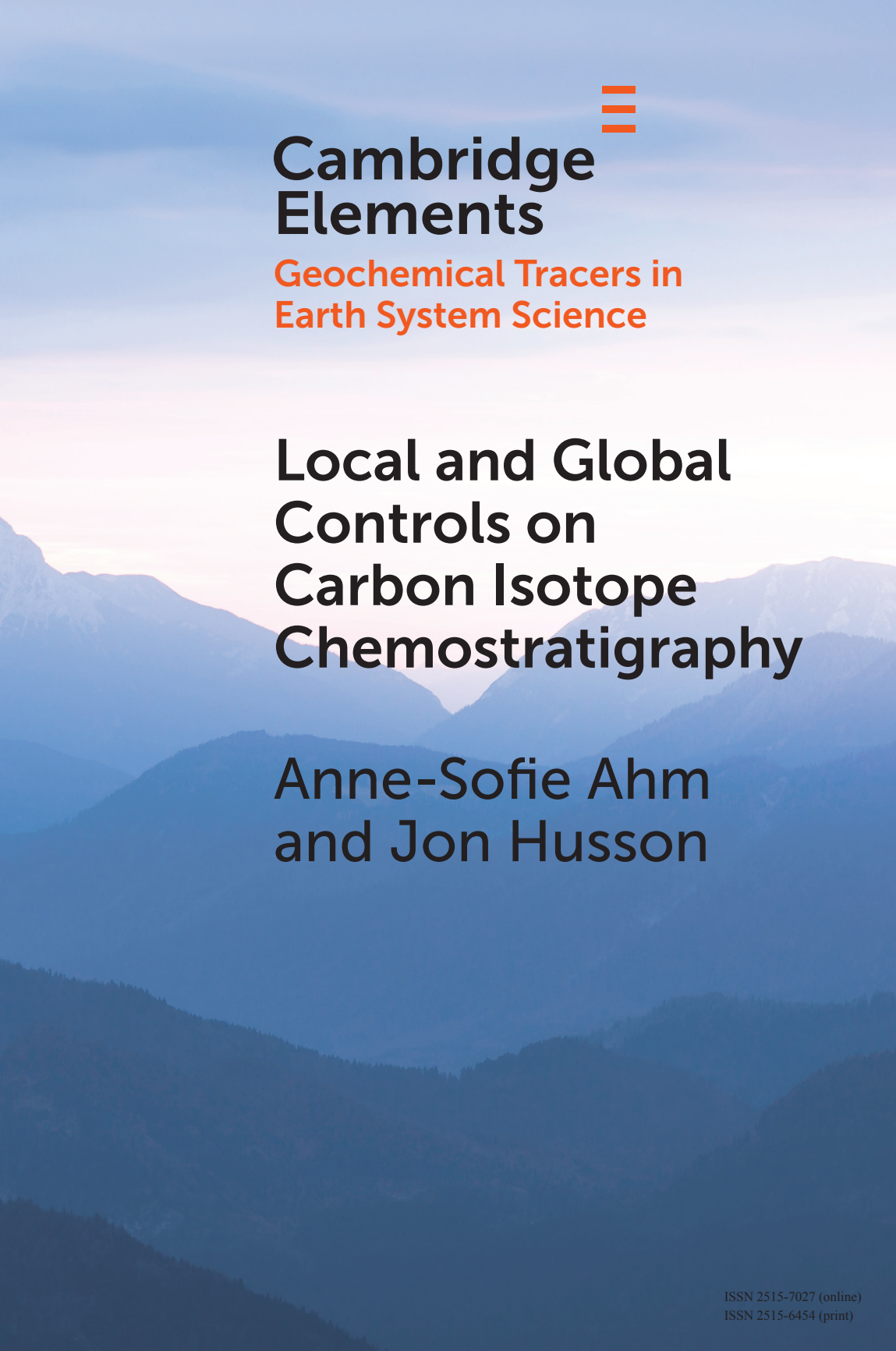

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Local and Global Controls on Carbon Isotope Chemostratigraphy

Anne-Sofie Ahm and Jon Husson

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Abstract: Over million-year timescales, the geologic cycling of carbon controls long-term climate and the oxidation of the Earth's surface. Inferences about the carbon cycle can be made from time series of carbon isotopic ratios measured from sedimentary rocks. The foundational assumption for carbon isotope chemostratigraphy is that carbon isotope values reflect dissolved inorganic carbon in a well-mixed ocean in equilibrium with the atmosphere. However, when applied to shallow-water platform environments, where most ancient carbonates preserved in the geological record formed, recent research has documented the importance of considering both local variability in surface water chemistry and diagenesis. These findings demonstrate that carbon isotope chemostratigraphy of platform carbonate rarely represents the average carbonate sink or directly records changes in the composition of global seawater. Understanding what causes local variability in shallow-water settings, and what this variability might reveal about global boundary conditions, are vital questions for the next generation of carbon isotope chemostratigraphers.

Keywords: carbon isotopes, global carbon cycle, platform carbonates, carbonate diagenesis, chemostratigraphy

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