this greater confidence in the global model, the sharp sunward intensity decrease in the spatial H_2O^+ profiles observed by McCarthy, Strauss and Spinrad for comet Halley between 2.14 AU pre- and post-perihelion are interpreted as the cometopause boundary. This interpretation may then be used to determine the solar wind conditions local to the comet.

SESSION VI

S38-92

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19.

Solar-Terrestrial Research in the Space Station Era

ND 73680

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NASA/Marshall Space Flight Center, Alabama 35812

Because of the immense size of the solar-terrestrial system and its tightly-coupled physical nature, its study requires a carefully planned and coordinated approach using a variety of observational techniques. Of fundamental importance is the simultaneous measurement of the varying sun, the solar wind, and the Earth's magnetosphere and atmosphere. These multiple measurements require a multi-spacecraft approach with both remote sensing of the sun and atmosphere and in situ measurement of the solar wind and magnetosphere. The decade of the 1990's will bring an opportunity to carry out the simultaneous set of measurements using a combination of instruments on missions such as the International Solar Terrestrial Physics Program, the GOES satellites, and the space station. For the first time it will be possible to determine solar variability and to sample the response of the solar wind and geospace portion of the environment in a thorough way. This talk will identify the potential opportunities for solar-terrestrial studies during the coming era of the space station.

Solar Wind - Cometary Interaction at the Ionopause and Associated Phenomena

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Solar wind - cometary interaction at the cometary ionopause (including the tail) is reviewed in the context of recent missions to comets Giacobini-Zinner and Halley. The role of various MHD instabilities is discussed. The apparent marginal instability of the ionopause of comet Giacobini-Zinner and the stability of the ionopause of comet Halley (for large wavelengths perturbations) are explained essentially in terms of the different solar wind conditions encountered by the two comets. Nonlinear evolution of the instability is discussed. Waves of large amplitude arising due to the instability may intermix the plasma and result in heating and particle acceleration. A number of the observed phenomena found a natural explanation in terms of this mechanism.

S40-90
ABS. ONLY

98808
1P.

Comet West: A View From The HELIOS Zodiacal Light Photometers

CD 34513

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Comet West passed through perihelion on February 25, 1976. The comet crossed the HELIOS A and B spacecraft zodiacal light photometer fields of view as the spacecraft orbited the Sun, allowing them to record the brightness, polarization, and color of the comet and its surrounding interplanetary medium. Data from the U, B, and V photometers across the tail shows a distinct bluing followed by a slight reddening corresponding to the ion and dust tails, respectively, entering the field of view. The non-Earth perspective of the HELIOS photometers allows a comparison of the tail with Earth observations at the same time. Precise location of the nucleus and tail allow the photometer data to be searched for evidence of the comet bow shock and orbital dust. A brightness "bump" present in the data before the comet reaches some photometer positions, can be shown to approximately form a parabolic shape sunward and ahead of the orbital motion of the Comet West nucleus. If this is the comet bow shock or bow compression, then it corresponds to a density enhancement of the ambient medium by 1.5 to 2 times in the vicinity of the comet. The distance of the brightness increase from the nucleus by comparison with Comet Halley implies a neutral gas production rate of approximately 3 times that of Halley.

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1P.

Solar Wind Effects on the Outer Ion Coma of Comet Halley

CD 345132

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A simple two-dimensional model is developed to examine the composition of the cometary ion coma in the region outside the ionopause which is strongly affected by the solar wind. Two-dimensional ion distributions are obtained assuming a cylindrically symmetric ion coma which accounts for the dynamic effects of the mass-loaded solar wind flow around the cometary ionosphere. The results of this model are discussed in the context of analyzing the GIOTTO ion data.

Pioneer VII: Solar Wind Plasma Observations During the Comet Halley STIP Interval XIX

D. Intriligator, Carmel Research Center, Santa Monica California.

Abstract Not Available

SESSION VII

S42-92
ABS. ONLY
98810
1P.

The Solar Wind Interaction with Comets: A Post Encounter View

CD345192

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The recent spacecraft encounters with Comets Giacobini-Zinner and Halley have led to an enormous increase in our knowledge of comets, including their dust, neutral gas, plasma, and magnetic field environments. The latter has in turn led to a better understanding of the nature of the solar wind interaction with the well-developed atmosphere of a comet. Here I will review our post-encounter understanding of this interaction, underscoring the differences with our pre-encounter understanding. The outstanding problems in this area will be emphasized.

S43-75

ABS. ONLY

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18.

PLASMA-TAIL ACTIVITY AND THE INTERPLANETARY MEDIUM AT HALLEY'S COMET DURING ARMADA WEEK: 6-14 MARCH 1986

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Konrad Schwingenschuh, Space Research Institute, Graz, AUSTRIA
J. Todd Hoeksema, Stanford University, Stanford, CA
Murray Dryer, NOAA-ERL, Boulder, CO
Patrick S. McIntosh, NOAA-ERL, Boulder, CO

The encounters of five spacecraft with Halley's Comet during 6-14 March 1986 offered a unique opportunity to calibrate the solar-wind interaction with cometary plasma as recorded by remote wide-field and narrow-field/narrowband imaging. Perhaps not generally recognized in the comet community is the additional opportunity offered by the Halley Armada to study the structure of the solar-wind and interplanetary magnetic field (IMF) in three dimensions using five sets of data obtained over similar time intervals and heliocentric distances, but at somewhat different heliolatitudes. In fact the two problems--comet physics and the structure of the interplanetary medium--are coupled if one wants to understand what conditions pertained at the comet between the encounters.

Using solar data, ~~four of us (MBN, JTH, MD, PSM) made~~ pre-encounter predictions of cometary crossings of the heliospheric current sheet and resultant plasma-tail "disconnection events" (DE's). These "indirect data" have been extended into the interplanetary medium by the Armada, especially the VEGA-1 and -2 magnetometers (on which author KS is co-I). The focus of the talk will be on establishing physical associations between large-scale plasma-tail activity and conditions in the IMF and solar-wind plasma during Halley Armada Week.

Perhaps most striking is the association of the spectacular DE which developed on March 7-8 with: (1) a reversal of the cometary (sunward) magnetic barrier polarity observed by VEGA-1 and VEGA-2 at the encounters (March 6.3 and 9.3 UT), and (2) a +/- sector boundary observed in the cruise phase on March 7.9 UT by VEGA-1 which maps to the comet at the time of onset of the DE. Although the solar-wind plasma picture on March 7-8 is less complete, the IMF results appear to constitute strong support for the frontside reconnection model of DE's (Niedner and Brandt 1978). The period March 10-14 appears to be very complex as the comet was skimming the interplanetary current sheet, with several crossings sometimes occurring on the same UT day. Similarly, the large-scale plasma-tail behavior evident in the imagery is highly complex. An attempt will be made to combine the imagery and the spacecraft data available to-date to form a coherent picture of the state of the interplanetary medium and the comet's response to it.

OCCULTATION OF COMPACT RADIO SOURCES BY THE ION TAIL OF HALLEY'S COMET.

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Physical Research Laboratory
AHMEDABAD - 380009
INDIA

Enhancements of scintillations of the compact radio sources PKS 2314+03 and 1827-360 were observed at 103 MHz and 408 MHz during 18-21 December 1985 and on 29 March 1986, respectively, when the plasma tail of Halley's comet swept across them. At 103 MHz the RMS plasma density variation along the tail was 10 and 3.3 cm^{-3} at 0.12 AU and 0.18 AU, respectively, as measured from the comet's position. At 408 MHz it was 1.9 cm^{-3} at 0.036 AU. Comparison of results of these two sets of observations is presented.

S45-90
ABS. ONLY
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19.

EQUILIBRIUM AND TEARING STABILITY OF THIN CURRENT LAYERS IN MAGNETIC ARCADES

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MI 915726

The MHD equilibrium of a thin, force-free current layer in a magnetic arcade is solved for analytically. Various approximations are made in order to achieve a lowest order description that is physically relevant as well as mathematically tractable: The arcade is assumed to emanate from "feet" that are well localized, the current emanates from a localized sheet within the feet and is relatively weak. The resulting expressions for $\vec{B}$ are relatively simple and natural flux coordinates are identifiable. The stability of such a current sheet to resistive filamentation is then investigated.

S46-75
ABS ONLY

A SIMULATION OF THE IPS VARIATIONS FROM A MAGNETOHYDRODYNAMICAL SIMULATION

98814
18P

S.J. Tappin[1,2], M. Dryer[1], S.M. Han[3], S.T. Wu[4]

NJ920944

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[3] Dept of Mechanical Engineering, Tennessee Technological University, Cookeville, Tennessee, USA.
[4] Dept of Mechanical Engineering, University of Alabama in Huntsville, Huntsville, Alabama, USA.

TN568019
AM584056

Calculations of the variations of interplanetary scintillation (IPS) from a disturbance simulated by a 3-dimensional magnetohydrodynamical (MHD) model of the solar wind are presented. The simulated maps are compared with observations and it is found that the MHD model reproduces the qualitative features of observed disturbances. The disturbance produced by the MHD simulation is found to correspond in strength with the weakest disturbances which can be reliably detected by existing single station IPS observations.

S47-92
ABS ONLY

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1P.

STUDY OF THE MECHANISM FOR SOLAR WIND FORMATION

AA 45715

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This paper analyses the observations in the corona and solar wind and compares them with generalized results, derived from laboratory-scale experiments to show that a major contribution to a precipitating plasma of the solar wind that emanates from coronal holes, may be made by a thermal pressure gradient. It is found that the divergence $\Phi = \left(\frac{R}{R_\odot}\right)^2 f$ of magnetic field lines, originating from coronal holes, is one of the factors, governing the solar wind velocity v at earth orbit ($R = 1AU$). A decrease in velocity $v_{R=1AU}$ from $\simeq 750$ km s^{-1} down to $\simeq 450$ km s^{-1} may be attributable to an increase in superradial divergence f from $\simeq 7 - 9$ to $\simeq 20$. The plasma energy flux density F at the base of coronal holes which represent the sources of a solar wind with $v_{R=1AE} = (450$ to $750)$ km s^{-1}, remains nearly constant, being $F \simeq (1.4 \pm 0.3) \cdot 10^6 \cdot erg \cdot cm^{-2} \cdot s^{-1}$ for the period 1973-1975.

SA 8805[illegible]
ML 789560
D 6093365
E 6889476

S43-92
ABS ONLY
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1P.

An Account of a Flare Related Shock Event Recorded by the Energetic Particle Detector EPONA of the Giotto Spacecraft During September 1985 (STIP Interval XVIII)

Susan M. P. Mckenna-Lawlor, Department of Experimental Physics, St. Patrick's College, Maynooth, Co. Kildare, Ireland, E. Kirsch, P. Daly, Max Planck Institut Fur Aeronomie, Katlenburg-Lindau, FRG., D. O'Sullivan, A. Thompson, Dublin Institute for Advanced Studies, Doublin, Ireland, P-K Wenzel, Space Science Department ESA/ESTEC, Noordwijk, NL

The Energetic Particle Detector EPONA of Abstract on the Giotto Mission to Halley's Comet was designed to measure electrons, protons and heavier ions (E > 20 keV) in the Comet Halley environment and during the Cruise Phase of the Mission (EPONA switch on : 22 August 1985 - Halley Encounteer; 13 March 1986). In September 1985 (STIP Interval XVIII) a well defined shock event was recorded at EPONA in association with a sequence of solar flares and a preliminary account of this event is presented.

349-92
98817
1P.

INTERACTIONS OF OBLIQUE INTERPLANETARY DISCONTINUITIES AND THEIR MANIFESTATIONS DURING STIP INTERVALS XV-XIX

AA 489953

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~~We consider~~ the generation of slow shock waves ~~generation~~ is considered as the result of the interaction of Alfvén discontinuities with solar wind contact surfaces. The latter are taken to be the boundaries of proton and alpha-particle concentration inhomogeneities. It is found that the intensity of the Alfvén discontinuity may be increased as the result of its interaction with the more dense plasma. The converse (i.e., decrease of the Alfven discontinuity's intensity following interaction with a less dense plasma) is also indicated.

Also discussed is the generation of a magnetic cloud ~~could~~ as the result of the interaction of a quasi-parallel Alfvén discontinuity with a dense plasma contact surface. It is shown that the (solar-generated) Alfvén discontinuity may then be transformed into non-flare fast and slow shock waves as the result of this interaction. Thus, it is indicated that some fast shock waves in the solar wind may have a nonsolar origin.

We have also analyzed ground observations of geomagnetic and ionospheric perturbations during STIP Intervals XV-XIX. Correlations are found between quasi-shock perturbations in space and sudden geomagnetic impulses. We underline the effect of the wave obliquity on the results of the discontinuities' interactions.

In a related topic, we discuss the role of secondary compression - rarefaction waves for the dynamics of solar wind - cometary interactions.

INTERSHOCK OBSERVATIONS DURING STIP INTERVALS XVII AND XVIII.

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Prognoz-10-Intercosmos satellite /Intershock project/ carried out observations on the earth orbit from April 26, 1985 till November 11, 1985, covering STIP Intervals XVII and XVIII. We present data obtained during the systematic measurements in the course of the STIP Interval XVII and partly XVIII: hourly averages of the solar wind speed, temperature and ion concentration, ion flux fluctuations /10^{-1} - 10^{-3}Hz/, plasma wave parameters, energetic particles fluxes, magnetic fields etc.

A special attention is paid to the solar wind disturbances causing abrupt and large effects on the shape of the bow shock /like, for instance, on May 2, 1985, and September 14, 1985/. Generally the period of observation was very close to the minimum of solar activity and quiet without significant interplanetary shocks.

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