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"Petrogenealogy" of the Mount Hillers intrusions, Henry Mtns, Utah, USA

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The Mount Hillers intrusive complex (Colorado Plateau, Utah) consists of a large central laccolithic intrusion and many smaller satellite intrusions, all of them diorite. The map pattern shows that the majority of the satellite intrusions emanate from the central intrusion, similar to volcanic lava flows connected to their volcano. Our recent work has shown an episodical and very rapid construction of the satellite intrusions, prior to, or at best synchronous with, the construction of the central intrusion. The goal of this work is to characterize the petro-geochemical signature of the satellites and central intrusions, and from their comparison and geological and structural data, to propose a “genealogical” model, i.e. a model of how the children (satellites) are related to their parents (intrusive complex). Our data show a great homogeneity of composition of all these intrusions. The only mineralogical difference lies in the presence or the absence of augite (Black Mesa and Hillers intrusions) and epidote (other intrusions), thus defining two petrological families. The geochemical analyses in minerals and in whole rock confirm this difference, which can be explained by two principal episodes of magmatic injection. The first injection results in the emplacment of the small intrusions. The second is responsible for the formation of Black Mesa. The Mount Hillers shows a greater heterogeneity, which reflects the complicated structure of this large intrusion, built in many consecutive episodes, some of which are synchronous with the satellite intrusions. The isotopic data show that the magmatic source seems to be unique and that it evolved during the formation of the whole complex.