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Andrea Albianelli¹, Maria Teresa Galli², Luciano Gorla², Fabio Lottaroli³, Giovanni Napoleone¹, Maria Rose Petrizzo⁴, Isabella Premoli Silva⁴, Antonio Valdisturlo² (1) Università di Firenze-Dipartimento di Scienze della Terra, Firenze, Italy (2) ENI-E&P Division, Milano, Italy (3) ENI/AGIP - IEOC (Egyptian Branch), Cairo, Egypt (4) Università di Milano-Dipartimento di Scienze della Terra, Milano, Italy

Integrated Cyclostratigraphy of Core and Well Log Data in Upper Cretaceous Reworked Carbonates (Scaglia)

The application of cyclostratigraphy to well logs is still an undervalued tool for the estimation of geologic ages and sedimentation rates in subsurface geology. We propose a study integrating biostratigraphic, paleomagnetic and well log data from a well drilled in the Late Cretaceous carbonates of Scaglia facies (Italy, external Apennine domain), consisting of generally resedimented (turbiditic) deposits with frequent short hiatuses. A nearly 200 m thick cored interval was studied for biostratigraphy, magnetostratigraphy and cyclostratigraphy. Biostratigraphy indicates a mid-late Campanian age for the bottom core, while the top is close to the Cretaceous/Tertiary boundary. Magnetostratigraphy resolved 7 magnetozones which are calibrated to chrons 33n to 31n of the geomagnetic polarity time scale, for a time span of nearly 9 my. An interval of 32.5 m in the middle of the core was treated in more detail with spectral analysis of the continuous magnetic signal, in order to estimate the changes in sedimentation rates and the amount of eroded sediment. The well log data (microresistivity curves) were processed in the corresponding depth interval to check their cycle durations. A good match was observed between the results of magnetostratigraphy and well log analysis, indicating a clear cyclic setting and its probable dependence from orbital forcing (Milankovitch band). These results led to apply the microresistivity analysis to the non-cored intervals, and extend afterwards the dating using only well logs with weak biostratigraphic constraints. The applied methodology is then helpful to improve the confidence in dating and correlating subsurface sections.