# School of Earth and Environmental Sciences Colloquium Series


## Dr. Dara Laczniak

Lecturer, Earth and Environmental Science
Queens College, CUNY


## Protons and Ions and Dust, Oh My! Improving Models of Space Weathering in a Decade of Sample Return

Wednesday, Oct. 18th
12:15-1:30 PM,
Science Bldg. C-207
Zoom ID:
820 5441 6677
Passcode: 895367


Photo: NASA/Erika Blumenfeld and Joseph Aebersold

Constraining the composition of planetary bodies is vital to understanding the origin and evolution of our solar system. Planetary scientists rely heavily on ground- and spacecraft-based remote sensing instruments to determine planetary surface compositions. However, for airless bodies (those that lack an atmosphere), the effects of space weathering interfere with the determination of surface composition and the pairing of meteorites to their parent bodies. The term space weathering collectively refers to the optical, physical, and/or compositional alteration of a planetary surface resulting from its exposure to harsh environment of interplanetary space over long periods of time. Bombardment by energetic particles from the sun (i.e., solar wind irradiation) and impacts by micrometer-sized dust particles (i.e., micrometeoroid bombardment) are the dominant space weathering processes that affect airless bodies in our solar system. Although research has investigated the effects of space weathering on the Moon and silicate-rich (S-type) asteroids, the planetary science community lacks a comprehensive understanding of how space weathering alters primitive, carbon-rich (carbonaceous or C-complex) asteroids—those that likely delivered organic molecules necessary for the evolution of life to an ancient Earth. Just last month, NASA's OSIRIS-REx mission delivered over 60 grams of material from the 4.5 billion-year-old, carbon-rich asteroid Bennu to Earth's surface. Detailed laboratory analysis of the finest-size fraction of these regolith grains will provide invaluable insight into the effects of space weathering on carbon-rich asteroid surfaces and help identify the origin of a very special type of meteorite—carbonaceous chondrites. This talk will contextually place the OSIRIS-REx mission into the history of space weathering and discuss how results from returned sample analysis and experimental analog studies can be integrated to develop a comprehensive model of space weathering on carbon-rich asteroidal regoliths.