Investigating glacial erratic blocks by gravimetry

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Context
Glacial erratic blocks have been carried from the Alps during one of the recent glaciation periods, and deposited in the Swiss Plateau when the ice has molten. What is not known, and remains a challenge to investigate by geophysics, is the sub-surface extent of such blocks. We propose to use a relative gravimeter to tackle this problem, on the example of the Pierre à Cambot (https://s.geo.admin.ch/96b3623445) near Lausanne. The measurement strategy is to be defined, the measurements have to be taken carefully, and then processed rigorously. A useful complement is the density estimate of the rock, either via Archimedes' approach (UNIL), or using a pycnometer (EPFL). Depending on the available time, other erratic blocks can be studied, or the study of glacial erratics broadened towards other geoscience disciplines.

Aims and Methods
-experimental design of the gravimeter surveys
-test measurements, then detailed measurement campaigns
-processing of the gravity data, including various corrections
-synthetic modelling of the gravity data
-geometry testing, or formal inversion to obtain the erratic block's sub-surface geometry
-density estimate of the rock
-openness to discuss with other specialist, e.g., geology and petrology for the origin of the block, glaciology for its transportation, photogrammetry for its volume, or even lichenology…

References
Epard J-L, Gex P, Vust M (2020) Les blocs erratiques propriété de la Société Vaudoise des Sciences Naturelles. Bulletin de la Société Vaudoise des Sciences naturelles 99:29-66.
Dentith M.C., Mudge S. (2014) Geophysics for the Mineral Exploration Geoscientist. Cambridge University Press.
Won I.J., Bevis M. (1987) Computing the gravitational and magnetic anomalies due to a polygon: Algorithms and Fortran subroutines. Geophysics 52(2):232-238.

Website
Gravimeter fabricant's page: https://scintrexltd.com/product-category/gravity/

GH's group page: https://www.unil.ch/orog3ny

Prerequiste
Preferably "Geophysics across scales", and any course making you comfortable in data processing and computer programming. Driver's license, a pair of shoes allowing to climb the Pierre à Cambot, and some practical skills are a plus.