Fe-Ti oxide minerals geochemistry of Late Triassic Carpathian Keuper sandstones: Implications for provenance

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Selected Fe-Ti oxides minerals from the Carpathian Keuper sandstones at different localities from Slovakia were analyzed by JEOL-JXA-733 Super probe analyzer and identified as highly altered and fractured Fe-Ti oxide minerals. Iron oxides which form a large portion of the heavy minerals in the samples examined are represented mostly by ilmenite, titaniferous magnetite, leucoxene, and hematite. Chemical analysis of Fe-Ti oxides revealed that the total oxides generally are low and this may be related to the alteration on these grains. Most of Fe-Ti oxide minerals studied are polymineralic grains with mixture of two or more phases. The chemical composition of some grains indicates a coexisting mixture of ilmenite and titano-magnetite. The highly TiO_2 concentrations may indicate the metamorphic source rocks origin of the studied grains (Basu & Molinaroli 1989, 1991). By comparing the present chemical results with that mentioned by aforementioned authors, it appears that Keuper ilmenites generally were derived from metamorphic and partly from igneous sources. Based on the mineralogical and geochemical indicators, the probable provenance of the Keuper sandstones was mainly the metamorphic and igneous rocks of the crystalline cores of the Western Carpathians and the foreland of the Bohemian Massif which were weathered and deposited in the continental mainly fluvial and littoral environments of deposition of the Keuper Formation.

References

Basu A. and Molinaroli E. (1989), *J. Sed. Petrology*, **59**. 922-934.

Basu A. and Molinaroli E. (1991), *Developments in Sedimentary Provenance Studies*. Geol. Soc. Spec. Publ., **57**. 55-56.

Open system behaviour and early chronologies in the Solar System

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The problem of concordant ages between different chronometers in meteorite chronology is discussed since the earliest comparisons between the precise chronologies obtained by ^{87}Rb-^{87}Sr and ^{129}I-^{129}Xe were made. However in recent years the subject became again important since considerable analytical progress has been achieved and allowed one to use a variety of extinct radioactivities: ^{26}Al-^{26}Mg, ^{53}Mn-^{53}Cr, ^{182}Hf-^{182}W, ^{146}Sm-^{142}Nd and ^{129}I-^{129}Xe.

Most "apparent ages" obtained by different chonometers have been calibrated against the set of U-Pb ages obtained on chondritic phosphates (Göpel *et al.* 1994). The older age considered as an absolute reference corresponds to 4567 Myr and was obtained on refractory inclusions of the Allende meteorite by Manhès *et al.*, (1988) and later confirmed by Amelin *et al.* (2002).

When the whole set of apparent ages obtained by various chronometers is considered, no simple pattern is visible. Some chronometers compared to another chronometers may give older ages for a few objects, applied on other objects they result in younger.

These inconsistencies are observed by assuming that each chronometer behaves as a closed system and by using simple chronometric equations for each of them.

We developed a quantitative model in which meteorites behave as open systems. After their initial formation the system has been perturbed by shock events, reheating, metamorphism occurring on planetesimal or meteorite parent bodies. We can compute a model for continuous or episodic perturbations assuming that the perturbations generate a loss of radiogenic isotopes or a change in the parent-daughter ratios.

This model shows how ages obtained by two chronometers can be sometimes older, sometimes younger depending the age of perturbation event and its intensity. We also may obtain concordant ages between a long lived and short lived chronometer which however have no physical significance, concordancy being just an artefact.

We can interpret all the apparent ages obtained on meteorites with this model. The data are compatible with a model in which all primitive solid objects formed around 4567 Myr and were subsequently perturbed by events occurring from few hundred thousands years to 100 Myr.

References

Göpel, C. *et al.* (1994), *EPSL* **121**, 153 -171

Manhès *et al.*, (1988), *Chem.Geol.* **70**, 32

Amelin, Y. *et al.*, (2002), *Science* **297**, 1678-1683