Ber. Inst. Erdwiss. K.-F.-Univ. Graz	ISSN 1608-8166	Band 17	Graz 2012
IGCP 580, 4th Annual Meeting	Graz, 24-30th June 2012		

Magnetic susceptibility and sedimentology techniques applied to unravel the interaction between eustasy and tectonic activity from the Jurassic Kashafrud Formation (Koppeh Dagh Basin, NE Iran)

SARDAR ABADI, M.[1], DA SILVA, A.C.[1], AMINI, A.[2] & BOULVAIN, F.[1]

(1) Liège University, Sedimentary Petrology Laboratory, B20, Sart Tilman, 4000 Liège, Belgium; *Mehrdad.SardarAbadi@student.ulg.ac.be*, *ac.dasilva@ulg.ac.be*, *fboulvain@ulg.ac.be*
(2) University of Tehran, Department of Geology, Tehran, Iran

Introduction

The Kashafrud Formation was deposited in an active extensional basin (Koppeh-Dagh Basin) during the Late Bajocian to the Late Bathonian. This extensional setting allowed the deposition of exceptional thickness of sediments during limited time. Surprisingly, despite being one of the probable source rocks for Gonbadli and Khangiran Gas fields in the north east of Iran and having great potential to improve our knowledge on the Jurassic evolution of the Kopeh-Dagh basin, this Formation has been the subject of limited sedimentological research. The Pole-Gazi type section of the Kashafrud Formation, selected for this work, is a 1616-m-thick interval exposed along the Kashafrud river valley. This work proposes to use a combination of magnetic susceptibility (MS) and lithological and facies description, in order to get a better understanding of facies evolution and a palaeogeographic model of the land/basin system, and in order to decipher the influence of tectonic activity and eustasy.

Sedimentology

Facies analysis reveals that the Formation was deposited in shallow marine, slope to basinal settings. Along the Kashafrud Formation, a major transgressive-regressive cycle was recorded, including flood dominated delta to deep basin deposits (transgressive phase, see Fig. 1), followed by siliciclastic shoreface and mixed carbonate-siliciclastic shoreface (regressive phase, see Fig. 1). During the transgressive phase, sedimentary structures typical of hyperpycnal feeder currents are observed. These hyperpycnal currents are interpreted as mainly developed during high tectonic activity phases (MUTTI et al., 1996). During the regressive phase, carbonate production increase and the alternation of carbonate and silicate cycle could be explained by eustatic sea level fluctuations (ZUFFA et al., 1995). Indeed, tectonism and eustasy were apparently the main factors controlling the sediment supply, accommodation and depositional style in this case.

Magnetic susceptibility

In the lower to the middle parts of the Formation where the hyperpycnal currents fed the basin, strong tectonic variations occurred because of the strong uplift across the land during the opening of the basin (POURSOLTANI et al., 2007; TAHERI et al., 2009). This strong tectonic activity was responsible for stronger erosion and higher amount of siliciclastic inputs into the basin which led to a high magnetic susceptibility signal (mean value of 3.78×10^{-8} m³/kg) (Fig. 1). Conversely, in absence of strong tectonic variations in the upper parts, bulk MS seems to be controlled by sea level variations. Actually, decreasing bulk MS values (mean value of 1.09×10^{-8} m³/kg) to the narrowing the land sources and carbonate production during one stage of sea level fall (Fig. 1).

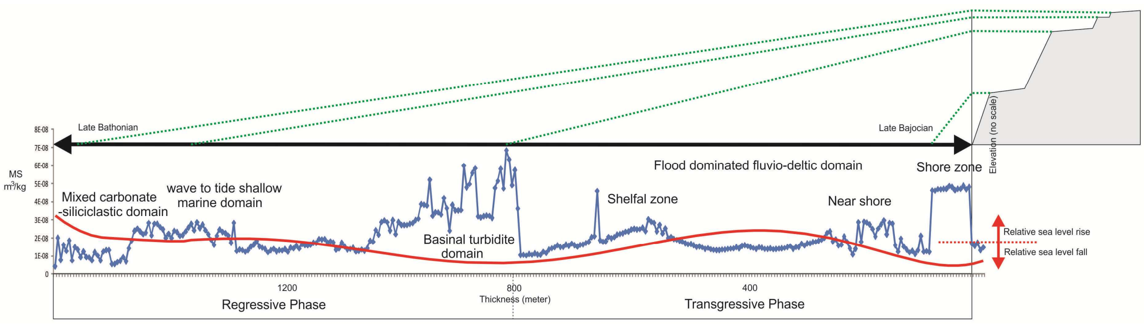

Fig. 1: Diagramatic relationship between tectonism (uplifted coastal terraces), magnetic susceptibility (MS), relative sea level changes and facies associations (sedimentary domains) with time.

In this study, high frequencies variations of MS coincide to the flood influenced deposits related to the modifications in hinterland/source system due to the high tectonic activity. In contrast, low MS frequencies are inferred to relaxation periods.

References

MUTTI, E., DAVOLI, G., TINTERRI, R. & ZAVALA, C. (1996): The importance of fluvio-deltaic systems dominated by catastrophic flooding in tectonically active basins. Memorie di Scienze Geologiche, 48: 233-291.

POURSOLTANI, M.R., MOUSSAVI-HARAMI, R. & GIBLING, M.R. (2007): Jurassic deep-water fans in the Neo-Tethys Ocean: The Kashafrud Formation of the Kopet-Dagh Basin, Iran. Sedimentary Geology, 198: 53-74.

TAHERI, J., FÜRSICH, F.T. & WILMSEN, M. (2009): Stratigraphy, depositional environments and geodynamic significance of the Upper Bajocian–Bathonian Kashafrud Formation, NE Iran. The Geological Society of London, 312: 205-218.

ZUFFA, G.G., CIBIN, U. & DI GIULIO, A. (1995): Arenite Petrography in Sequence stratigraphy. The Journal of Geology, 103: 451-459.