Biostratigraphical correlation and palaeogeographic relations of the Middle-Upper Devonian carbonate successions in the Spanish Central Pyrenees

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Abstract

The Devonian rocks of the Central Pyrenees are exposed in different facies settings. Pioneering stratigraphic studies carried out by Dutch geologists (University of Leiden) defined several *facies/subfacies areas,* which are distributed into four main facies areas (Mey 1967, Boersma 1973, Zwart 1979). Our main investigation is focused on the Southern Facies Area, which is located in the axial zone of the Central Pyrenees and comprises three of the four classical subfacies areas: *Sierra Negra*, *Renanué* and *Compte* (Mey 1967, Hartevelt 1970, Valenzuela-Ríos & Liao 2006).
Integrated conodont biostratigraphy and palaeogeographic relations of six successions from Middle to Upper Devonian (Givetian-Frasnian) in the Spanish Central Pyrenees are synthesized on the basis of published data (Liao 2014; Liao & Valenzuela-Ríos 2008, 2012 and 2022; Liao et al. 2002, 2008 and 2013; Gouwy et al. 2013).

These Devonian successions are Ampriú (Amp) and Ampriú II (*Sierra Negra Subfacies*), Renanué (*Renanué Subfacies*) and Compte, La Guardia d'Ares and Villech (*Compte Subfacies*).

In the Sierra Negra Subfacies, the *Renclusa limestone* comprises rocks from upper Givetian to Lower Carboniferous (Rios 1977). Pure, dark, grey and massive limestones interbedded by marly or lenticular calcareous shales compose Amp and Amp II sections. The conodont record in the Amp section indicates a late Givetian age and this limestone interval overthrusts middle Frasnian rocks. The precise age of the Amp II section could not be guaranteed by fossils, but litho- and sedimentologic characterization is very close to the upper Givetian part of the Amp section.

Mey (1967) introduced the *Renanué Subfacies*, which originally comprised a continuous succession spanning from Lower Devonian through Lower Carboniferous. This subfacies is composed of three main stratigraphical units: *Renanué Shales, Renanué Limestones* and *Sahún Shales.* Boersma (1973) defined the *Renanué Shales* alluding to the black shales below the *Renanué Limestones* and assigned late Emsian to Eifelian ages. Besides, he pointed out that the *Renanué Limestones* correspond to the dark and grey limestones interbedded with nodular limestones. In our investigations based on lithological characterization and faunal composition, the Renanué succession is composed of black shales (*Renanué Shales*) at the base, which is overlain by massive, bedded and nodular limestone (*Renanué Limestones*) and marly limestone in the upper part. Conodont data document a late Eifelian to early

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Frasnian age (Liao et 2001, Liao & Valenzuela-Ríos 2022).

The Compte Subfacies comprises four stratigraphic units: *Villech, Comabella, La Mena* and *Barousse formations*. The studied interval reaches the upper part of the Villech Fm. and mainly the Comabella Fm. The Villech Fm. extends widely and is mainly characterized by pink calcareous shales with thinner yellow limestones and lateral changes to red calcareous limestones. This lithological unit is bracket between the Basibé Fm. and Comabella Fm. Several authors assigned different ages for this unit. Our recent conodont investigation assigns an early Eifelian age for the Villech Fm. The Comabella Fm. is composed of nodular limestone (variable colours) with interbedded encrinitic limestones and shows a high diversity fauna. The age of this unit ranges from the upper Emsian to Frasnian/Famennian. Our studied area of this subfacies includes Compte, La Guardia d'Ares and Villech sections. Those sections exhibit the upper part of the Villech Fm. and the Comabella Fm. By means of conodonts, the age interval of the three sections ranges from lower Eifelian to middle Frasnian (Liao & Valenzuela-Ríos 2008, 2013; Gouwy et al 2013, 2016).
This work is a contribution to IGCP652, and the Research groups GIUV2017-395 and PERIGONDWANA UCM 910231. MIU-Next Generation EU (ZA21-005) supports J-C Liao research.

Keywords: Middle, Upper Devonian, Central Pyrenees, conodonts, biostatigraphical correlation, paleogeography