Geophysical Research Abstracts
Vol. 21, EGU2019-4617, 2019
EGU General Assembly 2019

Reasoning Research in Global Tectonics

Cyril Pshenichny
Geognosis Project, BIT Institute, ITMO University, St. Petersburg, Russian Federation (cpshenichny@yandex.ru)

Investigation of geological reasoning stems from the claim made by Vistelius (1992) in his pioneering work on foundations of mathematical geology, This claim was to conceptually rethink any geological issue prior to its mathematical modeling in order to select a formalism that suits it best by motivation and internal structure. Ten years later, in the framework of International Association of Mathematical Geology (now Geosciences, IAMG), the idea was revived under the titles Reasoning Research of Conceptual Modeling. This initiative resulted in a few publications, a workshop at the 2003 annual IAMG meeting, and the Georeasoning mailing list uniting about 200 participants worldwide. The conceptual modeling of geoenvironments was considered an independent research task having its own value and not requiring further mathematical modeling. Importantly, as advocated by Pshenichny and Henley (2003), this dimension of research is falling not as much into the field of knowledge representation but, rather, into the geoscience domain.

However, after a vigorous discussion in 2003-2006, the issue was somewhat shaded because of absence, by then, of appropriate tool for conceptual modeling of changing and evolving environments. These environments – tectonic movements, rock formation, landscape evolution and so forth – constitute the core of knowledge about the solid Earth, whatever paradigm to take. However, all that knowledge engineering could offer to capture the changes – a handful of methods, from Petri nets to sequence diagrams, mainly regarded as behavior diagrams of the Unified Modeling Language (UML), and even the novel ad hoc method of event bush – was drastically lacking the semantic strictness compared to the techniques of knowledge engineering used for the domains that describe unchanging, static world – ontologies, UML class diagrams and the like.

The theory that could give such strictness, the theory of multitudes, was developingd since then, but only now it is mature enough to give the basis for knowledge engineering of evolving environments (Pshenichny, 2018). Its key item is meaning seen as the building block of knowledge of any complexity. Interrelations of meanings represent context (whose particular types are hypothesis or theory) visualized as predmetka, a graph introduced to represent meanings and their relations regardless of terms used to denote them.

In the geosciences, the reasoning research in global tectonics looks one of the most fundamental (due to the role of tectonics in geology) and intriguing, due to abundant recent evidence hardly digested by the reigning paradigm of plate tectonics as well as thought-provoking new ideas emerging in NCGT publications.

At this session, the knowledge and evidence from selected abstracts are going to be grouped in a draft predmetka that is expected to be published. It would map the area of tectonics covered at the session. It will be then extendable further at any conference or in any thematic discussion, incorporating the conflicting views and and incompatible terminology. Thus, step by step, the conceptual traps and areas of woolly reasoning in the global tectonics are going to be enlightened and removed on the formal basis of the theory of multitudes.