Review of geochronology and paleoceanography of the Rupelian/Chattian boundary in the Oligocene

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Oligocene (33.9 Ma~23.03 Ma) is divided into Rupelian and Chattian, and its boundary age is 27.82 Ma (International Chronostratigraphic Chart, v2022/10). According to Coccioni et al. (2018), the GSSP for the Rupelian/Chattian boundary is at the Monte Cagnero (MCA) section in Italy, which was ratified in 2016. GSSP horizon coincides with the highest common occurrence of plantic foraminifera *Chiloguembelina cubensis*, and falls in calcareous nannofossil zone NP24, dinocyst zone Dbi, and Chron C9n. The MCA section yielded some biotite-rich volcaniclastic layers, providing radiometric ages. The age of GSSP horizon is determined as 27.82 Ma based on orbital tuning of magnetic susceptibility in the same section.
However, again according to Coccioni et al. (2018), there are uncertainties regarding the radiometric ages and the orbital tuning, and they show alternative orbital tuning determining the age of GSSP horizon as 27.41 Ma. Because the GSSP horizon lies in the lower part of Chron C9n, the Geomagnetic Polarity Time Scale provides 27.29 Ma for the horizon (Speijer et al., 2020 in Gelogic Time Scale 2020). Thus, the Rupelian/Chattian boundary age has about 500 kyrs uncertainty. In addition, the highest common occurrence of planktic foraminifera *C. cubensis* is based on relative abundance of planktic foraminifera assemblage, and is different from the highest occurrence (extinction) of the species, which needs caution (King and Wade, 2017).
In terms of paleoceanography, cooling occurred around the Rupelian/Chattian boundary, accompanying abrupt positive shift of benthic foraminifera oxygen isotope (Pälike et al., 2006; Coccioni et al., 2018). Meanwhile, test size of planktic foraminifera *Paragloborotalia opima* increased in response to high productivity in the equatorial Pacific (Wade et al., 2016). Cooling and high productivity might lead to a diversification of modern whales (Berger, 2007). Nevertheless, knowledge on cooling at around the Rupelian/Chattian boundary is less than those at around Eocene/Oligocene and Oligocene/Miocene boundaries. Understanding the magnitude of the Antarctic ice sheet development, and atmospheric CO_2 concentration is required for the Rupelian/Chattian boundary.

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