The aim of the study was to gain an impression of the subsurface configuration of the Skalkaho (mafic-alkaline) Complex, east of Hamilton, Montana. This was accomplished through the integration of geologic information and the results of forward modeling of gravity data. In the modeling process, the pyroxene core was delineated with respect to the out-lying syenites and host rocks.

The mid-Cretaceous Skalkaho Complex intruded the mid-Proterozoic Wallace Formation of the Belt Supergroup. The metasedimentary host rocks are situated within the western or trailing edge of the allochthonous Sapphire Tectonic Block, which postdates the complex. The pyroxene-syenite intrusion was shallowly-emplaced, probably as a co-magmatic, immiscible system. The complex covers about 9 sq. km, with an oblong, east-west trending core of pyroxenites surrounded by two syenite bodies that lack nepheline. Pyroxenite-syenite contacts range over 600 meters of elevation difference. A small, massive carbonate body composed mainly of calcite probably post-dates the complex and is not carbonatite. The remarkably similar, contemporaneous Rainy Creek Complex is 275 km to the north near Libby, Montana, but most likely had a magma source independent to that at Skalkaho.

Bouguer anomaly values ranged from -169 to -185 milligals over the area, with the highest anomalies centered over the pyroxenites. Modeling profiles perpendicular to the longitudinal trend of the complex show that the pyroxenite body is shaped like a narrow, inward-dipping cone which thins from east to west, and not a sill or outward-dipping cone. Approximate depths for the pyroxenite range from 1000 to 200 meters east to west. The syenite bodies formed along the flanks of the pyroxenite, but some syenite may have capped the pyroxenite at the time of emplacement. The Skalkaho intrusion probably is a "cored" complex, much like the ring-dike complex at Magnet Cove, Arkansas.

The irregular distribution of magnetite within the irregularly-distributed Skalkaho rock units complicated the use of magnetic survey data to complement the gravity results. Magnetic susceptibilities varied from 0.000023 to 0.0051 cgs units, which correspond to volume percents of magnetite from less than 0.01 to 3.0. Total field intensities ranged from 54,000 to 66,000 gammas and gradients of several thousand gammas per 30 meters were common.