Head, 2005). The dimensions of the channel remnants on the Eberswalde delta suggest that the discharges were comparable to terrestrial streams draining similar-sized basins (Moore et al., 2003) and that the deltas and fans may have taken only decades to form (Jerolmack et al., 2004). Chlorine-rich deposits found in local lows within the Noachian uplands may be the result of evaporation of lakes (Osterloo et al., 2008). Some of the sulfate-rich deposits found in Meridiani may have been deposited in transient inter-dune lakes, and subsequently altered as a result of oscillations in the local groundwater table (Grotzinger et al., 2005; McLennan et al., 2005). The Meridiani deposits are discussed more in detail below under the Hesperian.

Howard et al. (2005) suggested that the more pristine valleys incised into the highland terrains are the result of a late Noachian to early Hesperian episode of incision. They make a distinction between the general degradation of the landscape and formation of the incised valley networks. They suggest that during most of the Noachian there was widespread fluvial erosion of crater rims and other high ground and partial infilling of lows such as craters, but that formation of the incised networks was fundamentally different. They were incised into a degraded landscape, but contributed little to that degradation. They form an immature drainage system in which individual valleys are poorly graded and basin development by erosion and alluviation barely occurred. Some support for the late incision model in which the more pristine, more easily detected valleys contribute little to the general landscape degradation is the observation that areas that appear only sparsely dissected, such as the region between Hellas and Argyre, are just as degraded as the highly dissected areas.

Degradation of the Noachian landscape must have produced large amounts of erosional debris. The partial to nearly complete filling of Noachian craters of all sizes is a significant possible sink for erosional products. Malin and Edgett (2000) conclude that much of the crater fill consists of layered, sedimentary rocks. They also point out the common presence of layered rocks in intercrater areas, canyons, and areas of chaotic terrain. On the basis of their erodibility, the presence of steep scarps, and the lack of boulders at the bases of scarps, they conclude that most of these layered Noachian deposits are indurated, fine-grained sediments rather than coherent volcanic rocks. Unknown amounts of fill could also be hidden under younger deposits in the low-lying northern plains.

One of the most striking characteristic of these sediments, irrespective of their age, is their rhythmic layering, which in many cases is remarkably regular (Malin and Edgett, 2000) (Figure 2.3). The layering could result from a variety of causes such as successive impacts and volcanic events or changes in the erosional regime as a result of climate changes. While all these three processes likely contributed to the sediments, the extreme regularity of some of the layering argues against volcanism and impacts as a primary cause, at least in these cases. The rhythmic depositional patterns suggest an astronomic cause such as changes in erosion rates brought about by climate changes, which in turn result from periodic changes in the orbital and rotational motions of the planet (Laskar et al., 2004).

Many of the fluvial features found on post-Noachian terrains were formed by large floods. However, despite widespread dissection during the Noachian, large floods appear to have been rare. Ladon Vallis is one example. It may be part of a large ancient