# Gravity and magnetic surveys of a Proterozoic mafic sill in Cape St. Francis, Newfoundland

Aldila Nurkusuma, Tammy Perry, and Alison Leitch - *Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador A1B 3X5, Canada*

The Cape St. Francis region, near Pouch Cove, is underlain by Late Neoproterozoic rocks. These include flow- banded rhyolite overlain by siliceous siltstone and subarkosic sandstone, and epidote-rich pillow basalt of the Wych Hazel Pond Complex (585–580 Ma), overlain by siliceous sandstone and siltstone of the Mannings Hill Member of the Conception Group (<580 Ma). The youngest rocks in the area are mafic intrusions of the Beaver Hat Intrusive Suite. One distinct feature of the Cape St. Francis region is a 600 m-long, ENE-trending ridge located southeast of Jacobs Cove. The ridge consists of pillow basalts, basaltic intrusions, pillow breccias, and interbedded sandstones, and lines of diabase dykes run NNE on the west side of the ridge, and ENE on the east side of the ridge. This south- eastern part of this ridge has a cliff face with scree at its base, which contains a mafic sill. The sill has been determined from previous surveys to be dipping towards the north-west and is highly magnetic.

The objective of this project is to determine the thickness and the extent of the sill in the subsurface by performing geophysical surveys in the area. These surveys include an elevation survey using a TopCon Hiperlite + DGPS, a gravity survey using a Scintrex CG-5 Autograv Gravity Meter, and a magnetic survey using Scintrex Envi Proton Precession Magnetometer.

The DGPS survey determined the UTM coordinates for the stations and their elevations. These elevations were then used for Free-Air and Bouguer Correction for the gravity data. Density measurements were done using the Archimedes' Principle on rock samples obtained by Tammy Perry during her survey in 2003 to 2005. The Bouguer-corrected gravity data shows that the sill gives a NW-trending positive anomaly, trending to the NW, within the surrounding sedimentary rocks. Most of the magnetic data used were also obtained in 2003 to 2005. A survey was conducted in 2013 to obtain additional data and correlate these two groups of data due to secular magnetic drift. The magnetic survey shows a total magnetic intensity (TMI) along the sill that is higher than the surrounding sedimentary rocks, which are the same intensity as the Earth's magnetic field. The concentrated high-magnetic intensity at different spots along the sill suggest that rather than the sill being highly magnetic, it may be smaller, younger diabase dyke intrusions throughout the sill that may be highly magnetic. These dykes most likely belong to the Beaver Hat Intrusive Suite.

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