

1 May 2012
NLSF_ROSAT_abstract_120501_02.doc

ROSAT Observations of Solar Wind Charge Exchange with the Lunar Exosphere

Michael R. Collier^{1,2}
S.L. Snowden¹
M. Benna³
J.A. Carter⁴
T.E. Cravens⁵
H. Kent Hills⁶
R.R. Hodges^{2,7}
K.D. Kuntz⁸
F. Scott Porter¹
A. Read⁴
I.P. Robertson⁵
S.F. Sembay⁴
D.G. Sibeck¹
Timothy J. Stubbs^{1,2,3}
P. Travnicek⁹

michael.r.collier@nasa.gov
steven.l.snowden@nasa.gov
mehdi.benna-1@nasa.gov
jac48@star.le.ac.uk
cravens@ku.edu
howard.k.hills.1@gsfc.nasa.gov
hodges@lasp.colorado.edu
kuntz@pha.jhu.edu
frederick.s.porter@nasa.gov
amr30@star.le.ac.uk
robertin@ku.edu
sfs5@star.le.ac.uk
david.g.sibeck@nasa.gov
timothy.j.stubbs@nasa.gov
pavel@ssl.berkeley.edu

¹NASA's Goddard Space Flight Center, Greenbelt, Maryland

²NASA's Lunar Science Institute, NASA Ames Research Center, Moffett Field, California

³GEST, University of Maryland, Baltimore County, Maryland

⁴Department of Physics and Astronomy, Leicester University, Leicester UK

⁵Department of Physics and Astronomy, University of Kansas, Lawrence, Kansas

⁶ADNET Systems Inc., Lanham, Maryland

⁷Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, Colorado

⁸Department of Physics and Astronomy, Johns Hopkins University, Baltimore, Maryland

⁹Institute of Atmospheric Physics, Academy of Sciences, Prague, Czech Republic

We analyze the ROSAT PSPC soft X-ray image of the Moon taken on 29 June 1990 by examining the radial profile of the count rate in three wedges, two wedges (one north and one south) 13-32 degrees off (19 degrees wide) the terminator towards the dark side and one wedge 38 degrees wide centered on the anti-solar direction. The radial profiles of both the north and the south wedges show substantial limb brightening that is absent in the 38 degree wide antisolar wedge. An analysis of the count rate increase associated with the limb brightening shows that its magnitude is consistent with that expected due to solar wind charge exchange (SWCX) with the tenuous lunar atmosphere. Along with Mars, Venus, and Earth, the Moon represents another solar system body at which solar wind charge exchange has been observed. This technique can be used to explore the solar wind-lunar interaction.