The Pragian/Emsian boundary in the Huesca Province (Lower Devonian, Spanish Pyrenees): Biostratigraphic and magnetic data

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Abstract

The different development of Lower Devonian strata and faunas lead to the extensive use of two different scales of difficult adjustment during the XIX and XX centuries (and even today). This situation prompted the IUGS and the corresponding International Subcommission on Devonian Stratigraphy (SDS) to establish an unified chronostratigraphic scale, which initially combined both scales. The resulting subdivision into three Stages: Lochkovian, Pragian and Emsian presented numerous difficulties, being the Emsian Stage one of the more complex and controversial. Based on the extensive work carried out by Yolkin and collaborators, the SDS decided to establish the base of the Emsian in 1994 with the entry of the conodont *Polygnathus kitabus* in the Zinzilban section (Kitab Geological Reserve, Uzbekistan). Numerous reports by Carls and Valenzuela-Ríos demonstrated the inaccuracy of this decision and the need to revise, as soon as legally possible, the boundary criterion.

In the SDS field conference held in the Kitab Geological Reserve in 2008, two major agreements were reached: 1) *P. kitabicus* is a good index but not for the base of the Emsian and we shall look for a different index. The proposed index was *Polygnathus excavatus* 114. 2) The intention to maintain the GSSP in the Zinzilban section, but in higher strata (those showing the entry of *Polygnathus excavatus* 114 within the phylogenetic branch of the *Polygnathus excavatus* group). Consequently, two international expeditions (2008 and 2015) searching for the new position of the boundary were launched in the Kitab Reserve. Unfortunately, results were not as expected and the SDS decided to expand the investigation to other potential areas.

One of them is the Spanish Pyrenees, were Pragian and Emsian strata crop out in several places. Two of these sections are Isábena 1 and Baliera 6 in the province of Huesca (Spanish Pyrenees). Both of them contain a rich conodont record spanning through the Pragian/Emsian boundary in both senses, the current and the proposed boundary (entries of *Pol. kitabicus* and *Pol. excavatus* 114 respectively). Besides, they also record taxa of the genus *Icriodus*, which allows direct correlations with those

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sections without polygnathids.
Taking into account these favourable conditions, we have started a combined comprehensive and multidisciplinary study of these two sections. In this report we present pioneer data of magnetic susceptibility aligned with the biostratigraphic ones.

Magnetic susceptibility trends and excursions are well characterised and dated and enable to start the construction of a multidisciplinary matrix of Pyrenean data, which in turn will confer the required stability for future decisions concerning the Devonian Time Scale and, in particular, the definition of the Emsian stage and its further subdivision.

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