

UC **SANTA BARBARA**
Department of Earth Science

Speakers Club

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Ultrahigh-temperature metamorphism: the hottest rocks in the crust and how they form

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Metamorphic rocks—rocks with minerals that grew at high temperatures, deep in Earth’s crust—are a direct record of plate tectonics through time. Studying metamorphic rocks helps us understand how Earth has changed and provides us with insights about what the inaccessible deep Earth looks like today. In this talk, I will explore a particular subset of metamorphic rocks—ultrahigh-temperature (UHT) metamorphic rocks—and how they form. UHT rocks ($>900^{\circ}\text{C}$, 1650°F) are the highest temperature rocks that form in Earth’s crust. At these extreme temperatures, the large volumes of magma can be generated, which profoundly affects the distribution of elements in the crust (as the magmas separate from their sources) and the physical strength of the crust (magmas, as liquids, are much weaker than rocks, but the rocks that are left behind after melting are much stronger than before). UHT metamorphism is known to have occurred throughout Earth’s history and might be occurring at depth in several places today. However, despite the ubiquity of UHT rocks in the geologic record, exactly how such extreme conditions are reached and sustained in the crust has long remained unclear.