



The active outer shell of Earth: What remains to be explored in carbon and life interactions?

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Recent advances in methods and technologies have allowed us to explore the interaction between life and abiotic resources from nano to megascales in space and time, and this has set new challenges to the geosciences. This lecture aims at discussing key biological factors in the question of the dynamics of carbon reservoirs and fluxes on Earth, and the challenges to the geosciences to incorporate and further this knowledge. Humans themselves as one such biological factor have considerably changed the dynamics of carbon and other elements, with repercussions to most other life forms on Earth. Which other life forms shape carbon fluxes and reservoirs, and what do we know about their key traits in catalyzing geochemical reactions, their past and their future? I will use case studies from my own research field – geobiology of the oceans and the cryosphere – and from other geoscience areas to highlight the considerable non-linearity introduced by life to element fluxes and the environment; and discuss advances but also gaps in knowledge and research approaches concerning assessing and predicting carbon transformations in the active outer shell of Earth.