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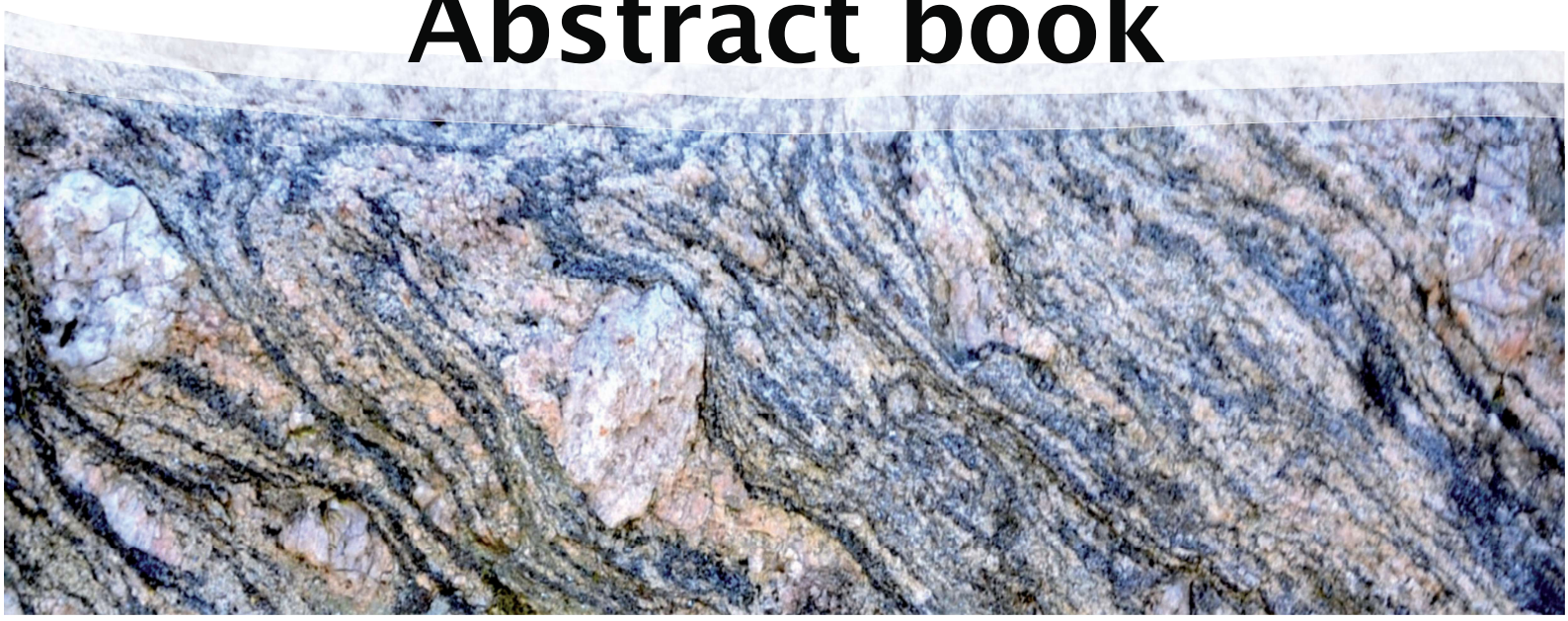

Variscan inversion of a Silurian basin: The role of preexisting features on shear zone nucleation (Central Iberian Zone, Iberian Massif)

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It is of broad consensus that during Silurian times the seawater anoxia-euxinia levels were enhanced, particularly from the mid Llandovery, often persisting until the Ludlow and Pridoli. The likely stratification of the water column, promoted by the steady Palaeozoic drift conditions, led to the accumulation of organic-rich sediments. This has been recognized throughout the whole Iberian Massif, in sedimentary basins (currently inverted due to the Variscan Orogeny) that register contrasting features when compared to Ordovician and Devonian units. In particular, the Marão-Alvão region (northern Central Iberian Zone, Iberian Massif) yields a privileged segment of the Silurian sequence as well as its shear contact with the underlying Ordovician strata.

New preliminary geochemical data on Ordovician, Silurian and Devonian metapelitic units show a slight contrast that may infer on the contrasting sedimentary conditions during the Paleozoic drifting phase. Results show that all rocks have chemical features typical of passive margin conditions, as expected. Provenance indicators suggest dominant 'intermediate-felsic' or upper crustal sources, which are congruent with the erosion of the evolved Gondwana mainland. Only a single Devonian sample deviated from this, falling in the 'basic rock' source and in the active continental margin fields; this could be due to local chemical increase of iron and magnesium or the contribution of the (now subducting) oceanic basins. Silurian rocks contain considerable amounts of organic carbon when compared to the Ordovician and Devonian samples. Similarly, the increase in redox-sensitive trace elements is also evident, specifically the high vanadium over chromium (presumably adsorbed in organic matter prior to the Variscan metamorphic recrystallization), inferring the anoxic depositional environment.

The progressive shift in depositional environments during Silurian sedimentation toward more anoxic conditions, now recorded in the Silurian metasedimentary successions, likely played a significant role in the accumulation of organic matter. These organic-rich layers, originally formed under limited redox conditions, may have acted as mechanically weak horizons during the Variscan Orogeny, as organic matter reduces the cohesion and friction of rocks. Recrystallized graphite can further reduce friction along deformation planes, increasing the potential for localized shearing. These results highlight the potential influence of early depositional conditions on later tectonic processes, suggesting that Silurian anoxia preconditioned the basin architecture for strain localization during Variscan deformation.

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