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Climate of the Past Discussions

Interactive comment on "The early Eocene equable climate problem revisited" *by* M. Huber and R. Caballero

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From James Ogg (who served as Executive Secretary of Internat. Comm. Stratigraphy, 2000-2008; current ICS coordinator of Stratigraphic Information; and professor at Purdue University)

Matt Huber asked me for clarification on usage of "Early" versus "early" Eocene. Here is a composite of our exchanges.

There are two related issues: (1) Formal "sub-epoch" or "sub-series" for any geologic epoch/series. (2) Informal usage. (3) Current definitions of informal Eocene "sub-epochs".

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(1) Formalization of "Early Eocene" or other "sub-epoch" or "sub-series"

When I served on ODP-IODP legs, I was greatly annoyed when the editors demoted my "Early Eocene" to a lower-case "early Eocene". Indeed, there is an implied vagueness about a lower-case "early Eocene". However, the "legal" reason is that "Early Eocene" is a category that is not formalized in the International Geologic TimeScale. Eocene is an Epoch/Series that has divisions into Stages/Ages (e.g., Priabonian, Ypresian). There are no official intermediate grouping of such stages/ages into "sub-epoch" or "sub-series". A "sub-epoch" or "sub-series" is not a recognized formal division of geologic time in the International or North American stratigraphic guides (e.g., see Table 2 in the North American Stratigraphic Code; or longer description within Internat. Strat. Code at https://engineering.purdue.edu/Stratigraphy/strat_guide/chro.html). Indeed, a request by the Pleistocene working group to have only a formalized "Late/Middle/Early" sub-series rather than named "stages" was rejected by ICS/IUGS – therefore, voting is now underway for formal stage names and definitions.

Only the Cenozoic has this "can I use official sub-epoch/sub-series" situation. Workers in all other periods seem content with just using the formalized stages. But, most of those other geologic periods have "Late/Middle/Early" as the formal series/epochs; therefore a sub-epoch division such as "Middle Late Cretaceous", although quite logical to convey exactly what is meant, would look rather odd.

In summary, officially, one must use the Stages/Ages as the only formal subdivision of an epoch/series. Or, only a lower case "early/middle/late" for refering to a relative placement or clusters of ages/stages within an epoch/series.

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(2) Informal usage within Cenozoic

But, when one uses "early Eocene" (lower case), it seems to imply a vague "somewhere in the early part of Eocene", rather than a more precise equivalence within only

the Ypresian Stage and not including the following Lutetian Stage. And, many Cenozoic workers have commonly used sub-epochs (e.g., “Middle Miocene”) within internal reports, stratigraphic columns, and other commuications. There is no standardization (e.g., ExxonMobil divides the Paleocene into “Early/Late” on their stratigraphic charts, but other groups use “Early/Middle/Late” Paleocene).

Therefore, when I was Secretary General, the ICS was requested by different groups (especially petroleum companies) to make a standard usage of the informal early/middle/late for each Cenozoic epoch/series. Essentially, allowing “early Eocene” to have a standardized equivalence. The Paleogene and Neogene subcommissions provided their “informal recommendations” for groupings of stages into intermediate “sub-epoch/sub-series”, which is used in our (ICS) TimeScale Creator display system (www.tscreator.org). But, I emphasize, that these are a “gray” category of standardized informal divisions.

Of course, there is another view that usage of the 100-odd geologic-stage names only adds confusion. Saying “Late Paleocene” conveys information more accurately to more geoscientists than saying “Thanetian”. Taking this one step further, the Commission for the Geologic Map of the World only uses numbered-stages within each period (e.g., J3) rather than trying to abbreviate the more obscure stage names.

In summary, my recommendation is that one can use a capitalized “Early Eocene" if one clearly states in the manuscript that this is equivalent to the Ypresian Stage, but “Early Eocene” is used here to effectively convey the relative age to non-specialists.

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(3) Eocene divisions – status of GSSPs

Until January of this year, there were NO formal definitions for any of the Eocene stages! Only the base-Eocene (base-Ypresian) and base-Oligocene (hence, top of Priabonian) had GSSPs fixed to the rock record and an array of correlation markers.

Early in 2011, the ICS/IUGS ratified the base-Lutetian GSSP; and it is now being prepared for publication in Episodes. The definition, which now coincides with the local lowest occurrence of nannofossil Blackites inflatus (middle of Chron C21r), is about a half-million years younger than a common foraminifer “working definition” (onset of Planktonic foraminifers of Hantkenina). I am reviewing the submission, and will recommend that this article include a statement that the base-Lutetian can be considered as the boundary between the “middle” and “early” Eocene.

The base of the “late” Eocene, or Priabonian GSSP, only has a preliminary candidate (submitted this month to GSA Bull.) at a level about a half-million years younger (mid-Chron C17n.3n) than the previous “working” placement (base of polarity chron C17n.3n). I’m not convinced of their logic, and the proposed GSSP section still lacks cycle-strat, radiometrics on the ash beds, carbon-isotope-strat and other useful correlation/dating tools. The authors do definitely state that this would be the base of “Upper” Eocene.

The base-Bartonian (mid of “middle” Eocene) is yet in limbo.

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– Jim Ogg (13 March 2011)

Interactive comment on Clim. Past Discuss., 7, 241, 2011.