Geochemical model and temporal diatribution of Ni laterites in Urals

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Nickel lateritic deposits of Urals have been forming during lateTriassic – Early Jurassic and Early to Late Cretaceous. Remobilisation and redistribution of Ni is related to Tertiary processes. Blanket-like, linear and combined types of deposits have tradidionally been distinguishing by Russian geologists. Presented is a model showing that all listed types represent a result of the same geochemical process.

Generalization of published materials and author's experiense point to the dual nature of Ni concentration during lateritic weathering. Within laterite and saprolite, Ni concentrates *in situ* due to removal of alcaline and alcaline earth elements as well as Si. Ni accommodates in oxides and hydroxides (goethite, haematite, maggemite, magnetite) within laterite zone and in layered silicates (smectites) within saprolite zone. Infiltration of Ni partly dissolved by weathering and its following precipitation leads to formation of rich quartz-garnierite ore in the zones of faults and deep karst cavities along the contacts of serpentinites and carbonate rocks. Such mineralization can be traced to the depth 400 – 500m. It seems that two described mechanisms cannot exist without each other: on the one hand, lateritic profile cannot develop without developing intensive drainage system which provides downward solution movement and leaching primary minerals; on the other hand, zones of foults and contacts with carbonate rocks play the role of such systems also being geochemical barriers for Ni presipitation.

Thus, the existanse of poor residual (lateritic) or poor infiltrative (linear) deposits seems to be doubtful. These types were distinguished due to weak tectonics study of ultrabasic massifs and impossibility of proper erosion level estimations.

Preliminary Ni isotope study (δ^{60}Ni and δ^{62}Ni, MC-ICP-MS Neptune, Centre of Isotopic Research, VSEGEI) shows, that with respect to Ni isotope composition of parent serpentinites, samples of quartz-garnierite infiltration ore show more heavy composition, while *in-situ* laterite samples have more light composition. This indirectly confirms the opinion about dual nature of Ni behavior during lateritic weathering of ultrabasic rocks.

Noble gas concentrations and isotopic ratios in single chondrules using laser ablation: Constraints on the origin of noble gases in chondrites

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The question of the origin of the noble gases on Earth remains unclear. Solar wind irradiation with mass fractionation due to sputtering on parent bodies is one scenario, dissolution of a dense primordial atmosphere in a molten earth is another one. Neon and argon isotopes measured in mantle-derived rocks suggest that the irradiation scenario is strong. In order to understand how parent bodies acquired their noble gases, we have developed an ablation system coupled to a noble gas mass spectrometer allowing measurement of noble gases *in situ*. The ablation system is an Excimer laser (193nm), giving ablation spots of ~60µm in diameter and ~50µm in depth. It is coupled to our glassy mass spectrometer ARESIBO II.

NWA3128 is a LL3.8 ordinary chondrite that shows chondrules up to 1mm in size. A sample of 0.1mg was first heated using a 10W continuous Wave Ytterbium fiber laser in order to get bulk helium and neon compositions. ^{4}He and ^{20}Ne concentrations were 7 10^{-3} and 3 10^{-4} ccSTP/g respectively. ^{4}He/^{3}He ratio is 2870 (SW=2500), ^{20}Ne/^{22}Ne=11.44 and ^{21}Ne/^{22}Ne=0.0780, suggesting a solar wind implantation in this sample.

We then have performed profiles in different chondrules from NWA3128 using our ablation system. Our results clearly show that the solar gases are at the surface of the chondrules. The concentrations obtained in the rims are more than ten times higher than the interior the chondrule. Moreover, isotopic ratios are solar-like in the rim (e.g. ^{20}Ne/^{22}Ne=11.59±0.07) whereas the interior presents a more important cosmogenic contribution (^{20}Ne/^{22}Ne=8.6 and ^{21}Ne/^{22}Ne=0.15).

Our results show that the chondrules were formed in an environment with a strong solar wind that was implanted at the surface of chondrules before the formation of the chondrite. An important proportion of noble gases that are present in the earth's mantle may derive from the solar wind implantation in chondrules, close to the young Sun. These chondrules will then mix to a matrix to form the different chondrite classes. Noble gases are then a mixture of these solar gases, fractionated during implantation, and gases from the matrix. Thermal metamorphism will homogenize these components to give the planetary signature.