

MOTIVATION

SAND-E: Semi-Autonomous Navigation for Detrital Environments project uses robotic operations to examine physical and chemical changes to sediments in basaltic glacio-fluvial-aeolian environments. This research studies changes in sorting and rounding of fluvial-aeolian sediments along a glacier-proximal-to-glacier-distal transect in the outwash plain of the Thórisjökull glacier in SW Iceland. This is especially significant to learning about the geology on Mars due to the lack of studies on basaltic sedimentary systems. Mars and Iceland are both covered in these basaltic sediments which have preserved the history of the environment and climate.

AREA OF STUDY

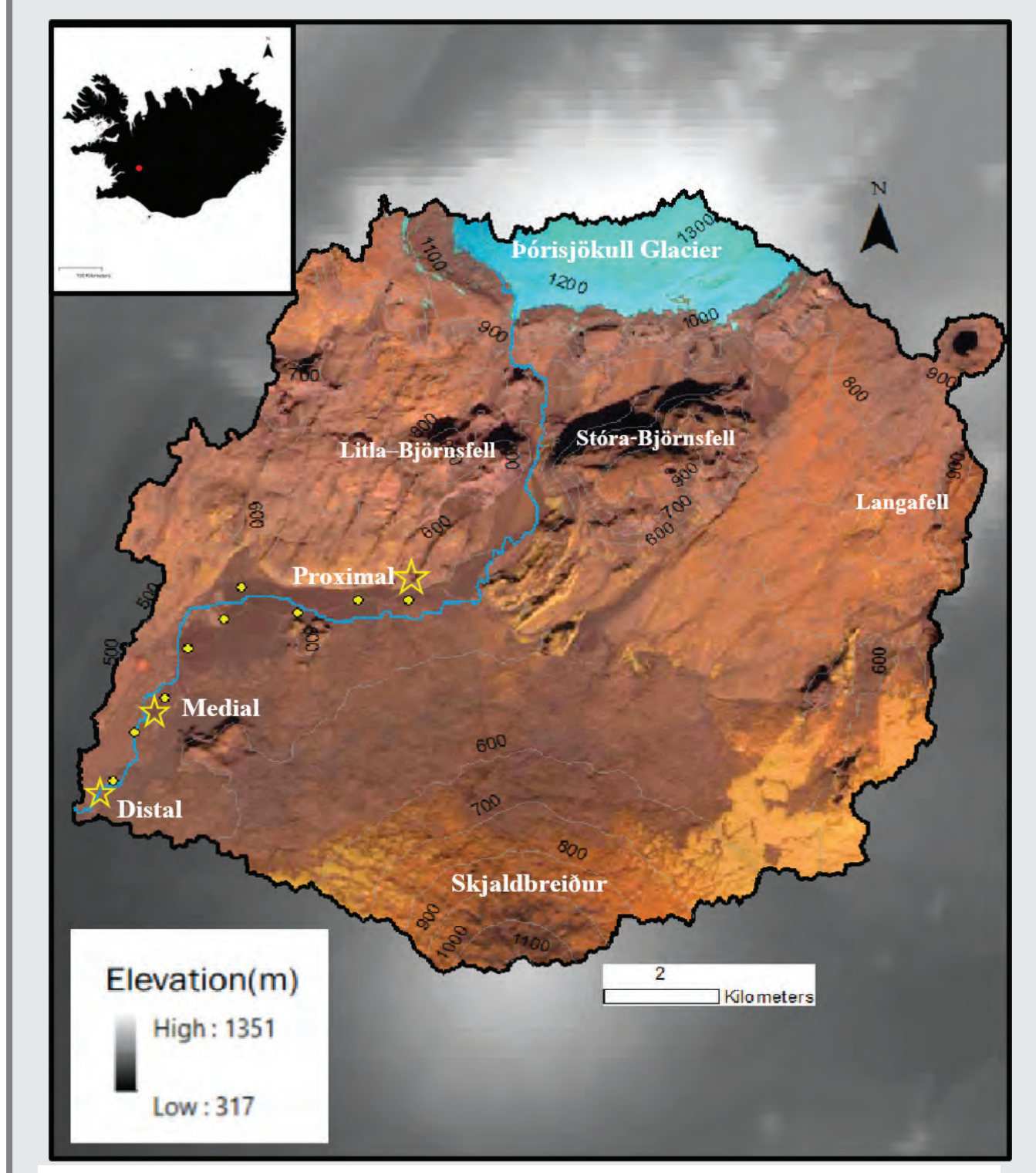


Figure 2: Picture of field location with glacier in the background.

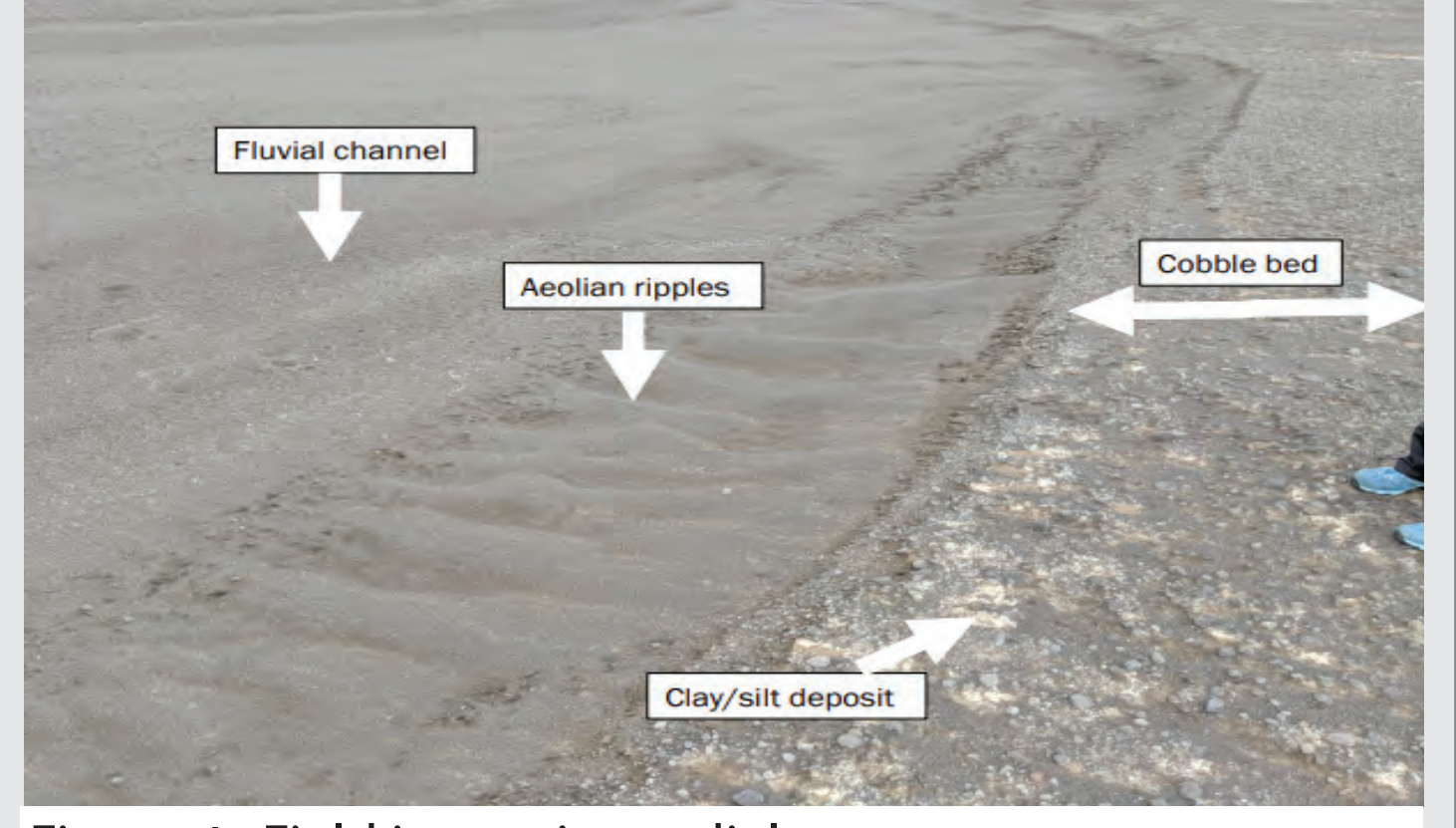


Figure 4: Field image in medial.

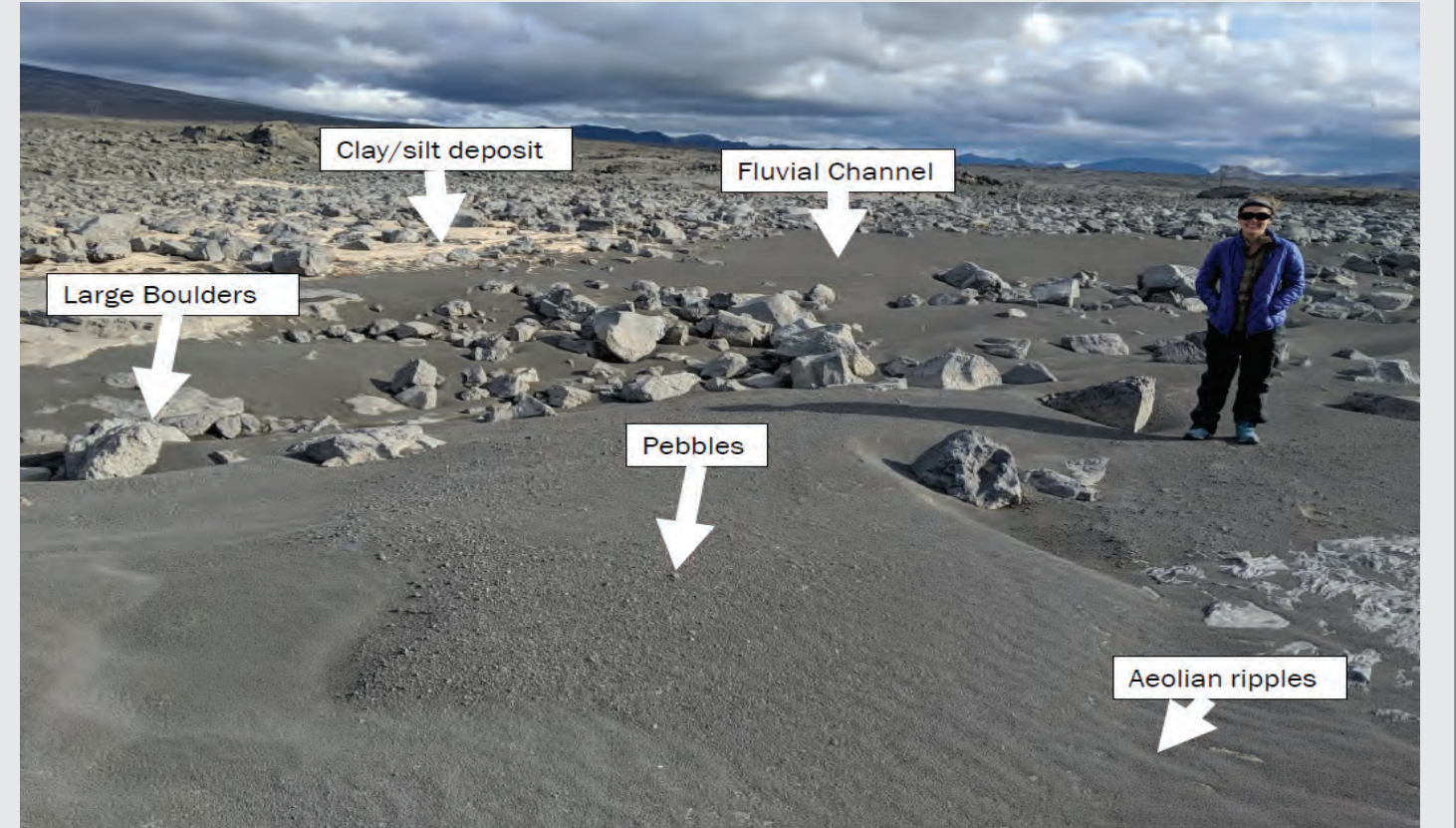


Figure 5: Field image in distal.

Figure 1: Map of Iceland with field location represented as a red dot.

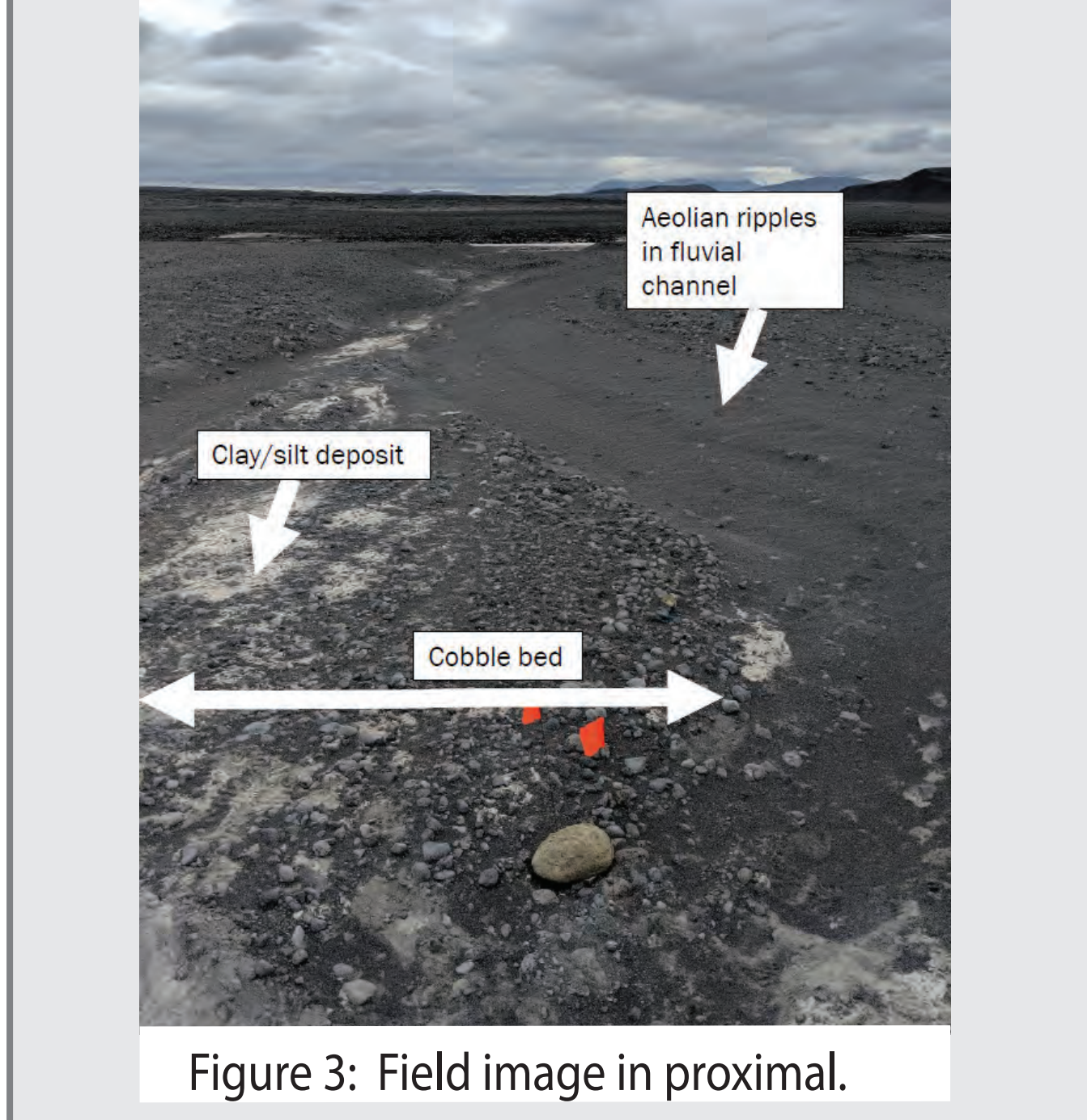


Figure 3: Field image in proximal.

METHODS

- Field Work: Samples were collected every km for 8km. At each stop a cobble count was done. This consists of measuring the intermediate and long axis of 100 randomly selected cobbles.
- Lab Work: Samples were analyzed in a particle analyzer.
- GIS Work: ArcGIS was used to determine stream order and create the surface geologic map of field site.

RESULTS

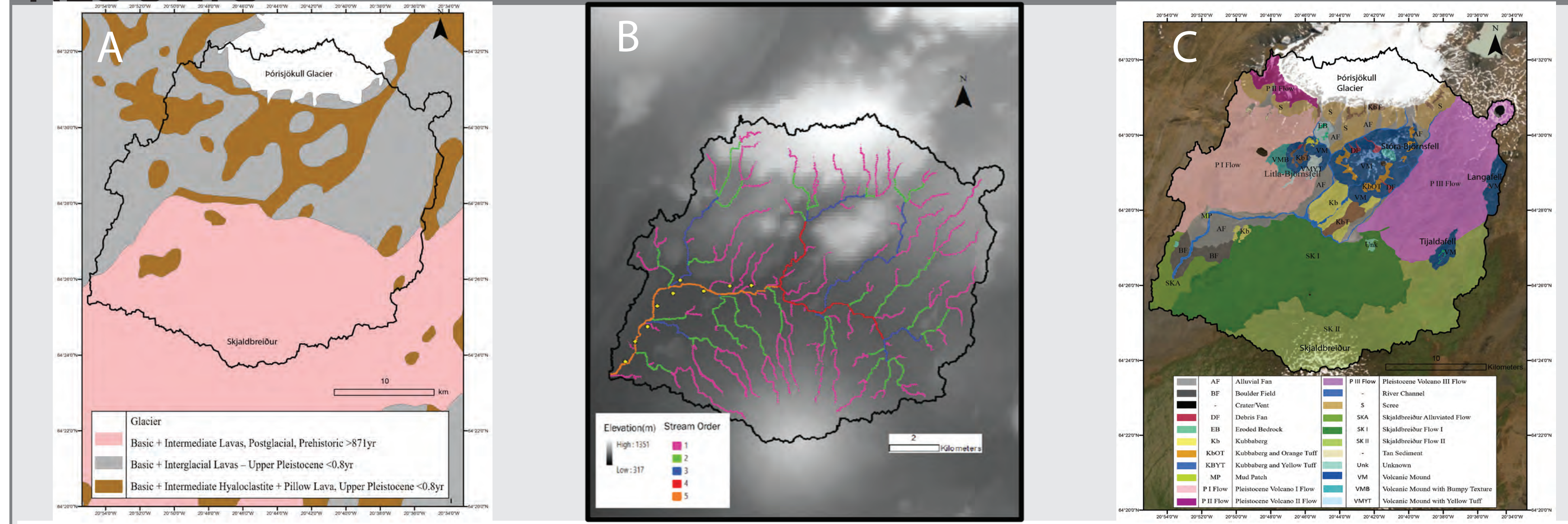


Figure 6: A) General Geology Map of Field Area 1. B) Stream Order of Map C) Surface Geologic Map.

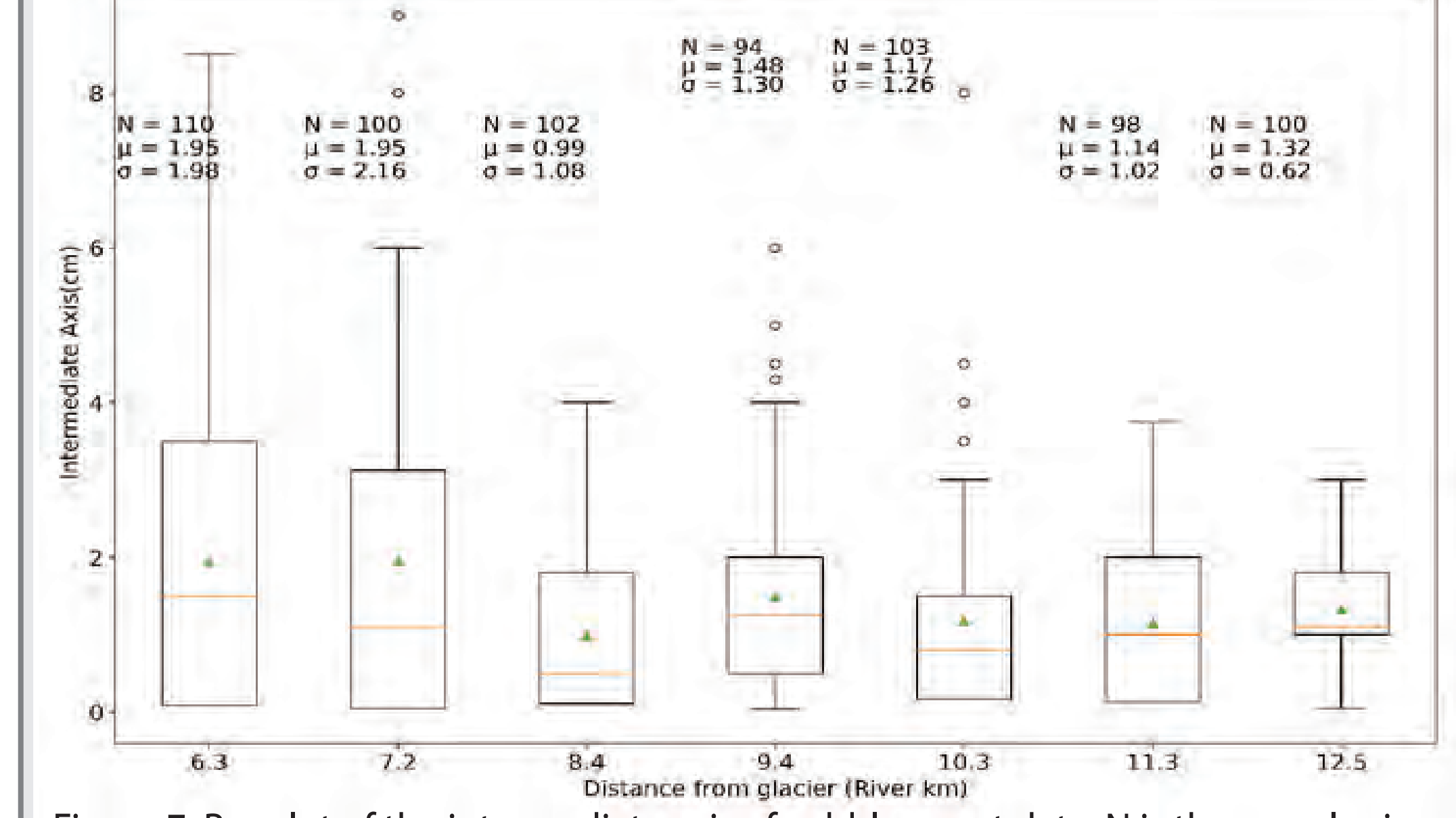


Figure 7: Boxplot of the intermediate axis of cobble count data. N is the sample size, μ is mean and σ is the standard deviation of the mean.

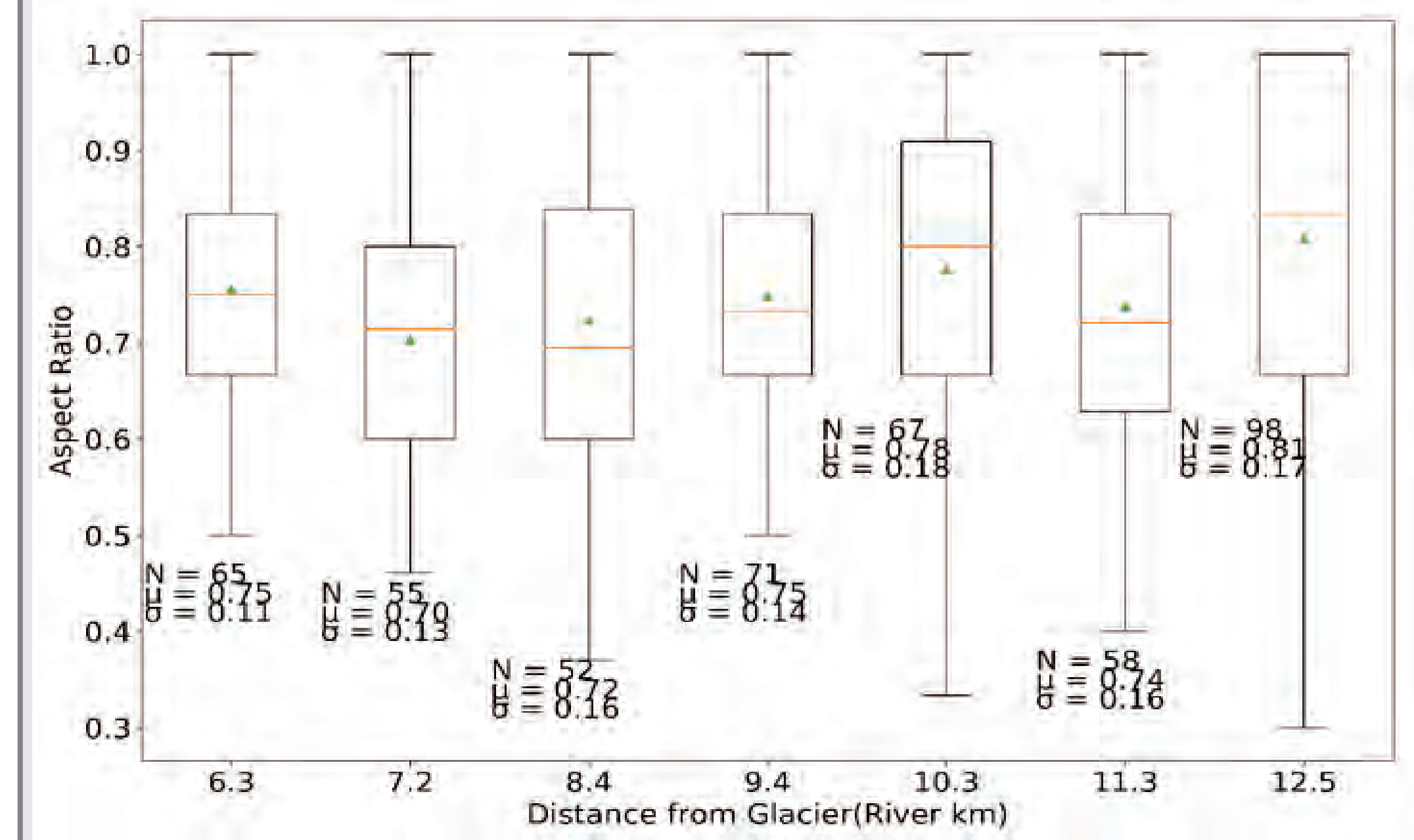


Figure 8: Aspect Ratio calculated at first 7 stops from cobble count data.

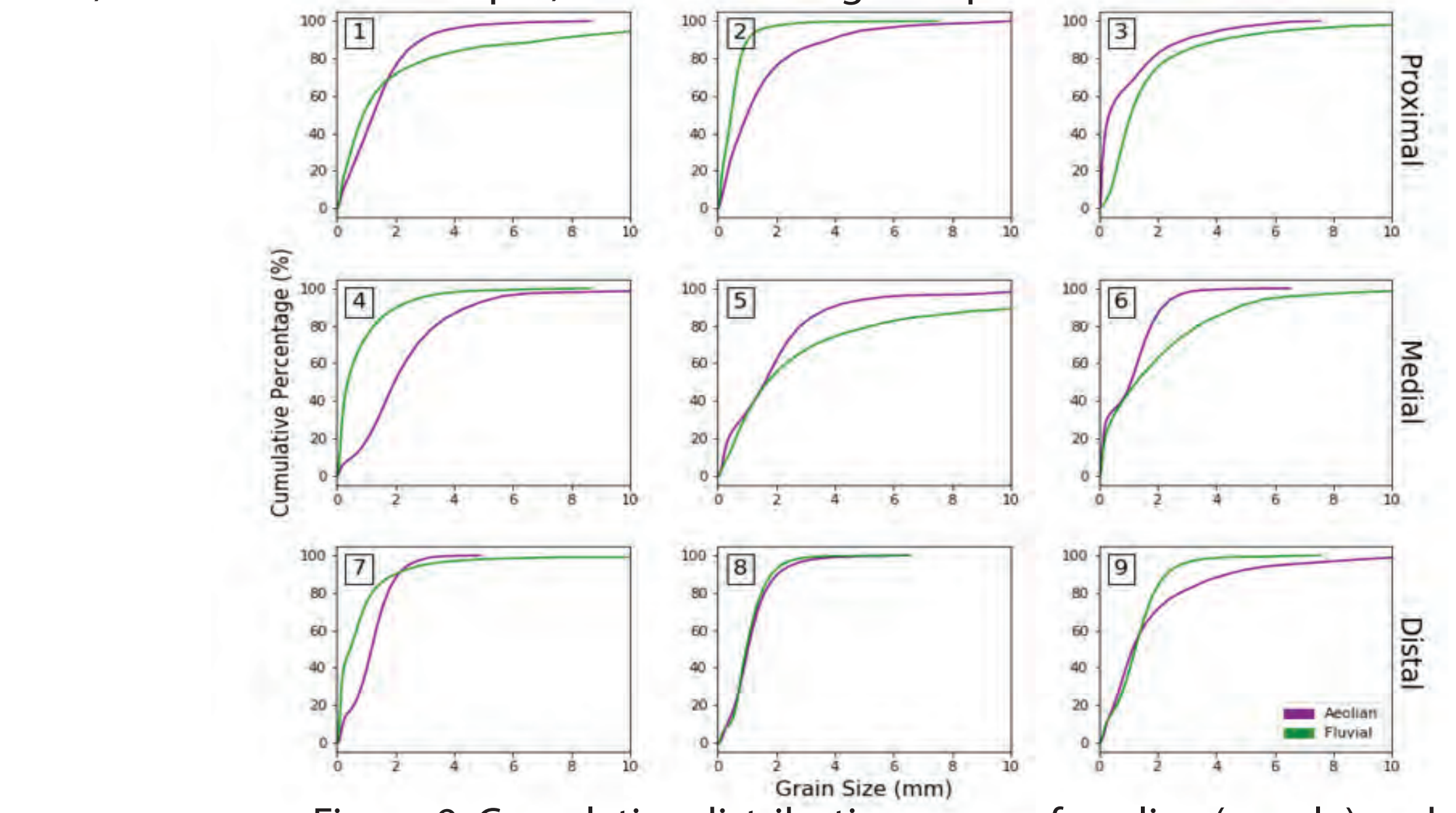


Figure 9: Cumulative distribution curve of aeolian (purple) and fluvial (green) grain sizes from proximal to distal.

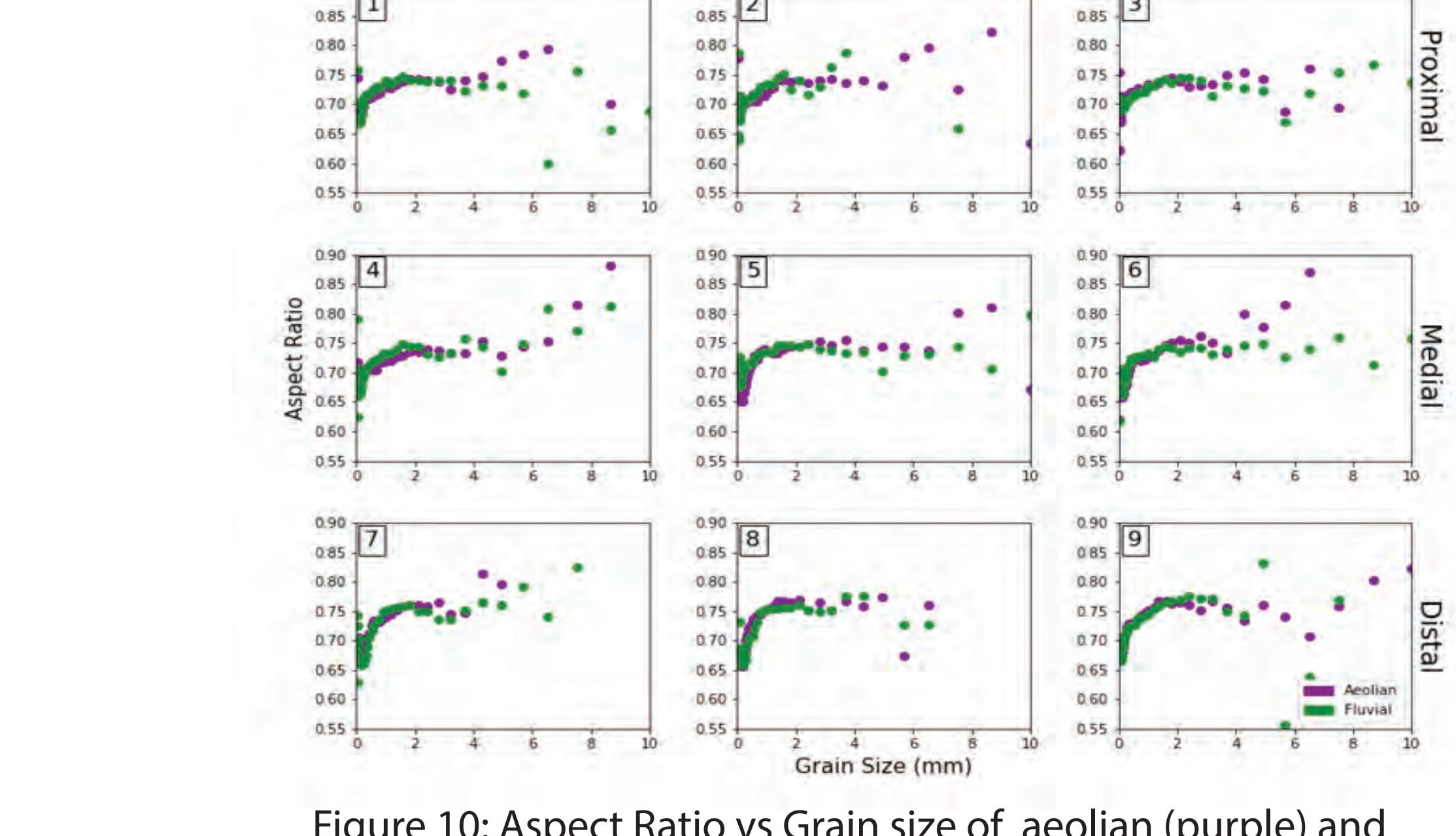


Figure 10: Aspect Ratio vs Grain size of aeolian (purple) and fluvial (green) grain sizes from proximal to distal.

KEY POINTS

- Geomorphic map shows the major contributions to the source area.
- A decrease in grainsize and an increase in the aspect ratio occurs along an 8km source-proximal-to-source-distal fluvial transect for grain sizes above 2mm.
- No significant differences in grainsize variation exists between bulk aeolian and fluvial sediment samples.
- Trends in aspect ratio for smaller grains are consistent with the tendency for smaller grains and larger grains to be less rounded.
- Lack of variation in samples may be due to sampling bias, length of transect and fluvial and wind transport capacity.