Chapter 5
General Conclusions

The south Iberian Palaeomargin during the Pliensbachian and Toarcian was a complex context as evidenced by the detailed analysis of the reference sections of the External and Median Subbetic. The fragmentation of the palaeomargin during the Late Pliensbachian and the configuration in different tilted blocks with variable subsidence determined differences in thickness and facies during the Toarcian as well as the presence of stratigraphic discontinuities, hardgrounds and omission surfaces.

In this context, the record of the T-OAE is not homogeneous in the palaeomargin and is very different to the typical black shales of the central and north Europe sections. As evidenced in the text, sections from Mediterranean and Submediterranean provinces are characterised by low values of TOC. In the case of the Subbetic sections, the higher TOC values are usually less than 1 wt% during the Early Toarcian biotic crisis and the negative CIE.

In the context of the Betic Cordillera, the External Subbetic records the more typical facies of the T-OAE with comparatively higher record of TOC, the presence of the negative CIE, as well as evidences of local oxygen depleted conditions as showed by the analyses of redox geochemical proxies, trace fossils and foraminiferal assemblages. Good examples are La Cerradura, Cueva del Agua and Fuente Vidriera sections. Changes in lithofacies are registered around the transition from Pliensbachian to Toarcian related to decreasing carbonate content and the development of dark marls (but not black shales *s.s.*). The T-OAE in the External Subbetic is identified by the increase of TOC, the negative CIE, the increase of redox sensitive elements as well as biotic evidences of oxygen depleted conditions. Trace fossil assemblages decrease in diversity during the Serpentinum Zone and locally they are absent associated to maximum values of TOC and the CIE. The foraminiferal assemblages in this area are characterised by decreasing abundance and diversity as well as proliferation of some opportunist forms just before the negative CIE. The more adverse conditions are commonly recorded by a thin benthic barren interval. The recovery is evidenced by the increasing values of diversity and abundance, initially with the colonisation by opportunists showing

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decreasing in size (Lilliput Effect). In the case of ostracods, the biotic crisis determines the extinction of Metacopina and the recovery with a very different assemblage composition (see Cueva del Agua section). Changes in water column conditions are also evidenced by the composition and diversity of the calcareous nannofossils and in the Cueva del Agua section by the proliferation of radiolarians.

In the case of the Median Subbetic, the record of the T-OAE is more complicated due to the presence of omission surfaces and probably associated hiatuses. The thickness of the different sections is variable as well as the observed lithofacies and microfacies. The negative CIE is not recorded in the Iznalloz section where the Lower Toarcian is represented by reduced thicknesses of marls and marly limestones with intercalations of tempestite layers. In the case of the Arroyo Mingarrón section, more expanded succession, the negative CIE is not clearly recorded in spite of the prevailing marl and marly limestone alternance nature. The TOC values are also lower than in the External Subbetic and there is not a clear maximum in the Serpentinum Zone. Redox geochemical proxies are also without a clear stratigraphic trend. These unfavourable aspects determine that this area has been poorly studied and more works are necessary for the future, mainly focused in the foraminiferal and trace fossil assemblages. Actually, we can recognise a variable incidence of the T-OAE, lower in the Median than in the External Subbetic. However, data from the Median Subbetic allow understanding the evolution of the palaeomargin and the development of the lithofacies and microfacies during the Toarcian with the record of the ammonitico rosso facies. External and Median Subbetic determine a complex setting for understanding the evolution of this part of the Western Tethys. They are far from the typically reported T-OAE with well-developed black shales and negative CIE from the classical works in central and North Europe, being essential for understanding the complexity of the global T-OAE.