

Bartonian–Priabonian larger foraminiferal events in the West Tethys

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Having reflected the general cooling of the Earth, the composition of West Tethyan larger foraminifera (LF) significantly changed in the late Bartonian and Priabonian. It is characterized by the disappearance of *Alveolina*, giant *Nummulites* and *Assilina* and also of some orthophragminid phyla. Simultaneously, radiate and especially reticulate *Nummulites* (the *N. fabianii* lineage) and nummulitids with secondary chamberlets (*Heterostegina* and *Spiroclypeus*) emerged. Based on the evolution of these forms and also on other data (field observations, other LF and planktic data), a high-resolution stratigraphy of the Bartonian and Priabonian could be established in the frame of the Tethyan shallow benthic zonation (with SBZ zones and newly erected subzones for SBZ 18 and 19 based on the exceptionally rapid evolution of *Heterostegina armenica* and *H. reticulata*). The updated time-table of LF events for this period mainly based on first/last occurrence (FO/LO) data of the phyla is presented below (morphometrically undefined changes within lineages are not considered):

1. The base of the Bartonian (the SBZ 16/17 boundary) is tentatively defined by the FO of the *Operculina gomezi* group.
2. The base of the late Bartonian (the SBZ 17/18 boundary) is marked by the FO of genus *Heterostegina* (represented by *H. armenica*), *Chapmanina*, *Silvestriella* and of *Nummulites hormoensis*. The boundary of OZ 13/14 orthophragminid zones (the extinction level of the *Orbitoclypeus douvillei* lineage) roughly corresponds to this event, as well as the LO of the *Nummulites brongniarti*, *N. lorioli-ptukhiani* and *Assilina exponens* lineages.
3. The base of the latest Bartonian (the SBZ 18A/B boundary) is defined by the FO of the *Heterostegina reticulata* lineage. The FO of genus *Pellatispira* is close to this event.
4. The LO of the most widespread giant *Nummulites* (i.e. the *N. perforatus-biedai*, *N. millecaput-maximus* and *N. gizehensis-lyelli* groups) during the latest Bartonian seems to have been migrated eastward as reconstructed by the rapid evolution of the *H. reticulata* lineage subdivided into five subspecies in this interval. The LO of *Alveolina* s.s. is largely uncertain but might also have happened in this time.
5. The SBZ 18/19 boundary is marked by the FO of genus *Spiroclypeus* and by the intraphyletic change of *Heterostegina reticulata reticulata* to *H. r. mossanensis* and *Nummulites hormoensis* to *N. fabianii*. *Discocyclus discus* with giant embryo does not cross this boundary, which falls within the P 15 and NP 18 zones, and is being therefore slightly younger than the Bartonian/Priabonian boundary placed at the boundary of NP 17/18 zones by planktic experts.
6. The base of the late Priabonian (the SBZ 19/20 boundary) is defined by the FO of granular *Heterostegina* (*H. gracilis*), by the intraphyletic change of *Spiroclypeus sirothii* to *S. carpaticus* and by the boundary of OZ 15/16 orthophragminid zones. This event is preceded by the SBZ 19A/B boundary defined by the change between *H. reticulata mossanensis* and *H. r. italica* and by the OZ 14/15 boundary (the extinction level of genus *Nemkovella*, *Asterocyclina kecskemetii* and of the *Discocyclus pratti* and *A. alticostata* lineages).
7. The Priabonian/Rupelian (SBZ 20/21) boundary is marked by the LO of most LF including all orthophragmines, genus *Assilina*, all Eocene nummulitids with secondary chamberlets and most radiate *Nummulites*. The reticulate *N. fabianii* lineage survived the global boundary event, however it is reflected in the decrease of the embryo size. The change in the surface ornamentation between *N. fabianii* and *N. fichteli* cannot definitely be tied to this event.

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