

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



Geoevents, Geological Heritage, and



the Role of the IGCP

Caravaca, September 15-18, 2010

**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. Zhuravlev¹, 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 Cristalografía y Mineralogía, 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, redlichiids, and protolenids), as well as almost complete disappearance of some other Early Cambrian marine animals, such as the archaeocyaths. Extinguished Extinct trilobite taxas were replaced by new trilobite assemblages at the base of the Cambrian Series 3 (formerly Middle Cambrian), including paradoxidids 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 filaments/filamentous cyanobacteria, strong decrease in trace fossil diversity, disappearance of sponges and echinoderms, and pronounced anomalous geochemical (major and minor elements) and mineralogical signals. $\delta^{13}\text{C}_{\text{org}}$ 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. Redlichiid-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 *Alueva undulata*, together with abundant specimens of a few inarticulate brachiopod taxa (notably the dwarfed *Trematobolus simplex*) and scarce feeding traces (*Planolites 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 *Acadoparadoxides mureroensis* Zone, or lowermost Middle Cambrian) record include fossil assemblages of aboutwith 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, Markedly significant increase in more diverse body-fossil assemblages will only appear at within the *Eccaparadoxides asturianus* Zone, after the Mid Leonian Regression.

Among surviving taxa, Only one protolenid trilobite genus (*Alueva*) persisted within assted 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. TDuring the following succeeding *Eccaparadoxides szuyi* Zone is characterized by, a second exotic trilobites invasion (conocoryphids), which took placeoccurred 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, redlichids in Eastern Gondwana and Siberia, and the appearance of the first paradoxidids s.s. (genus *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).

