

Bio-chronostratigraphic calibration of the Upper Carnian-Lower Norian magnetostratigraphic scale at Pizzo Mondello (Sicani Mountains, Sicily)

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Pizzo Mondello section is known since 15 years because of the continuous Late Triassic pelagic record of great significance for the establishment of an integrated chronostratigraphy of the Late Triassic (Gullo *et al.* 1996; Muttoni *et al.* 2001, 2004).

During the last 4 years, Pizzo Mondello section has been studied in detail to provide a new and high resolution integrated bio-chronostratigraphy for the calibration of the magnetostratigraphy and chemostratigraphy proposed by Muttoni *et al.* (2001, 2004), and now it is one of the GSSP candidates for the definition of the base of the Norian.

The lowest 143 m of the Cherty Limestone, straddling the C/N boundary have been studied in detail. The preliminary data of the ongoing research have been presented in all the meetings of the STS from Albuquerque 2007 and here we summarize the final results.

The key correlation to the standard marine Triassic Scale is provided by the ammonoids. They are relatively rare, however the available collections document the Upper Carnian *Discotropites plinii* and *Gonionotites italicus* Subzones, from meter 15 to meter 80 from the base of the section. The following 15 meters are poor in ammonoids, while higher up the lower part of the Lower Norian *Guembelites jandianus* Zone is documented by *Dimorphites* cf. n. sp.1 of Krystyn, 1980.

Conodonts are very abundant and have a great potential as practical tool for global correlations. The abundance

of specimens at Pizzo Mondello gave the opportunity to point out clear relationships among the five most widespread Upper Carnian/Lower Norian conodont genera (*Paragondolella*, *Carnepigondolella*, *Metapolygnathus*, *Epigondolella* and *Norigondolella*) and to identify trends of the generic turnovers (Mazza *et al.* 2010). The two biomarkers so far proposed as possible marker events for the GSSP were the FAD of *E. quadrata* (sample FNP88A) and the FAD of *M. communisti* (sample NA35). However, the FAD of *E. quadrata* occurs within the *Gonionotites italicus* Subzone, while the FAD of *M. communisti* is on its top.

Halobiids are extremely common in the Cherty Limestone and they have also a great potential for large scale correlations. Nine species of *Halobia* have been recognized: *Halobia carnica*, *H. lenticularis*, *H. simplex*, *H. superba*, *H. cf. rugosa*, *H. radiata*, *H. austriaca*, *H. styriaca* and *H. mediterranea*. The best possible marker for the base of the Norian is the first occurrence of *Halobia austriaca*, that is recorded in the middle of the interval between the record of the *Gonionotites italicus* Subzone and the *Guembelites jandianus* Zone.

Radiolarians were found in few samples but with high diversity assemblages. In the upper *Gonionotites italicus* Subzone to the *Guembelites jandianus* Zone there is an overlap of species previously considered Late Carnian with species usually regarded as Early Norian. About 4 m above the FAD of *E. quadrata*, in the *Gonionotites italicus* Subzone, the first assemblage with *Capnuhosphaera deweveri* Kozur & Mostler, *Capnuhosphaera tricornis* De Wever, *Kahlerosphaera norica* Kozur & Mock and *Xiphothecaella longa* Kozur & Mock, usually referred to Early Norian, occurs.

These integrated bio-chronostratigraphic studies lead to identify some possible GSSP marker events especially on conodonts and halobiids, which occur in the upper part of magnetozone PM 4n, within PM 4r and in the lower part of PM 5n.

Possibly the most suitable magnetostratigraphic event to recognize the basal Norian is the base of magnetozone PM 5n, as already suggested by Krystyn *et al.* 2002 and Muttoni *et al.* 2004.

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Bio-chronostratigraphic revision of the Wengen Formation (Ladinian-earliest Carnian) in the central Southern Alps

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The Ladinian carbonate buildups are particularly well represented in Southern Alps, where they developed as a number of isolated platforms (Esino Limestone and Schlern/Sciliar Formation) separated by intraplatform basins with volcanoclastic-dominated sedimentation (Wengen Formation) or carbonate-dominated sedimentation (Perledo-Varenna Limestone). The traditional dating of many of these buildups was mostly based on lithostratigraphic correlations instead of bio-chronostratigraphy, because the occurrence of age-diagnostic fossils (e.g., ammonoids) is limited to very few platforms and it is also scattered.

Here we present new bio-chronostratigraphic data on the Wengen Formation from a selected area of central Southern Alps, i.e., the eastern Lombardy between Scalve and Giudicarie Valleys. Five new sections have been selected: Cima Verde (north face of Presolana, BG), Corna S. Fermo (Pizzo Camino, BG), Monte Colombine (Caffaro Valley, BS), Monte Corona and Malga Le Pozze (Bondone Valley, TN). The studied successions were all deposited in a basin to platform transition setting, where the Wengen Formation is overlain by the prograding of the Esino Limestone. The data from these sections complement earlier data (Balini *et al.* 2000) from successions deposited in distal setting with respect to the carbonate platforms, and the detailed bio-chronostratigraphic study by Mietto *et al.* (2008) on the Wengen Formation of the Dolomites.

In all the new sections the successions the Wengen Formation is up to 200 m thick and is overlain by at least 400 m of carbonate facies traditionally attributed to the Esino Limestone. After detailed bed-by-bed sampling of the studied sections, the most significant bio-chronostratigraphic data are:

- 1) *Daonella lommeli* is common in the lowermost part of the Wengen Formation in almost all sections.
- 2) The ammonoids are scattered, but in all the studied sections *Frankites*, genus typical of the Upper Ladinian *Frankites regoledanus* Zone to the lowermost part of the Lower Carnian *Daxatina canadensis* Zone, occurs in the middle part of the Wengen Fm.
- 3) The genus *Trachyceras*, whose first occurrence is recorded in the lower part of the Lower Carnian *Daxatina canadensis* Zone, has been found in the