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Sommario/riassunto

Petrochronology is a rapidly emerging branch of Earth science that links time (ages or rates) with specific rock-forming processes and their physical conditions. It is founded in petrology and geochemistry, which define a petrogenetic context or delimit a specific process, to which chronometric data are then linked. This combination informs Earth's petrogenetic processes better than petrology or geochronology alone. This volume and the accompanying short courses address three broad categories of inquiry. Conceptual approaches chapters include petrologic modeling of multi-component chemical and mineralogic systems, and development of methods that include diffusive alteration of mineral chemistry. Methods chapters address four main analytical techniques, specifically EPMA, LA-ICP-MS, SIMS and TIMS. Mineral-specific chapters explore applications to a wide range of minerals, including zircon (metamorphic, igneous, and detrital/Hadean), baddeleyite, REE minerals (monazite, allanite, xenotime and apatite), titanite, rutile, garnet, and major igneous minerals (olivine, plagioclase and pyroxenes). These applications mainly focus on metamorphic, igneous, or tectonic processes, but additionally elucidate fundamental transdisciplinary progress in addressing mechanisms of crystal growth, the chemical consequences of mineral growth kinetics, and how chemical transport and deformation affect chemically complex mineral composites. Most chapters further recommend areas of future research.
