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太陽系小天体の表面プロセス：小惑星の内部構造と、その探査に向けて
Surface processes on small bodies: Implications to the internal structures of asteroids and their explorations

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Recent missions reveal that significant varieties exist in the shapes and surface states of small bodies in the solar system. These are partly results of surface processes including cratering, reaccumulations of ejecta, migrations of gravels, and space weathering. Recently, we find an impact crater on the unusually smooth-looking surface of a small saturnian satellite, Atlas, whose enigmatic shape is explained by accumulations of particles from the A-ring of Saturn. This finding as well as geologic and electro-static analyses indicate that the surface of Atlas is covered by fine particles, which electro-statically levitate, migrate, and deposit to erase surface features, including craters. Such process is likely active on other small satellites of Saturn if they are 1) in the region outside the orbit of Titan, and 2) in the region that lies within A-, B-, and C-rings, including the orbits of Atlas and Pan. Also, this process might be important even for near-earth asteroids, especially if large amount of fine particles are supplied on their surfaces.

We consider this process is another example that the surface states of small bodies can be more active than relatively larger bodies, such as the Moon. In this talk, we will review the surface processes on the surface of small bodies and discuss their implications to the internal structures of asteroids. We also present the current status of our development of a Ground Penetrating Radar for future asteroid mission, which is probably the most effective way to explore the near-surface structures of asteroids.

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