Geochemical heterogeneity of the clinoform sequence by the example of neocomian sediments of the West Siberian plate

I.V. AFONIN, G.M. TATYANIN AND P.A. TISHIN

Tomsk State University, Russia, (if_w@sibmail.com)

In recent years two models of clinoform sequence forming are developing: cross-stratification and avalanche-stratification models. Potential oil content and foulness of these complexes and necessity in their fractional partition indicate the urgency about solving this problem. The conventional methods for seismic facies analysis and the biostratigraphy can't always give a necessary result. Therefore we have tried to typify different units of clinoform sequence of the achimovskaya slice (West Siberia).

Within these researches 52 argillite samples from the units AC_3-BU_{12}, AC_1-BU_{12}, AC-BU_{12}, AC_2-BU_{11}, AC-BU_{10}, AC-BU_9 were analyzed by XFA and ICP-MS. Based on the researches studied rocks were classified in two geochemical groups. The first group includes argillites of the units AC-BU_{12}, AC_2-BU_{11} which characterized by low REE accumulation (102-204 ppm) at La/Yb varied from 10 to 14, high Eu/Eu* content (0,58-0,66), and low Ce/Ce* content (0,9-1,07). These values indicate a deep-sea regime of the sedimentation. The second group consists of the units AC_3-BU_{12}, AC_1-BU_{12}, AC-BU_{10}, and AC-BU_9 with higher REE concentration (154-262 ppm), increased Ce/Ce* (1,08-1,58) and La/Yb (10,1-24,07) ratios, and decreased Eu/Eu* content (0,48-0,59). At the same time Mn/Fe, Sr/Ba variations in successions of the units AC_3-BU_{12}, AC1-BU_{12} record increasing parameters of the basin paleosalinity (Sr/Ba 0,44-0,56) and indicators of chemogeinc accumulation of sediments (Mn/Fe 0,007-0,01) on the upper levels. It shows trasgressive regime of sedimentation. For the units AC-BU_{10}, AC-BU_9 an inverse relationship was established where the Sr/Ba (0,3-0,44) and Mn/Fe (0,0076-0,011) values are decreasing up in the succession (Sr/Ba=0,33-0,35 и Mn/Fe=0,77-0,92), thus indicating their regression regime.

Thereby accomplished researches allow defining polygenetic sedimentation regime of the clinoform sequence of achimovskaya slice. It is established a consistent change of the northwest transregression (AC-BU_{12}, AC_2-BU_{11}), deep-sea sedimentation (AC-BU_{12}, AC_2-BU_{11}) and following southeast sea basin regression (AC-BU_{10}, AC-BU_9). These facies reconstructions can be used at the correlation of the units in succession.

The study was funded by the Russian Ministry of Education and Science.

Experimental compressibility of molten hedenbergite at high pressure

C.B. AGEE[1], R.G. BARNETT[1], C.M. WALLER[2], P.D. ASIMOW[2], X. GUO[3] AND R.A. LANGE[3]

[1]Inst. of Meteoritics, Univ. New Mexico, Abuquerque, NM
[2]Geological and Planetary Sciences, Caltech, Pasadena, CA
[3]Geological Sciences, Univ. Michigan, Ann Arbor, MI

The compressibility and density of molten hedenbergite ($CaFeSi_2O_6$) has been determined through a multi-lab collaborative effort to establish a new database for a range of silicate melt compositions. The database will contribute to development of an empirically based predictive model of silicate liquid density and compressibility over a wide range of P-T-X conditions where melting could occur in the Earth. Experimental methods include (i) double-bob Archimedean method for melt density and thermal expansion at 1 bar, (ii) frequency-sweep ultrasonic sound speed measurements on liquids for adiabatic melt compressibility at 1 bar, (iii) sink/float technique for melt density to 11 GPa, and (iv) preheated shock wave measurements of P-V-E equation of state to 150 GPa. The combined data from ultrasonics and shock waves yield an isentropic bulk modulus (K_s=19.81 GPa) and its pressure derivative (K'=5.19). Static compression sink/float measurements carried out in piston-cylinder and multi-anvil devices using olivine and garnet buoyancy markers are in good agreement with these elastic constants. We also determined the fusion curve for hedenbergite well beyond the pressures of earlier work [1] and observed a significant decrease in slope with pressure consistent with a temperature maximum of ~1900 °C at 10-12 GPa. This change in sign of the liquidus Clapeyron slope is also supported by our data that predict a density crossover between hedenbergite crystals and melt at approximately 10.5 GPa.

[1] Lindsley (1967) *Carnegie Yearbook*, **65**, 293.