Geochronology, Sr isotope analysis, magnetostratigraphy, and plankton stratigraphy across the Oligocene-Miocene boundary in the Contessa section (Gubbio, Italy)

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with 13 figures and 3 tables

Abstract. Results from litho-, bio-, magnetostratigraphic, geochronologic, and Sr isotope analyses across the Oligocene-Miocene boundary in the classic marine sedimentary section of the Contessa Valley, near Gubbio (Italy), show a stratigraphic discontinuity immediately below the contact between the Scaglia Cinerea formation and the overlying Bisciaro formation. However, no lithostratigraphic breaks are evident throughout the rather uniform and well bedded Scaglia Cinerea, and the bottom of the Bisciaro is marked here, as well as in other complete sections throughout the Umbria-Marche Apennines, by a thin layer of volcanic bentonite known as "Livello Raffaello". Thus, the sharp lithologic change between the two formations may not represent a major stratigraphic hiatus; rather, top of the Scaglia Cinerea is probably a condensed sequence representing a period of slow sedimentation, and may contain multiple lesser hiatuses. In this paper we document the following observations:

1) In the uniform pelagic sequence of the Valle della Contessa, sedimentation rate changes abruptly in the mid Chattian, at a stratigraphic level represented by Chron 7 (i.e. ~ 25.5 Ma);

2) Due to contamination of diagenetically recrystallized biogenic calcite, and/or the recycling of older carbonates following a major global sea-level drop in Late Oligocene, the $^{87}\text{Sr}/^{86}\text{Sr}$ ratios in the condensed interval including the top of the Scaglia Cinerea and lower part of the Bisciaro, are significantly lower than the values expected from the rather monotonic and linear trend that characterizes the upper Eocene to Oligocene Sr isotope evolution curve;

3) The normal polarity intervals of Chrons 6C and 6B, and possibly of the lower part of Chron 6A, are not represented in this section probably due to stratigraphic condensation and/or the presence of lesser hiatuses;

4) In the Contessa sequence, the condensed stratigraphic interval includes the top of Zone P22, and the upper part of Zone N4 (sensu Blow, 1969). Therefore, it is difficult, if not impossible, to accurately define the Oligocene-Miocene boundary. In the Mediterranean area, this time interval is represented by hiatuses and stratigraphic discontinuities probably related to the great Late Oligocene sea level fall and/or to the inception of regional orogenic tectonism;

5) The Aquitanian-Burdigalian boundary, defined in the Contessa CT section by the apparently coincident first occurrences of Globigerinoides trilobus s.s. and Globigerinoides altiaperturus (top of Glo-