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# Suitability of erratic boulders in NW Poland for cosmogenic dating of the last Scandinavian Ice Sheet recession

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## Abstract

North-western (NW) Poland is a key region to complete cosmogenic chronology of the last Scandinavian Ice Sheet (SIS) retreat available south of the Baltic Sea. A new cosmogenic dating project (<http://www.daterr.ug.edu.pl/home.html>) in this region will bridge the existing gap between the records available in the "west" (Denmark, Germany) and "east" (north-eastern Poland, Lithuania and Belarus). However, the reliable dating of a paleo-ice sheet retreat with cosmogenic nuclides requires sampling of glacially eroded bedrock surfaces or well-preserved erratic boulders resting on moraines. In the area south of the Baltic Sea, where usually soft sediments cover occurs, well-preserved erratics from the Fennoscandian Shield are the best candidates for cosmogenic sampling. We present the results of our desk-based selection and ground truthing of massive erratics in NW Poland for cosmogenic dating with <sup>10</sup>Be.

Our analysis was achieved in three phases. At first, a broad GIS database of large boulders in NW Poland was created based on all available information about massive erratics: lists of natural monuments, database of geosites, geologic and geotourism maps, books, forest ranger interviews, local commune reports, landscape park reports, etc... The GIS database includes basic information about boulders, such as: location (coordinates), dimensions (perimeter and height), petrography and other remarks (e.g. if given - boulder's name). The second phase included the analysis of boulders dimensions, petrography as well as distribution against the digital elevation model and geologic maps. All boulders with perimeter <5 m and height <0.5 m as well as located in valleys and extensive outwash plains were rejected. Boulders already dated with <sup>10</sup>Be were also ignored. The largest boulders located on ice-marginal belts or on moraine plateaux were pre-selected and compiled in a list of over 100 objects potentially suitable for further investigation. In the final phase, these boulders have been ground truthed in the field with special focus on: geomorphological position, height above the ground, shape, petrography, evidence of glacial erosion, and potential marks of anthropogenic impact. Finally, over 60 massive, located in-situ, quartz-rich erratic boulders were identified as suitable for sampling and <sup>10</sup>Be dating (Figure 1). Because almost all of pre-selected boulders are natural monuments protected by law, special permissions for their examination are required as well as special sampling techniques to minimize the visual impact on the selected objects.

Some of the boulders rest on the ice-marginal belts along the limits of the last SIS glacial phases, whereas others are located between the limits of particular glacial phases - on moraine plateaux. This allows us to document the deglaciation chronology in detail, i.e. to date ice-sheet limits and to estimate timing of the ice-sheet retreat along broad north-south transects.

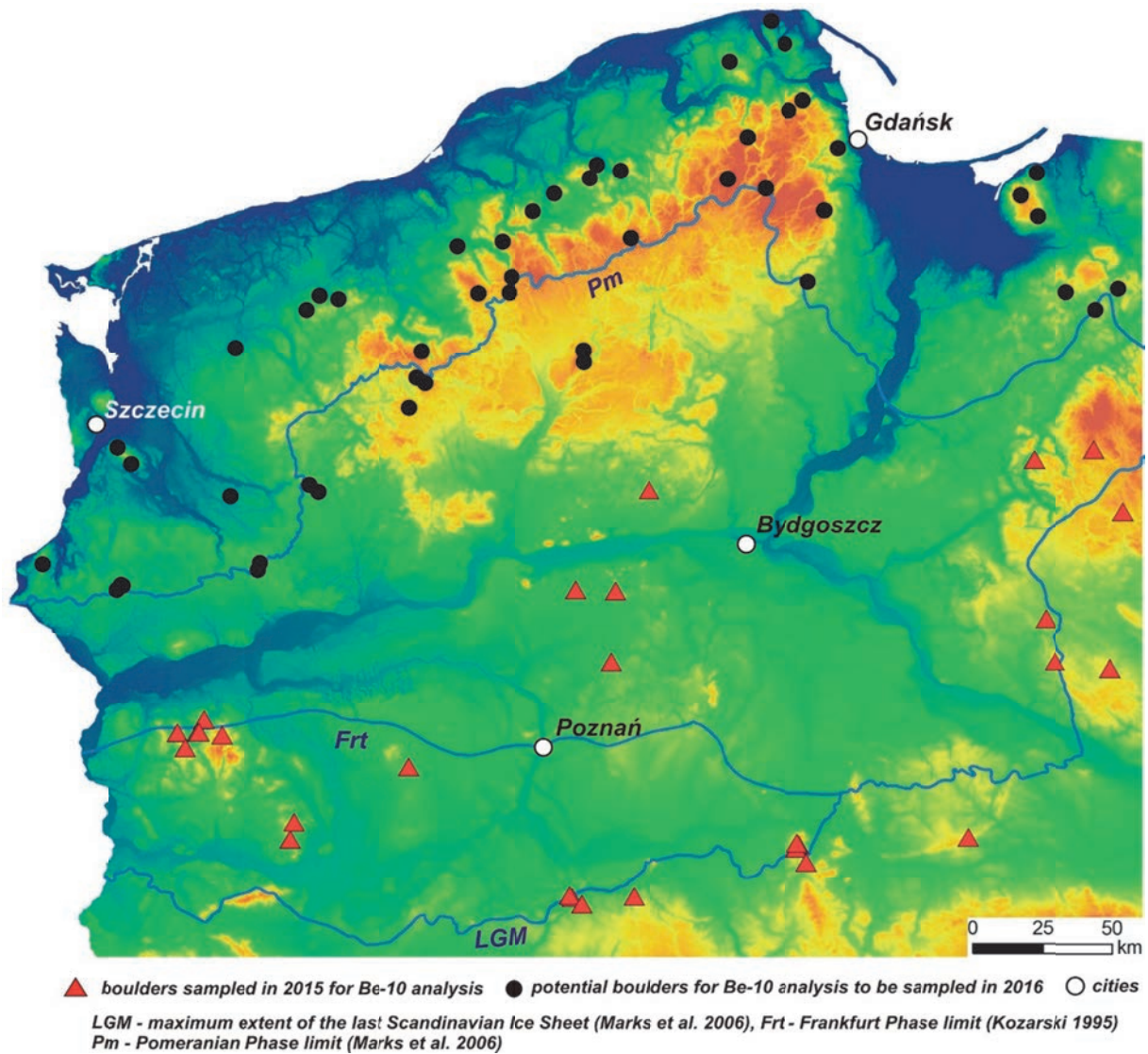


Figure 1. Distribution of erratic boulders sampled in 2015 and potentially suitable for sampling in 2016.

## References

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