Investigating Thermal Effects of Cordilleran Processes on the Cenozoic Magallanes Basin, Chile and Argentina, 50˚ 30’ S and 51˚ 30’S

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ABSTRACT

Basins record numerous processes including tectonic and thermal histories, which can be challenging to quantify but crucial for assessing hydrocarbon resources and basin development. I propose to link Cordilleran processes to thermal effects within the unusually hot Cenozoic Magallanes foreland basin. Previous studies suggest elevated basin heating due to high sedimentation rates during orogenesis while another study interprets multiple generations of cement formation, and thermal differences in vitrinite reflectance across the Paleocene-Eocene boundary as lateral hydrothermal fluid flow. Resolving this debate is critical for constraining unconformity thickness, calculating paleotemperatures of the basin, and modeling thermal and tectonic subsidence histories. Since lithologic formational boundaries can control fluid flow, I will examine the Paleocene-Eocene unconformity to resolve this conundrum. I hypothesize organic indicators and detrital zircon thermochronology datasets will reveal a temperature inversion across the unconformity related to fluid flow due to advancement of the Patagonian fold and thrust belt. To test this hypothesis, I will use a novel approach involving vitrinite reflectance, cement geochemistry, and double dating of detrital zircon (U-Pb and (U-Th)/He). Detrital thermochronology, vitrinite reflectance and cement geochemistry will be used to calculate paleotemperatures of the deposits, and to recognize thermal inversions, which are key to identifying fluid flow. Double dating allows comparison of maximum depositional ages with He ages to recognize if the sediment has been reheated. This study will ultimately elucidate our understanding of resource availability and increase our understanding of how tectonic events are linked to the thermal history of the Cenozoic Magallanes Basin.

AAPG Search and Discovery Article #90321 2018 Grants-in-Aid Projects