

The Varignano section (Trento Province, northern Italy): a chance to correlate shallow benthic zones and calcareous plankton zones near the Bartonian–Priabonian boundary

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The GSSP for the base of the Priabonian stage has not yet been defined, but a candidate section has been recently proposed by Agnini et al. (2011) near Alano di Piave (Veneto region, northern Italy), some 50 km far from the historical stage stratotype of Priabona. The Alano section, deposited in a bathyal setting, has been investigated for the calcareous nannoplankton, planktonic foraminifera, as well as magnetostratigraphy. The ‘Tiziano bed’, a prominent lithological tuff layer whose base has been proposed for the base of the Priabonian (Agnini et al., 2011) is very close to different events, namely the *Cribozentrum erbae* acme (Fornaciari et al., 2010; Agnini et al., 2011), the extinction of morozovellids and large acarininids (Agnini et al., 2011; Wade et al., 2012), and the base of magnetochron C17n.1n (Vandenberghe et al., 2012).

Unfortunately, at Alano di Piave there is no way to directly correlate any of these events with the larger foraminifera shallow-water biozones, namely the Shallow Benthic Zones (SBZ) of Serra-Kiel et al. (1998). In the lower part of the Alano section, two coarse-grained bioclastic levels indeed contain larger foraminifera, but they both belong to the SBZ 17 (lower Bartonian). Moreover, these beds are at least 25 m below the extinction of muricate planktonic foraminifera, the lowest event that could approximate the base of the Priabonian.

However, a unique chance for a direct correlation between the SBZ and the calcareous plankton zones is provided by the Varignano section (Trento Province, northern Italy), which is 80 km west of Alano di Piave, deposited in a similar bathyal setting but with much more larger-foraminiferal bearing bioclastic levels (eleven sampled). The Varignano section was first studied by Luciani & Lucchi Garavello (1986) and recently re-sampled in its Middle–Upper Eocene part on a thickness of more than 25 m. The coarse-grained levels are

quite evenly distributed from base to top of this interval, intercalated with the hemipelagic sediments. In the lowermost part of the section, the second coarse-grained level cuts a sapropelic interval recording the post-MECO phase as in the Alano di Piave section (Luciani et al., 2010; Spofforth et al., 2010).

The Varignano section spans from E12 to the lower E14 zone according to the biozonation of Wade et al. (2011), and from MNP16Bc to MNP18 calcareous nannoplankton zones of Fornaciari et al. (2010). The event of extinction of morozovellids and large acarininids occurs in the upper third of the section, just between the eighth and the ninth coarse-grained bioclastic levels (counted from base to top). The *Cribozentrum erbae* acme has been detected between the ninth and the tenth coarse-grained bioclastic level and occurs, as in the Alano section above the morozovellids/acarininids extinction.

The lower part of the section is attributed to the SBZ 17 (lower Bartonian) for the presence of *Nummulites alponensis*, *N. millecaput*, and *Discocyclina discus adamsi*. The passage to the SBZ 18 (upper Bartonian), is considered sure with the first appearance of *Pellatispira* sp. (Fig. 1), even if this genus has not been reported since now from the very base of the biozone. *Pellatispira* appears between the seventh and the eighth coarse-grained bioclastic levels, so well below any of the planktonic events proposed in the literature for recognizing the base of the Priabonian.

This direct correlation raises the problem of the heterochrony between what is usually considered the base of the Priabonian in shallow-water settings (the appearance of *Nummulites fabianii*, or base of SBZ 19; see e.g. Serra-Kiel et al., 1998) and the same boundary in pelagic settings. This heterochrony has been alleged recently by Costa et al. (2013) in the Ebro Basin, northeastern Spain: they reported the NP19/20 starting within the SBZ 18, but the quality of their nannofossil record hampers reliable comparisons with the Varignano record.

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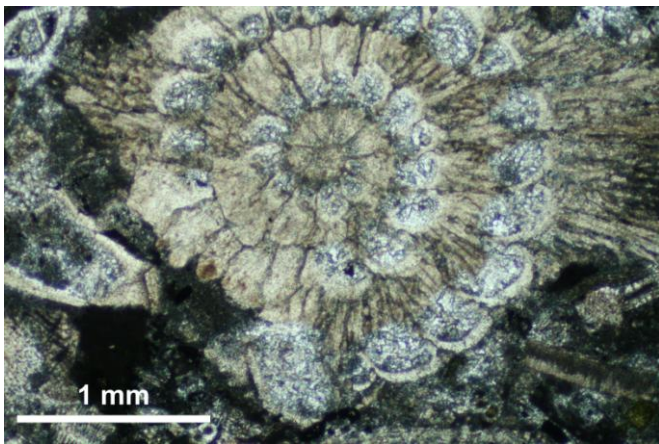


Fig.1 – *Pellatispira* sp., sample VAR 6, eighth coarse-grained level.

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