Ber. Inst. Erdwiss. K.-F.-Univ. Graz	ISSN 1608-8166	Band 16	Graz 2011
IGCP 596 Opening Meeting	Graz, 19-24th September 2011		

An approach for paleoclimatic conditions for the formation of Lower Givetian ironstones within carbonate platform succession in NW Anatolia

YILMAZ, I.O.[1], GÖNCÜOGLU, M.C.[1], TÜRKMENOGLU, A.G.[1] & SAYDAM-DEMIRAY, G.[2]

(1) Middle East Technical University, Department of Geological Engineering, Ankara, Turkey;
ioyilmaz@metu.edu.tr; *mcgoncu@metu.edu.tr*; *asumant@metu.edu.tr*
(2) M.T.A., Geol. Res. Dept, Ankara, Turkey; *dgsaydam@mta.gov.tr*

The iron bearing successions are studied by two measured stratigraphic sections in the Kabalak Dere and Ferizli areas in the Camdag region (NW Anatolia). These successions lie within the Istanbul Terrane (GÖNCÜOGLU & KOZUR 1998) which is considered as an eastern continuation of the Avalonian Terrane (OKAY *et al*. 2008).

Ironstones recognized in the Ferizli Formation are characterized by alternation of red and green mudstones and sandstones at the bottom, and followed by a series of dolomite, dolomitic limestone with oolitic ironstones and chamositic mudstones at the top (Ironstone member of KIPMAN 1974). The Ferizli formation is underlain by the Findikli Formation characterized by alternation of limestones with brachiopods and echinoids and black shales/mudstone and overlain by the Manastır Member of the Yilanli Formation which is characterized by alternation of marly limestones, nodular limestones and dolomitic limestones with abundant corals, brachiopods, bivalves and echinoids.

In the Ferizli area, eleven separate bands of red colored, iron rich, medium-bedded, oolitic limestones/dolomites and oolitic ironstones were recognized along the studied succession. These levels are mined locally for iron-ore in the area and can be followed towards the East of Safranbolu, central northern Anatolia. Oolitic grainstones, bioclastic grainstones, bioclastic packstones and wackestones are commonly observed microfacies of limestones alternating with mudstones along the section. Alternating red colored, iron rich limestones and mudstones form cyclic couplets through the sections. Mineralogically, the carbonate part is dominated by goethitized and chamositized fossil fragments and chamositic oolites. The oolitic ore is made up of goethite, brown iron-silicates, chamosite, sideritic oolites, quartz clasts and brachiopods.

In the Kabalak Dere, similar facies are recognized along the section, but iron rich bioclastic grainstones were more dominant than iron rich oolitic grainstones and mudstones were less frequently observed compared to the Ferizli section. A well sorted, white colored, cross laminated quartz arenite succession lies at the top of the section.

Recent conodont findings in the first limestone bands beneath the ironstones in Kabalak Dere section indicate the *ensensis* and *hemiansatus* zones of Lower Givetian (BONCHEVA *et al*. 2009).

Partial iron precipitation within microborings or precipitation along the spine holes on echinoid grains are observed in the bioclastic grainstone (Dunham)/ biosparite (Folk) facies. Iron was also involved in the ooid formation and can be observed as concentric laminae and nuclei. Iron peloids are also recognized in the grainstone facies. Iron could not be observed as replacing the sparry cement, therefore occurrence of iron is not related to late diagenesis. Iron precipitation could be explained as precipitation of transported dissolved iron from terrestrial environment under the wet/subtropical climate within oxidizing and increased PH conditions, or dissolved iron transported by upwelling currents over the shelves and precipitated under oxidizing environment. Alternation of iron rich limestones and mudstones display cyclic nature in the Ferizli section. The cyclic occurrence of primary iron in marine carbonate environment and extensive distribution over large areas display that controlling mechanism for iron rich carbonates and mudstones could be related to cooperation of climate, sea level and oceanographic changes in the Givetian.

References

BONCHEVA, I., GÖNCÜOGLU, M. C., LESLIE, S.A., LAKOVA, I., SACHANSKI, V., SAYDAM, G., GEDIK, I. & KÖNIGSHOF, P. (2009): New conodont and palynological data from the Lower Palaeozoic in Northern Çamdağ, NW Anatolia, Turkey. - Acta Geologica Polonica, 59, 2: 157-171.

GÖNCÜOGLU, M.C. & KOZUR, H. (1998): Remarks on the pre-Variscan development in Turkey. - *In*: LINNEMANN, U., HEUSE, T., FATKA, O., KRAFT, P., BROCKE, R. & ERDTMANN, B.T. (eds.): Prevariscan Terrane Analyses of "Gondwanean Europa". - Proceedings, Schriften des Staatl. Mus. Min. Geol. Dresden, 9: 137-138.

KIPMAN, E. (1974): Geology of the marine iron deposits in Sakarya Çamdağ. - *I.Ü.F.F.* Monographies Ser. 25: 1-72.

OKAY, A, BOZKURT, E., SATIR, M., YIGITBA, E., CROWLEY, Q.G. & SHANG, C.K. (2008): Defining the southern margin of Avalonia in the Pontides: Geochronological data from the Late Proterozoic and Ordovician granitoids from NW Turkey. - Tectonophysics, 461: 252-264.