Geoevents, Geological Heritage, and the Role of the IGCP
Caravaca de la Cruz, September 15th - 18th, 2010

Symposia
- Geoevents: learning about Global Changes
- IGCP European Regional Meeting
- First Meeting of ProGEO Regional Working Group SW Europe

ABSTRACT BOOK
LIBRO DE RESUMENES
THE VALDEMIEDES EXTINCTION EVENT (VEE): BIOTIC CRISIS
AND RECOVERY AT THE LOWER/MIDDLE CAMBRIAN BOUNDARY

Eladio Liñán¹, María E. Dies Álvarez¹, José A. Gámez Vintaned², Rodolfo Gozalo², Andrey Yu. Zhuravlev³, Ignacio Subías³, Blanca Bauluz³

1 Área y Museo de Paleontología, Universidad de Zaragoza, E-50009 Zaragoza, Spain
2 Depto. de Geología, Universitat de València, E-46100 Burjassot, Spain
3 Área de Cristalográfia y Mineralogia, Universidad de Zaragoza, E-50009 Zaragoza, Spain

Paleontological, mineralogical, geochemical and carbon isotope data indicate a global oceanic perturbation at the limit of Cambrian Series 2 and Series 3 (formerly Lower/Middle Cambrian) boundary. This event called the Valdemiedes Extinction Event (VEE) is associated with a remarkable extinction of trilobites (mostly olenellids, redlichiiids, and protolenids), as well as almost complete disappearance of some other Early Cambrian marine animals, such as the archaeocyaths. Extinguished Extinct trilobite taxa were replaced by new trilobite assemblages at the base of the Cambrian Series 3 (formerly Middle Cambrian), including paradoxids in some regions (Fig. 1).

In its Spanish stratotype area (Rambla de Valdemiedes, near Murero; Iberian Chains, NE Spain), the VEE (topmost Protolenus jilocanus Zone, or uppermost Lower Cambrian) is recorded in a continuous and monotonous shale sequence (transgressive systems tract) that shows no apparent physical differences prior to, and after the event. At that site, shale beds of the same structure and texture as the ones below and above with which it composes continuous monotonous monofacies (transgressive systems tract). The VEE brought aboutis concurrent with the disappearance of all (but one) genera of Protoleninae, Ellipsocephalinae, and Resseropinae trilobites. It is also associated with, progressive dwarfing (“Lilliput effect”) of calcitic brachiopods, (as well as the disappearance of phosphatic brachiopods (at the end of VEE) as well as of sponges and echinoderms, bloom of algal filamentous cyanobacteria, strong decrease in trace fossil diversity, disappearance of sponges and echinoderms, and pronounced anomalous geochemical (major and minor elements) and mineralogical signals. 13Corg values show noticeable oscillations in strata underlying the VEE, and then a strong negative excursion at the end of the event VEE followed by a recovery to a isotopically lighter baseline, returning to normal organic productivity. T(this trend mimics replicates similar isotopic curves, reported in sediments those oof Laurentia and South China, and, named known as the ROECE, i.e. Redlichiiid-Olenellid Extinction Carbon Excursion (ROECE)).

The low-diversity fossil assemblage of sThe relic assemblage (or surviving taxa) of the Valdemiedes Extinction Event shows low-diversity that consisted of scarce individuals of the trilobite Alveua undulata, together with abundant specimens of a few inarticulate brachiopod taxa (notably the dwarfed Trematotholus simplex ) and scarce feeding traces (Planolitites montanus ichnoassociation). T. simplex size was progressively recovered its initial size towards the end of the survival interval).

Strata of the post survival interval (basal Acadoxidex muroeensis Zone, or lowermost Middle Cambrian) record include fossil assemblages of about with diversity close to the same diversity as the pre-VEE ones levels, butand greatly increased bigger specimen abundance. Concurrently; at the same time., the ichnodiversity is was also re-established (Sericichnus
ichnoassociation). Nevertheless, a markedly significant increase in more diverse body-fossil assemblages will only appeared at within the *Eccaparadoxides asturianus* Zone, after the Mid Leonian Regression.

Among surviving taxa, only one protolenid trilobite genus (*Alueva*) persisted within assed the event beds (survival interval), reached, reaching basal Middle Cambrian strata (post survival interval), to and eventually ultimately disappeared within the first Middle Cambrian zone (*Acadoparadoxides mureroensis* Zone). Similarly, a few relic olenellid and protolenid trilobites are present recorded in basal Middle Cambrian rocks in Morocco and Turkey. During the following succeeding *Eccaparadoxides szluzy* Zone is characterized by, a second exotic trilobites invasion (conocoryphids), which took place occurred in the Mediterranean region concurrent, coinciding with the extinction of relic protolenids.

Both isotope and paleontological evidences show that the disappearance of olenellids in Laurentia, redichoids in Eastern Gondwana and Siberia, and the appearance of the first paradoxid s.s. (*Acadoparadoxides*) in western Gondwana, Baltica, Avalonia, and Siberia were contemporaneous events. Although these bioevents were previously believed to, which once upon a time thought to be diachronous regional perturbations, now their recognized synchronism thus characterizes, apparently were contemporaneous events. These features of a global ecological crisis, which and replacement being taken together with a pronounced global 13Corg negative excursion are the best indicators of the Cambrian Series 2/Series 3 boundary.

**Acknowledgements:** This research is a contribution to the IGCP project no. 493, and a part of the ACI2008-0796 of the MICINN.

---

**Figure 1.** Biostratigraphic distribution of trilobite and brachiopod taxa across the Valdemiedes Extinction Event (VEE) in the Rambla de Valdemiedes 2 section (RV2).