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Late pre-rift to early drift sedimentary history of Central Iran

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In the last 3 years the late Paleozoic history of Central Iran has been investigated with the aim of restoring a critical phase in the geological evolution of this Cimmerian block, that is its late pre-rift and the following early drift sedimentary history. This project was developed as the ideal continuation of a former project on the Triassic collision history of Central Iran, carried out during the MEBE Programme and now under the DARIUS Programme.
The approach for the new research was based on extensive samplings of selected stratigraphic sections distributed along a present day SW to NE transect, from the Sanandaj-Sirjan southeast of Shahreza (Asadabad), to Anarak, Kalmard (Rahdar), Bagh-e-Vang (Bagh-e-Vang and Shesh Angosht) and Ozbak-Kuh (Zaladou). The stratigraphic interval selected for study is comprised between the Carboniferous Sardar Formation to the Permian Jamal or Jamal-equivalent units. The main problem in the study of the units of the selected interval is their dating, often based on scattered data, and their simplified lithological descriptions available from literature. Then the sections selected for sampling were sampled on a bed-by-bed approach for several groups of fossils (conodonts, fusulinids and brachiopods) as well as for microfacies study of limestones and the petrographic study of conglomerates and breccias.
The analyses of the huge amount of samples lead to improve the bio-chronostratigraphy and to much better characterize the main unconformities. The main achievements with respect to the major aims of the project can be summarized as follows:
- During the late Early Carboniferous to earliest Late Carboniferous the area between Sanandaj-Sirjan and Ozbak-Kuh was characterized by marine sedimentation dominated by siltstones with episodes of shallow water carbonate sedimentation. The Kalmard unit is the unique exception within this uniform setting, as sedimentation in this area was dominated by shallow water carbonates. Evidence of synsedimentary tectonic activity is limited to Sanandaj-Sirjan and Kalmard.
- A Gzhelian transgression (possibly late Kasimovian) is documented in Sanandaj-Sirjan, Bagh-e-Vang and Ozbak Kuh. This transgression marks the major unconformity of the area, that is the most likely breakup unconformity. No dating is available for the two major unconformities recorded within the Khan Fm at at Rahdar (Kalmard).
- In agreement with the literature, the hiatus between the Sardar Fm and the Gzhelian units is much more important in the Sandandaj-Sirjan, where most of the Late Carboniferous is missing, than in the rest of Central Iran.
- The Asselian was everywhere characterized by restoration of shallow water carbonate sedimentation except in the Bagh-e-Vang and northern Shotori Range area. This area was affected by strong extensional tectonics that led to the opening of a deep basin gradually filled by a succession of marls with olistoliths and megabreccias, documenting the dissection of a carbonate platform, overlain by thin bedded cherty calcarenites.
- The Permian post-Asselian sedimentation reflected stable shallow water conditions without any siliciclastic supply in all the study area. In the Bagh-e-Vang area, the Early Permian basin was filled during the Middle Permian and shallow water conditions were restored in the Midian.