

N89-10000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
RESEARCH AND TECHNOLOGY RESUME

TITLE

Evolution of Large-Scale Plasma Structures in Comets: Kinematics and Physics

PERFORMING ORGANIZATION

Laboratory for Atmospheric and Space Physics
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INVESTIGATOR'S NAME

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DESCRIPTION (a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)

(a) Strategy: Disconnection Events or DEs are the dramatic part of the periodic morphology involving the separation of the entire plasma tail from the head region of the comet and the growth of a new plasma. The coordinated observations of comet Halley recorded approximately 30 DEs during the 7 months of plasma activity; 19 of these are obvious. We approach the plasma physics of these events via a detailed, kinematic investigation of specific DEs and the solar-wind environment associated with it. As the detailed investigations are completed, we should be able to answer the question of a single or multiple mechanism(s) for DEs and determine which mechanism(s) are important. At present, the mechanism of sunward magnetic reconnection caused by interplanetary sector boundary crossing is consistent with the data available.

(b) Accomplishments: Note that this research activity is scheduled to begin on October 1, 1988. Activities underway before this date are: (1) assembling the Image Archive for the Large-Scale Phenomena Network of the International Halley Watch at Boulder, CO. Logistical arrangements are complete and the images are arriving at a steady rate; (2) Reviews of the field have been presented at Solar Wind VI and COSPAR; a major review is in press (Brandt 1988); (3) an analysis of the major DE of January 9-11, 1986 is underway. Initial results indicate consistency with the sector boundary hypothesis.

(c) Anticipated Accomplishments: During the first year of this program, we plan to complete the archive facility at Boulder and fully analyze two DEs. These have been tentatively selected as the DEs of December 31, 1985 and April 15, 1986.

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d. Publications

Brandt, J.C.: Large Scale Structure of the Plasma Tail of Comet Halley During the 1985/1986 Apparition. In Comet Halley 1986, Ellis Horwood Ltd., in press, 1988.

Brandt, J.C.: The Nature of Comets. Phil. Trans. R. Soc. Lond., A, 323, 437-446, 1987.

Brandt, J.C., and Niedner, M.B., Jr.: Plasma structures in comets P/Halley and Giacobini-Zinner. Astron. Astrophys., 187, 281-286, 1987.

Brandt, J.C., and Niedner, M.B., Jr.: The Solar-Wind Interaction with Comets: 1987. In Solar Wind VI, in press, 1988.

Brosius, J.W., Holman, G.D., Niedner, M.B., Jr., Brandt, J.C., Slavin, J.A., Smith, E.J., Zwickl, R.D., and Bame, S.J.: The Cause of Two Plasma Tail Disconnection Events in Comet P/Halley During the ICE-Halley Radial Period. Astron. Astrophys., 187, 267-275, 1987.