

Stop 2. Upper Member L-M and Perkasio Member of the Passaic Fm. Pebble Bluff, Milford, NJ.

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Latitude and Longitude: (aprox.) 40°34.60'N, 75°08.27'W

Stratigraphic Unit: Passaic Formation

Age: Norian; ~215 Ma

Main Points:

1. Passaic Formation near border fault and coarse facies of interval at Stop 1.
2. Milankovitch cyclicity, and deeper water units extending into conglomeratic facies
3. Comparison to central basin facies
4. Fossiliferous outcrops
5. Reptile footprint faunules

These outcrops (Fig. 1), also described by Van Houten (1969, 1980), Arguden and Rodolpho (1986), Olsen and Flynn (1989), and Olsen et al., 1989) are less than 2.4 km to the southeast from the border fault and consist of thick sequences (>20 m) of red conglomerate and sandstones alternating with cyclical black, gray, and red mudstone and sandstone. Dips average 10-15° NW, and there several faults, downthrowing to the east, between the largest outcrops. These outcrops are part of the cyclical and quasiperiodic lacustrine to fluvial succession of the central Newark basin in which lake depth responded profoundly to Milankovitch climate forcing (Olsen, 1996; Olsen and Kent, 1996; Olsen and Kent, 1999). The thickest gray beds at this stop (see Figures 1 and 2) are the Perkasio Member, marking a 405 ky McLaughlin cycle within the wetter part of a 1.75 m.y. modulating cycle (P2) and a wetter part of a 3.5 m.y. Laskar cycle (La4). The red conglomerates in the lower parts of the section are the coarse lateral equivalents of the red mudstones seen at Stop 1.

The Perkasio Member consists of Van Houten cycles and compound cycles showing the same pattern as the Lockatong (Olsen, 1986; Olsen and Baird, 1986). It consists of two sequential 100 ky year cycles, each containing two well developed ~20 ky Van Houten cycles and weakly developed red and purple Van Houten cycle, succeeded upwards by red clastics (Figure 2). McLaughlin named the lower set of gray beds member N and the upper member O, which I have renamed short modulating cycle N and O, respectively. Underlying strata at these outcrops comprise the drier parts of member L-M, and these are largely conglomeritic at this site.

Conglomerates at Pebble Bluffs occur in three basic styles. 1) Poorly-bedded boulder-cobble conglomerate with pebbly sandstone interbeds. Matrix rich conglomerates are in places matrix-supported. These appear to define lenses that are convex-upward and bounded by the largest clasts at their edges and tops. These lenses appear to be debris flow lobes, in which some of the matrix may have been partially washed out by rain during periods of non-deposition. If correctly identified, the flow lenses are typically less than 30 cm thick and less than 5 m wide, similar to debris flows formed on mid to lower portions of steep fans. Pebbly sandstone and muddy sandstone include "trains" of isolated