UM | Clayton H. Riddell Faculty of Environment, Earth, and Resources

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The Department of Earth Sciences welcomes you to their Seminar Series featuring:

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The three-million-year pulse: pace and processes of Late Jurassic magmatism in the Sierra Nevada arc

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Continental arcs commonly experience brief, high-flux magmatic pulses, and the Late Jurassic Sierra Nevada arc records one such event in the form of a bimodal suite of highly silicic plutonic, hypabyssal, and volcanic rocks, associated cumulate gabbros, and a regionally extensive andesitic dike swarm. This study presents new constraints on the timing, magma sources, differentiation, and genetic relationships of this bimodal igneous episode and the andesitic dike system. High-precision CA–ID–TIMS zircon geochronology, whole-rock Sr–Nd–Pb isotopic data, trace-element geochemistry, and zircon $\delta^{18}O$ data are integrated to characterize the evolution of this magmatic system. Geochronological data constrain all magmatic activity to a narrow interval (152–149 Ma), indicating that the bimodal suite and andesitic dike swarm are coeval. Geochemical and isotopic data indicate that the andesitic magma served as the parental melt, from which high-silica, crystal-poor volcanic, hypabyssal, and plutonic rocks formed as interstitial melts, whereas the mafic cumulate gabbros represent the **residuum**. Geochemical patterns, including mantle-like zircon $\delta^{18}O$ values, evolved Sr, Nd, Pb isotopic signatures, and trace-element systematics, point to partial melting of the hydrated lower crust or subcontinental lithosphere to generate the parental andesitic magma, which then differentiated in shallow, deformation-influenced reservoirs to generate the bimodal suite.