

The Peroxy Paradox

Electrical Processes in the Solid Earth

This book examines the role of stress-activated electrical processes in the Earth's crust and their potential implications for Earth-system science. Departing from the conventional treatment of the solid Earth as an electrically inert medium, The Peroxy Paradox presents a physical framework in which common rock-forming minerals host dormant electronic structures that can become active under tectonic loading. The analysis focuses on peroxy defects in crystalline lattices and on the generation of highly mobile electronic charge carriers whose transport properties differ fundamentally from classical ionic conduction in geological materials. Drawing on solid-state physics, geochemistry, and observational geophysics, the authors address longstanding objections related to charge screening and conductivity in wet crustal environments, and propose mechanisms by which large-scale electronic signals may arise prior to mechanical failure. The book also outlines experimental and observational approaches for investigating stress-related geoelectric phenomena, situating these processes within a broader context of lithospheric dynamics. Intended for researchers and advanced students in physics, geophysics, and Earth sciences, this volume offers a focused contribution to the study of electrical phenomena in the solid Earth.

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