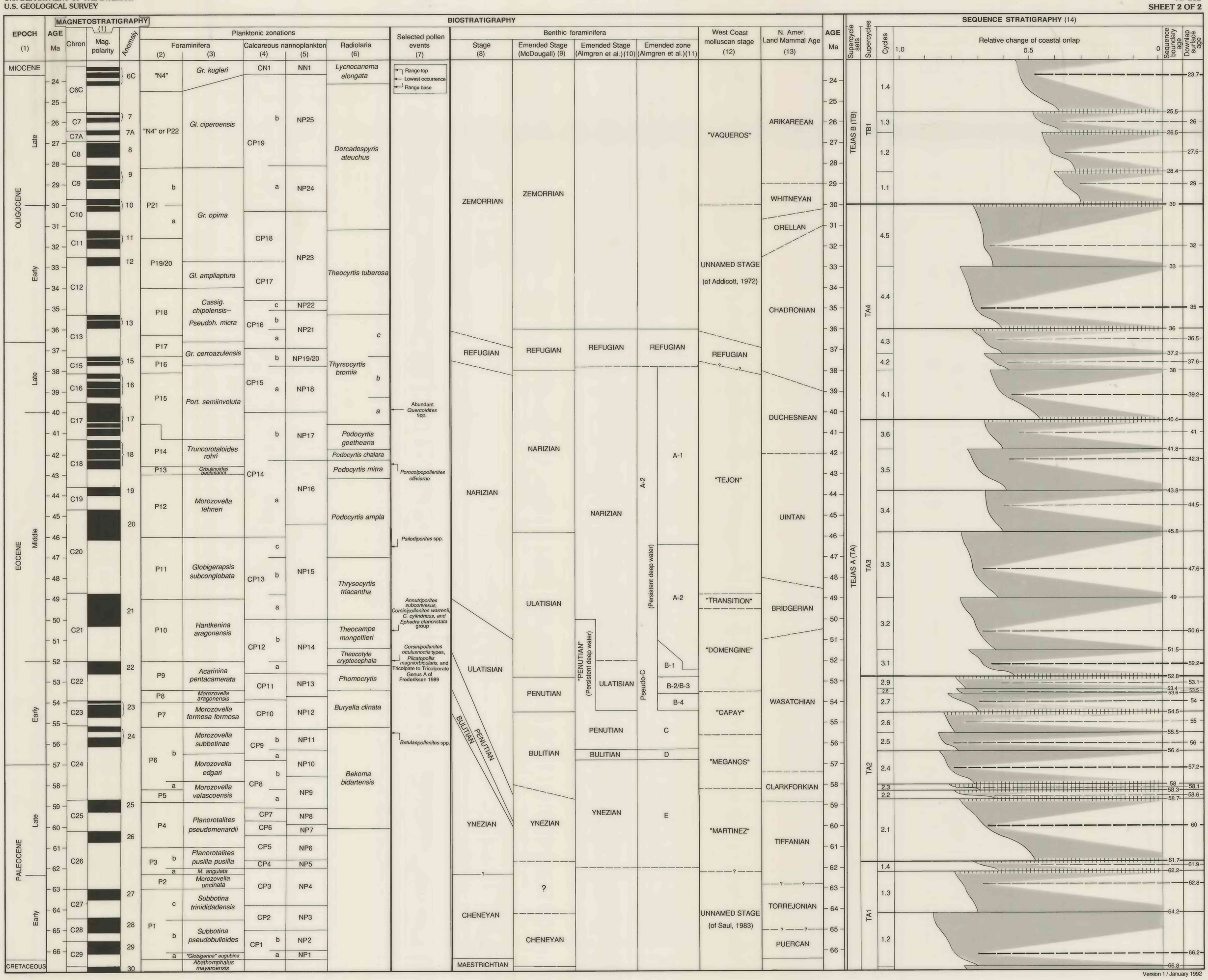

SOURCES

1. Berggren and others (1985), Aubrey and others (1988)
2. Blow (1969, 1979), Berggren and Van Couvering (1974), Hardenbol and Berggren (1978)
3. Bolli (1957, 1966), Premoli Silva and Bolli (1973), Stainforth and others (1975)
4. Bukry (1973, 1975), Okada and Bukry (1980), Bukry (personal commun., 1991)
5. Martini (1970, 1971)
6. Riedel and Sanfilippo (1970, 1971, 1978)
7. Frederiksen (1989, 1991a, 1991b)
8. Cheneyan Stage of Goudkoff (1945), Ynezian through Narizian Stages of Mallory (1959), Rufugian Stage of Schenk and Kleinpell (1936), and Zemorrian Stage of Kleinpell (1938, 1980); correlation from Poore (1980), Dumoulin (1984). To be used for published age calls not specifying any emended zonation (generally pre-1988)
9. Stages of Goudkoff (1945), Mallory (1959), Schenk and Kleinpell (1936), and Kleinpell (1938, 1980) as emended by McDougall (1989)
10. Stages of Mallory (1959) as emended by Almgren and others (1988).
11. Zones of Laiming (1939) as emended by Almgren and Filewicz, 1984, and Almgren and others 1988)
12. Addicott (1977), Saul (1983), Squires (1988)
13. Woodburne (1987)
14. Haq and others (1987), adjusted to fit this time scale

Columns 1 through 6 from Berggren and others (1985) and Aubrey and others (1988)

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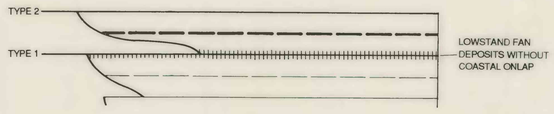
Note: This chart was designed to aid inter-basin corelation of Paleogene strata for a current large-scale geologic mapping effort in southern California. It was largely assembled from published information and is, of course, subject to change as new information becomes available. Change in the chronology will, for example, be required as a result of recent re-dating of Eocene-Oligocene tephra in Wyoming (Swisher and Prothero, 1990), but a revision of that magnitude is beyond the scope of this compilation.

A number of plankton stratigraphy zonation schemes are available that reflect different interpretations or correlations of zones, most of them minor. The correlations of Berggren and others (1985) and Aubrey and others (1988) are used here, mostly because they seem to be widely accepted. Benthic foraminiferal zonations, recently emended by Almgren and others (1988) and the West Coast molluscan Stages are tied to calcareous nannofossil zones, at least in part. The North American Land Mammal Ages are tied to isotope stratigraphy and the magnetostratigrapic time scale.

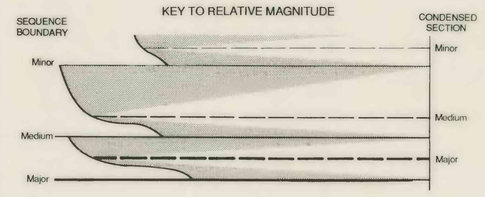
The use of quotation marks follows the practice of Weaver and others (1944) in flagging problems in the definition of California formations, stages, and zones. Dashed and queried lines express difficulties in correlating these units. Many of these difficulties are explained by Kleinpell (1980, p. 4-53).

EXPLANATION

SEQUENCE BOUNDARY TYPES



KEY TO RELATIVE MAGNITUDE



This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey editorial standards or with the North American Stratigraphic Code. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

PALEOGENE TIME SCALE FOR SOUTHERN CALIFORNIA

Compiled by J.A. Bartow

1992

Version 1 / January 1992