Ultrahigh-speed electroatmogenic transformation of humus matter into naphtoid

N. YUSHKIN AND A. LYSIUK

Institute of Geology, Russian Academy of Science, Ural Branch. 54, Pervomaiskaya st. Syktyvkar, 167982, Russia (andra227@yandex.ru)

Fulgurites are a geological consequence of a lightning stroke to rocks. They are tubular or drop-shaped form composed of glass, relics of surrounding rocks and new mineral formations. Two types of fulgurites are noted. They are determined by target rocks: *clastofulgurites* (aleuro- or psammito-) formed on different porous rocks, and *petrofulgurites* resulted from lightning discharge on exposed hard rocks. We have discovered a new type of fulgurites – *phytofulgurites* which formed on plants. A lightning stroke to a dry haycock resulted in grass inflammation and its partial coking in the lower part without air access. On the ground among ash a cake-like body was found which had rolled fibrous structure. It was presented by a complex hydrocarbon polymer $C_{411}H_{182}N_{26}S$ corresponding to natural medium anthraxolite, similar to oil coke. The aromatic specifics of phytofulgurite are determined by its origin, when the basic substance was represented by humus organic matter with a substantially aromatic hydrocarbon framework. Our studies revealed the presence of diverse amino acids in the examined phytofulgurite material. It appeared that their total content (2.36 mg/g) is maximal for all the natural bitumens. It should be noted that practically all amino acids are largely represented by L-modification (95%). Moreover, the latter is also dominant in other naphtoids (in naphtides, 85%). Thus, the powerful atmospheric electric discharge on the haycock provoked ultrahigh-speed (almost lightning) transformation of high plant material, i.e., organic matter of humus origin, into pyrobitumen (naphtoid) corresponding to medium anthraxolite. It means that the multistage and long-term (in natural environments) process was realized almost instantly.

Texturally controlled U/Pb dating of rutile from the Ivrea Zone

T. ZACK[1], G.L. LUVIZOTTO[1], D.F. STOCKLI[2] AND M. BARTH[3]

[1]Mineralogisches Institut, Universitaet Heidelberg, Germany
[2]Department of Geology, University of Kansas, USA
[3]Institut fuer Geowissenschaften, Universitaet Mainz, Germany

In general, granulite-facies rocks are good candidates for U/Pb rutile dating as they commonly contain rutiles with >10 ppm U. From an analytical point of view, such rutiles are a particularly attractive phase for laser ablation ICP-MS dating for two reasons: 1) they often form large, homogeneous single grains of >200 microns, therefore allowing large spot sizes and hence good precision and 2) they contain virtually no Th (Th/U ratios are commonly <0.001), hence allowing for common lead correction via ^{208}Pb. The second point is especially relevant as ^{208}Pb is *c*. 40 times more abundant than ^{204}Pb and has no interferences with ^{204}Hg in the argon gas. With the analytical strategies outlined above, U/Pb rutile analysis offers new aspects for dating granulites. Single grain analysis of regular thin sections allows controlled dating both texturally and chemically.

Rutiles from granulite-facies metapelites of the Ivrea Zone exhibit a range of different textures. Infiltrating fluids partly recrystallized large rutiles in the matrix, while rutiles included in garnet are less affected, although not completely shielded [1]. Texturally-controlled dating revealed significantly younger ages of the obviously earlier grown rutiles (inclusions) compared to later grown rutiles (in matrix). This observation suggests that the U/Pb ages of these rutiles are not crystallization ages. Instead, a correlation of U/Pb age with crystal size (inclusions are generally smaller than matrix rutiles) seems to hint towards a diffusion-controlled mechanism (see Schoene & Bowring [2]) for controlling the ages of Ivrea Zone rutiles. The large spread in ages (ranging from ca 165 to 190 Ma; +/-5 Ma 2s) either indicates slow cooling rates (ca 2°C/Ma) in the Ivrea Zone or faster cooling rates with a heat pulse at ca 190 Ma, perhaps associated with Tethyan rifting [3].

[1] Luvizotto & Zack (submitted) *Chem Geol* [2] Schoene & Bowring (2007) *Geochim. Cosmochim. Acta* **71**, 165-185. [3] Handy, Franz, Heller, Janott & Zubriggen (1999) *Tectonics* **18**, 1154-1177.