-Planetary Surfaces and Life-

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Abstract

Phenomena and processes of mineral and rock formation and destruction are ruled by physical and chemical interactions of crustal elements with their environment(s). These can be considerably accelerated by any kind of biological activity. All atoms and materials exposed to the atmosphere, water, and minerals are more rapidly transferred and cycled biologically than under conditions of a sterile environment ruled by pure physical chemistry. Although water plays an eminent role in all biotransfer processes, subaerial and rock internal biofilms or bio-networks need only very small amounts of water to produce dramatic mechanical and chemical changes with rocks and minerals. Biogeomorphogenetic processes on small and large (global) scale rules the cycle of minerals and rocks to an extent, comparable to the impact of humankind on global climate and geochemical cycles assumed by many a scientist. The idea of life taking part in the transformation and shaping of the atmosphere, hydrosphere and soils on planet Earth is almost as old as all scientific thought. The notion of the importance of crustal movements for life processes and *vice versa* at or near the earth surface stems from scientists of the enlightenment period (G. Bruno, M. Lomonosov, G. Buffon, I. Kant, G. Herder and Alexander von Humboldt). Modern approaches have first been developed with increasing precision in the work of V. I. Vernadsky between 1906 and 1946. The ideas and data on a considerable influence of the biogenic migration of energy, atoms and rock materials concerning crust and mantle chemical and rock composition as well as on global tectonics emerged about 40 years later (Krumbein, 1983; Anderson, 1984, 2003; Krumbein and Schellnhuber, 1990, 1992, Krumbein, 1996, Franck et al., 2006, Krumbein et al., 2006; Rosing et al., 2006). In a nutshell: The constant and geologically fast transformation of global geomorphology, global climate, and global distribution of land and sea are controlled by living matter. The very variable chemical composition and mechanical behaviour of land masses controlling the movement of continents, as well as vertical and horizontal formation, deformation and movement of physically denser parts of the crust is a phenomenon and outcome of life processes on Earth constantly trapping solar energy and transforming it into chemical differences stored in the crust by living matter. The energy content of the crust of planet Earth thus changes and is powered by sun energy captured for geological periods of time within crust and upper mantle. These findings may also shed light on other planets and the question of whether or not these exhibit signs of former or extant life processes. Finally: Approximately 10% of the Earth mass are under the complex control of living matter channelling atoms, ions and compounds from the living to the inert (unanimated) state, not unlike any abiological purely chemical reaction. We prefer and explain the model of top-down instead of the presently common view of bottom-up Geomorphogenesis. Anderson (2006) uses the new term platonics for these processes.