In the past silica-based magmas erupted on Vesta, the Moon, and Mercury, while more recent eruptions occurred on Venus and Mars; the Earth and Io are the only bodies known to have currently active silica-based volcanism. Cryovolcanism has occurred on a variety of icy moons. Melting inside a body, whether silicate or ice, is achieved through one of three processes: increasing the temperature, reducing the pressure, or changing the composition of the melting source region. On the Earth reducing pressure is the primary melting mechanism; it occurs dominantly at mid-ocean ridges and in mantle plumes. Pressure-release melting probably occurs under large impact craters as well; it is likely to be an important melting process on all bodies, but not all bodies will be dominated by pressure-release. Melting produced by increasing temperature is probably not a high-volume process on Earth, but temperature increase by tidal heating is likely the dominant process on some moons, and radiogenic heating was a dominant process in planetesimals. Temperature rise through conductive heating of sinking lithospheric instabilities is a likely melting process on one-plate planets. Radiogenic heating may also be a critical process on some bodies. Finally, changing the composition of the melting source region is a major process in terrestrial subduction zones; can this process occur in the absence of plate tectonics? I will present models for the dynamics of melting in these different regimes and discuss them in the context of a range of solar system bodies and over a range of evolutionary stages.