stable within the satellites because the density of liquid water is intermediate between the densities of ice I and the higher density polymorphs (Figure 1.2).

Jupiter's satellite Europa has a radius of 1561 km, the outer $\sim$ 170 km of which consists of H_2O-rich material (*Anderson et al.*, 1998). Measurements from the Galileo magnetometer show that Europa behaves as a conductor in the presence of the Jovian magnetic field, indicating that a global layer of conductive liquid, most likely water, lies beneath its icy surface (*Zimmer et al.*, 2000) (Figure 1.3). Due to its orbital resonance with Io and Ganymede, Europa has an eccentric orbit around Jupiter and thus experiences a time-varying tidal force on its surface and dissipation of orbital energy in its interior.

Gravity data suggest that Ganymede, with a radius of 2631 km, is differentiated into an ice mantle approximately 900 km thick, a rocky core $\sim$ 400 to 1300 km thick, and an iron inner core with a radius between 400 to 1300 km (*Anderson et al.*, 1996) (Figure 1.3). Galileo magnetometer measurements show that Ganymede has a complex magnetic field that is the sum of a permanent dipole field and a small contribution to the total magnetic field from Ganymede's inductive response to the Jovian magnetosphere (*Kivelson et al.*, 2002). Like Europa, the inductive response of Ganymede suggests the presence of a liquid water ocean in its interior, likely near the depth where the melting point of water ice is minimized, approximately 160 km (*Kivelson et al.*, 2002). Calculations of the orbital evolution of the Galilean satellite system over time performed by *Showman and Malhotra* (1997) suggest that Ganymede may have experienced increased tidal dissipation as it passed through orbital resonances with other satellites, which may have resulted in increased melting in Ganymede's interior.

Jupiter's third icy satellite, Callisto, is roughly the same size as Ganymede, with a radius of 2403 km. Callisto has roughly the same mean density as Ganymede, but shows little evidence of endogenic resurfacing (*Moore et al.*, 2004), leading many to believe that Callisto is undifferentiated and is composed of a homogeneous mixture of