Landforms, which shape reassembles fans and cones, are common elements in many mountain areas in all climatic environments. These depositional landforms develop at the mouth of small tributary catchments where there is a distinct transition from relatively steep mountain sides to less steep areas (e.g. valley, plains, basins). Different processes are responsible for construction of fans and cones, including whole range from gravitational mass movements to fluvial transport and deposition. Fans dominated by normal fluvial processes (channelized flows, sheet-flows) are often called fluvial or alluvial fans. They are typically larger and characterized by lower gradient than other fans. Fans dominated by gravitational mass movements are smaller and steeper and are often called colluvial fans or debris-flow fans. Very steep fans produced by weathering and rock falls are named talus cones.

In this project we will focus mostly on geomorphological aspects. Thus, we use the term "fan" in a broad sense to indicate the landform with characteristic fan-shape. The main objects of this study are therefore generally small fans (including alluvial fans, debris-flow fans, talus cones and different mixed types) which developed along the mountain sides in the Arctic and varied greatly in geomorphology and processes.

The motivations for undertaking the project are related to the fact that understanding of fan evolution in general is important for three main reasons:

1) Fans are potentially valuable archives of past environmental conditions.
2) Some of low-gradient fans are used for agriculture and/or human settlement in mountain areas. Fan-related processes (e.g. sudden debris-flow activity etc.) can cause that human life is at risk and human possession may be destroyed or damaged. This is much common in relatively densely inhabited mountain areas.
3) Fans and fan-related processes, especially in non-vegetated polar areas, offer a potentially very good analogue, which is used for studying and interpretation of extra-terrestrial landforms genesis (like fan-shaped landforms on Mars or Titan).

The most important **scientific problem** of the project is related to the reconstruction of the fans development in selected areas of Spitsbergen and Iceland as an example of the landscape response to climate changes and glaciers' recession. The project is based on an assumption about differences in relief development processes in the Arctic in relation to local topographical, geological and climatic conditions. To understand fan evolution and its response to climate change it is necessary to answer to the following **questions**:

1) How divers is surface morphology of fans?
2) Which processes are responsible for the development of fan morphology?
3) How dynamics are fan systems in varied spatial and temporal scales?
4) What controls spatial distribution of different types of fans and dominant relief-creating processes?
5) To what extent does the surface morphology of the Arctic fans reflect the primary processes of fan formation? How rapidly can secondary processes mask the primary depositional processes?

Proposed research represents a multidisciplinary approach linking geomorphological observations of modern slope environments in the high- and low-Arctic settings with repetitive topographic surveys, remote sensing (traditional and an unmanned aerial vehicle (UAV) based) and GIS analysis.

The fundamental objective of the project (i.e. to investigate the diversity of modern landform and processes) is the realisation of the research principle that present-day observations are the key to the past as well as to the interpretation of remote areas. In the context of slope research it means that processes, sediments and landforms of modern environment are the basis for interpretation of the past events and extra-terrestrial landforms as well.

Implementation of the project will identify the contemporary fan activity and its evolution in the Arctic at different spatial and temporal scales based on examples from Svalbard and Iceland. Thus, the realization of the project will contribute to the increase of the knowledge about fan evolution due to qualitative and quantitative understanding of how fans are built over time, and how their surface morphology and deposits can be altered by post-depositional processes. The use of this knowledge will be important for better understanding of the long- and short-term responses of landscape to climate changes and deglaciation processes related to them. Improvement in reconstruction and models of fan development will be useful also from a socio-economic point of view, as they can be implemented for better quantification of resources threatened by mass wasting processes.