

IUGS RATIFICATION OF THE QUATERNARY SYSTEM/PERIOD AND THE PLEISTOCENE SERIES/EPOCH WITH A BASE AT 2.58 MA



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ABSTRACT

The International Union for Geological Sciences (IUGS) on 29 June, 2009 ratified a proposal by the International Commission on Stratigraphy that the base of the Quaternary System/Period and the base of the Pleistocene Series/Epoch be lowered to that of the Gelasian Stage/Age. The Gelasian is transferred accordingly from the Pliocene to the Pleistocene. The Global Stratotype Section and Point at Monte San Nicola, Sicily, Italy, with an estimated age of 2.58 Ma, defines the lower boundary of the Gelasian, Pleistocene and Quaternary. Details of the ratification are given, and implications discussed.

RÉSUMÉ

RATIFICATION PAR L'IUGS DU QUATERNAIRE EN TANT QUE SYSTÈME/PÉRIODE ET DU PLÉISTOCÈNE EN TANT QUE SÉRIE/ÉPOQUE AVEC UNE BASE À 2.58 MA

L'Union Internationale des Sciences géologiques (IUGS) a ratifié le 29 Juin 2009 la proposition faite par la Commission Internationale de Stratigraphie (ICS) de descendre la base du Quaternaire en tant que Système/Période et celle du Pléistocène en tant que Série/Époque pour la faire coïncider avec celle de l'Étage/Âge Gélasién. En conséquence, le Gélasién est transféré du Pliocène dans le Pléistocène. La coupe et le point de référence du stratotype global (GSSP) de Monte San Nicola, en Sicile, Italie, avec un âge estimé à 2,58 Ma, définit la limite inférieure du Gélasién, du Pléistocène et du Quaternaire. Les détails de la ratification sont donnés et les implications discutées.

1 - ANNOUNCEMENT

On 29 June 2009, the Executive Committee of the International Union for Geological Sciences (IUGS) approved, by majority vote, the 2 June 2009 recommendation of the International Commission on Stratigraphy (ICS) that:

“1) the base of the Pleistocene Series/Epoch be lowered such that the Pleistocene includes the Gelasian Stage/Age and its base is defined by the Monte San Nicola GSSP, which also defines the base of the Gelasian;

2) the base of the Quaternary System/Period, and thus the Neogene–Quaternary boundary, be formally defined by the Monte San Nicola GSSP and thus be coincident with the bases of the Pleistocene and Gelasian, and

3) with these definitions, the Gelasian Stage/Age be transferred from the Pliocene Series/Epoch to the Pleistocene.” (Riccardi, 2009).

Hence, the Global Stratotype Section and Point (GSSP) at Monte San Nicola in Sicily, Italy, which has served to define the base of the Gelasian Stage/Age since

1996 (Rio *et al.*, 1998), now also defines both the base of the Pleistocene Series/Epoch and that of the Quaternary System/Period. The Gelasian GSSP has been correlated to Marine Isotope Stage (MIS 103) and is astrochronologically constrained at 2.58 Ma. The base of the Pleistocene had hitherto been defined by the GSSP at Vrica in Calabria, Italy, which is astrochronologically dated at 1.806 Ma (Lourens *et al.*, 2005). This GSSP remains available to define the base of the Calabrian Stage formally (Cita *et al.*, 2008).

2 - DISCUSSION

The ICS decision to approve the above proposal was reported in a June issue of *Quaternaire* (Gibbard and Head, 2009). The ICS presented this proposal to the IUGS Executive Committee for ratification, which was duly granted. Having now reported this important final decision, we clarify several issues relating to the boundary and to the ratification process.

1) The original Quaternary proposal submitted to the ICS for consideration (reproduced in Gibbard & Head, 2009, box 1) asserted that the GSSP of the Gelasian

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Stage coincides with the base of Marine Isotope Stage 103. This claim was based on information then published on the website of the ICS, but is incorrect. The GSSP of the Gelasian Stage does coincide with Marine Isotope Stage 103 (Rio *et al.*, 1998), but not specifically its base.

2) Rio *et al.* (1998) stated that the Gelasian GSSP is at the base of a marly layer immediately overlying a sapropel (known as the Nicola bed) assigned to Mediterranean Precession-Related Saproel (MPRS) 250. They noted that “The astrochronological age of sapropel MPRS 250 (mid-point), corresponding to precessional cycle 250 from the present, is 2.588 Ma (Lourens *et al.*, 1996), which can be assumed as the age of the boundary.” (Rio *et al.*, 1998, p. 85). Although an age of 2.588 Ma for the Gelasian GSSP (Rio *et al.*, 1998, Lourens *et al.*, 2005) has not since been disputed, it is not strictly correct, and without knowing the sedimentation rate of the sapropel, it is unrealistic to assign four significant figures to the age. Thus, if we assume that the sapropel was deposited over 7–10 kyr (e.g. Capozzi *et al.*, 2006) and its full thickness has been preserved, then the age of the GSSP rounds down to 2.58 Ma, a figure that we accept here. Ultimately, of course, the boundary is defined by the position of the GSSP in the rock record, not by its age or indeed any other criterion.

3) The Quaternary proposal submitted to the ICS in September 2008 had requested that “The Vrica GSSP (the present Quaternary and Pleistocene basal boundary) be retained as the base of the Calabrian Stage, the second stage of the revised Pleistocene Series.” (Gibbard and Head, 2009, p. 127). However, the ICS proposal to the IUGS omitted this request, due to oversight, and the IUGS ratification (above) made no mention of the Calabrian Stage. This stage, while meeting all necessary requirements (Cita *et al.*, 2008) and having been accepted by both the ICS Subcommittee on Quaternary Stratigraphy and the ICS itself, must therefore await future ratification by the IUGS.

It is nonetheless evident that ratification by the IUGS Executive Committee formally brings to closure a debate

on the status of the Quaternary and the position of the lower boundaries of both the Quaternary and the Pleistocene that has lasted for more than 60 years (Gibbard *et al.*, 2009). Ratification by the IUGS is therefore a monumental event for the Quaternary community and beyond.

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