INTERACTION OF COMETS AND THE SOLAR WIND

NASA Grant NAG5-12814

Annual Report #2

For the period 1 February 2004 to 31 January 2005

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November 2004

Prepared for

National Aeronautics and Space Administration

Washington, D.C. 20546

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The Smithsonian Astrophysical Observatory
is a member of the
Harvard-Smithsonian Center for Astrophysics

The NASA Technical Officer for this Grant is William Wagner, NASA HQ, Washington, DC.

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SAO 16613436/P5302-2-02

The analysis of Comet Kudo-Fujikawa at perihelion was published (Povich et al. 2003) and picked up by Der Spiegel. Besides a large and rapidly increasing water outgassing rate, we detected a bright tail in doubly ionized carbon. The amount of carbon was greater than could be accounted for by CO photodissociation, and we attribute it to evaporation of organics from dust. A spectacular disconnection event was apparent in the C III tail, and it coincides within the uncertainties to the position of the heliospheric current sheet.

The analysis of the sungrazing comet C2001 C2 is in press. It showed evidence for subfragments and for a very long lasting source of neutrals, which we identify as evaporation of pyroxene dust grains. Results were also presented at COSPAR (Bemporad, Poletto and Raymond 2004). We are working on observations of another sungrazer, comet C2002 S2, which shows a sudden 2 magnitude drop in optical brightness and an equally sudden recovery. UVCS observations during that time show a steadily increasing outgassing rate. We have derived solar wind densities for both comets, but we are still sorting out the ambiguities involving the fragmentation and optical behavior. We are collaborating with Philippe Lamy on the LASCO measurements.

The grant covered partial support for Silvio Giordano, who reduced the observations of C2002 S2 and constructed a Monte Carlo simulation of the H atom distribution, and for Matt Povich, who reduced the Comet Machholz data. It also supported members of the SAO team who observed comet C2004 R2.

In the coming year we expect to finish the analyses of the C2002 S2 sungrazing comet and to analyze the Comet Machholz in collaboration with M. Combi. The grant will support page charges, a trip to the University of Michigan, and probably a visit to CfA by S. Giordano.

Papers

Discovery of Doubly Ionized Carbon in the Ion Tail of Comet Kudo-Fujikawa, M.S. Povich, J.C. Raymond, G.H. Jones, M. Uzzo, Y.-K. Ko, P.D. Feldman, P.L. Smith, B.G. Marsden & T.N. Woods 2003, Science, 302, 1949

UVCS Observation of sungrazer C/2001 C2: comet fragmentation and plasma-dust interactions, A. Bemporad, G. Poletto, J.C. Raymond, D.A. Biesecker, Y.-K. Ko, P. Lamy, B. Marsden & M. Uzzo 2004, ApJ, in press

Evidence for Pyroxene Dust Grains in C/2001 C2 sungrazing comet, Bemporad, A., Poletto, G., & Raymond, J. 2004, COSPAR04-A-03526