

Structural Geological Model of the Kaunisvaara Mining District, Norrbotten, Sweden

Master's thesis by Simon Husén (2024)
Supervisor: Ulf Söderlund

BACKGROUND

Kaunisvaara mining district, located in Norrbotten, includes two economically important iron ore deposits: Tapuli and Sahavaara. The former is currently operational as an open pit mine, while the latter is in the process of being developed for future mining.



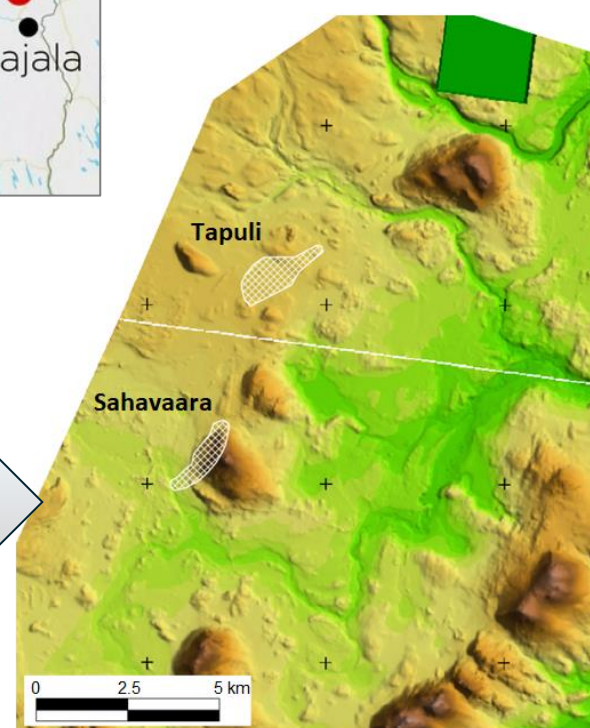
SCOPE OF THESIS

The project aims to establish a structural geological model of the mining area, with emphasis on brittle deformation, by integrating interpretations of geophysical data (lineament analysis) with detailed structural measurements (structural analysis).

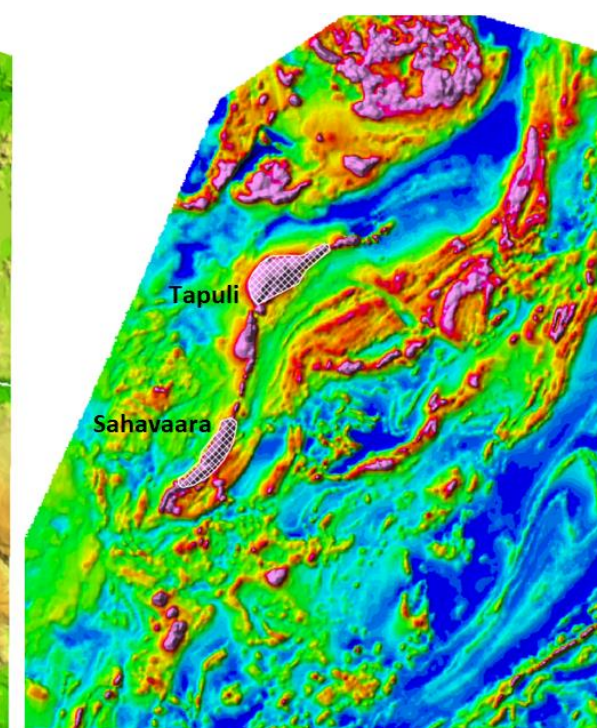
LINEAMENT ANALYSIS

Semi-regional brittle deformation was outlined through interpretations of pre-existing topographic and geophysical data (so-called lineament analysis). Lineament interpretations were made with consideration to several data types, including:

- Topographic data
- Magnetic data
- Electromagnetic data



Topographic map



Magnetic map



3D-model of Tapuli pit

STRUCTURAL ANALYSIS

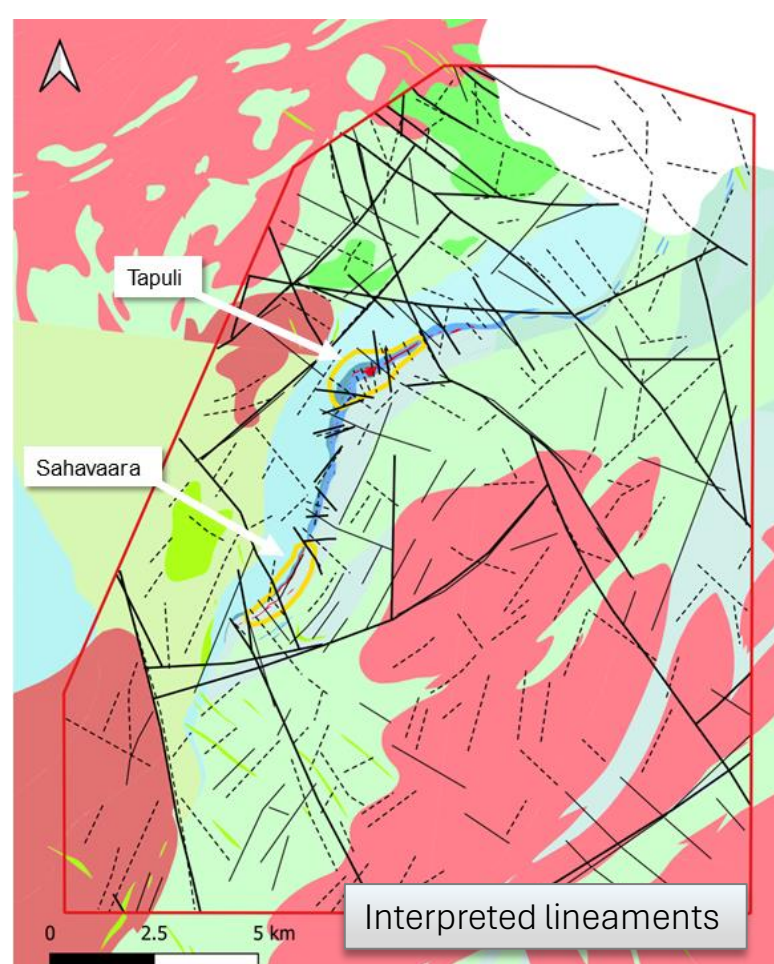
A 3D-model of the Tapuli mining pit was generated from georeferenced drone photography and photogrammetry. Structural measurements (strike/dip data) were then collected from brittle deformation (i.e., fault planes) using software-based operations applied to the 3D-model. This method was employed as conventional measuring techniques with a compass was not applicable due to the strong magnetic signature of the mineralization.

RESULTS

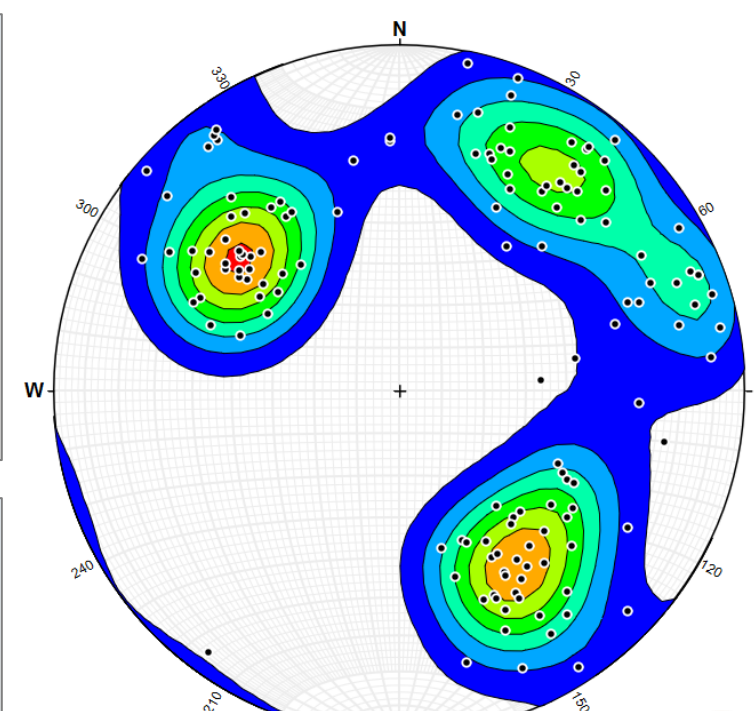
The lineament analysis yielded a total of 217 interpreted lineaments (left) with dominating trends oriented NW-SE and NE-SE. The structural analysis resulted in 137 measurements (right) divided into three main groups striking NE, SW and SE.

CONCLUSIONS

The outcome of the respective analyses exhibited consistent findings, reinforcing the observed dominant orientations across the geological scales, and aligning well with previous studies conducted at both regional and local levels.



Interpreted lineaments



Structural measurements

