

The regulation and stability of Earth's chemical cycles: theories and politics of the Earth, 19th and 20th century.

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The most famous conception of the idea of a “balance of nature” stems from an *ecological* tradition, focused on animal and plant demography, stretching from the Greeks to contemporary ecology, going through Linnaeus and Darwin. Yet a powerful (geo)*chemical* tradition of this idea has also developed, though it has received less attention (but see Marald 2002, Galvez & Gaillardet 2012, Grinevald 1998, Aronowsky 2018, Fresoz & Locher 2020, Oldroyd 2006, Rispoli 2014). It has come into light over the past decades, when it was realized that a planetary industrial metabolism was perturbing Earth's chemical stability and provoking “global changes”.

Over the past two centuries, debates about the chemical stability (circulation of matter, and changes) of the Earth have been intertwined with theological matters: e.g. in the early 19th century the maintenance of a chemical equilibrium through global cycles was to show the perfection of the Creation. They have also been the subject of sanitary controversies and political worries: about soil's fertility (from Hutton's theory of the Earth to the neo-malthusian moment of the second part of the XXth century, going through 19th century agricultural chemistry); or about atmospheric composition (from worries about oxygen exhaustion due to coal combustion in the 19th century to contemporary “global changes”). They have finally been linked with theoretical debates in geology about the very nature of the Earth itself and the way to understand its composition, history, and changes. Various theoretical schemes have been used to analyse the stability and (catastrophic) changes of Earth's chemistry, the two most famous being “global cycles of matters” within a geochemical tradition (stemming in 19th century “chemical geology” and Vernadsky's geochemistry); and the understanding of Earth's surface as a “cybernetic/complex system” which spread in Hutchinson's “Biosphere”, Lovelock and Margulis's “Gaia hypothesis”, and contemporary “Earth system science”.

This communication aims (i) at retracing the history of this idea of a “chemical stability” of the Earth” over the past two centuries, and, (ii), through the use of selected examples, at showing these intertwinements between theology, politics and scientific practices, conceptual schemes, and theoretical debates about the nature of the Earth.