



Introduction to Geologic Processes

Of the terrestrial planets, the Earth is the most complex and diverse. Because we live on this planet, we have the opportunity to study the geologic processes that have formed and continue to shape its surface. The four main geologic processes that act on the Earth's surface are **volcanism, tectonism, gradation, and impact cratering**.

Volcanism is the eruption of molten material onto the surface. On the terrestrial planets, the molten material (or magma) is composed of melted rock and gases. On icy satellites the material is predominantly liquid water or slushy ice, with some fraction of rocky material. Tectonism involves the movement of rock by folding, fracturing, or faulting. Earthquakes are a manifestation of tectonism. Volcanism and tectonism are processes driven by internal planetary activity. Gradation involves the erosion, movement, and deposition of surface materials. The major agents of gradation are running water, ice, gravity, and wind. Gradation is con-

trolled by the surface environment of a planet or satellite. Factors controlling surface environment include gravity, temperature, and the presence of an atmosphere. Material falling from space such as meteoroids and comets result in impact cratering, the fourth principal geologic process.

By recognizing the morphologies (shapes) of landforms produced by each of these four processes, it is possible to begin to unravel the history of a planetary surface. Planets and satellites have different geologic histories, with each of the processes playing a part. However, the extent to which any process has operated on a surface varies from planet to planet. The exercises in this unit are designed to introduce the student to the landforms produced by each process. Today, impact cratering (emphasized in Unit Two) is relatively rare in the solar system, but historically it has played a major role in shaping planetary surfaces and in the formation of features now seen.

