Dust, Atmosphere, and Plasma at the Moon

I. Introduction and General Considerations (3 pages)
   a. Progress since last NVM – explosion of field with 7 s/c
   b. Missions, Laboratory, Modeling
   c. Integrated view of 3 apparent disparate topics

II. Drivers of the Near-Lunar Space Environment (4 pages)
   a. Solar radiation (UV esp)
   b. Charged particles (nominal solar wind, m-tail, energetic particles, CMEs)
   c. Micro-meteoroids (nominal and streams)

III. The Moon's Response to the Drivers
   a. Neutral Exosphere (8 pages)
      i. Introduction (cite past reviews, like Stern)
      ii. New findings (LADEE, ARTEMIS PUI, Energetic neutral H, LAMP H2/He, LCROSS special event, GB work)
   b. Dust Exosphere (8 pages)
      i. Introduction (cite past reviews, like Krivov)
      ii. New Findings (LADEE; LAMP)
   c. Space Plasma Interactions (8 pages)
      i. Introduction (surface effects, cite past reviews, Jasper's New View paper)
      ii. New findings (LP; ARTEMIS; Wake-revisited; precursor regions; surface charging at global scale, sheath-scale and grain micro-scale; regional effects at terminator; flow in polar craters; mag anomalies; plasma-volatile connection (OH at mid-latitude, polar water erosion?)

IV. System-level Effects
   a. LADEE and the renewed appreciation of meteoric control of exosphere (1.5 pages)
   b. Lunar soil hydroxylation and its contribution to the water cycle (1.5 pages)
      i. Solar wind H inventory and the hydrogen sub-cycle
      ii. Possible water creation
   c. Role of solar wind plasma at poles (an H source processor a water loss process?) (1.5 pages)
   d. Laboratory studies (3 pages)

V. Future directions: (3 pages)
   a. Cubesat missions
   b. RP
   c. Getting surface measurements within special regions: mag anomaly, terminators, polar craters

VI. Conclusions (2 pages)

Co-authors

Farrell
Halekas
Horanyi
Szalay
Fatemi
Poppe
Killen
Collier
Hurley
Colaprete
Elphic
Mahaffy
Benna
Retherford
Grava
Haruyama