Ice sheets are important litmus paper of past and present climate changes on Earth. But they are also important factor influencing climate because ice masses store large volumes of water and cover vast parts of the world. The knowledge about their changes in time and space allows to build ice sheet models shading light on the climate fluctuations in the past.

Contemporary ice sheets on Antarctica and Greenland are accessible to monitor their dynamics using direct measurements or satellite techniques. Previous investigations provided data revealing fluctuations of their mass, limits and ice flow velocities. Ice sheet behavior is mostly determined by interactions with climate and substratum over which they lay. The bed properties (thermal conditions of the ice, sediments and water content) determine ice flow velocity. When ice and substratum are at the melting point water content in sediments increase decreasing friction and promoting bed deformation and/or basal sliding of the ice sheet over the bed. These processes and conditions are recorded in structure and texture of tills formed under ice.

Previous qualitative till studies allow to link various sedimentary features to adequate processes and conditions. However, qualitative description of these characteristics impede precise reconstructions of ice sheet dynamics. This is very important in sense of palaeo ice sheets because we have only access to their sedimentological record.

The main objective of the project is to differentiate conditions and mechanism of subglacial till formation, and ice sheet dynamics in regard to strain magnitude recorded in micro- and macroscale in tills. This project apply many methods of sediment analysis, including laboratory experiments mimicking natural subglacial conditions during till deformation beneath the ice sheet. The research focuses on quantitative approach to conditions and processes recorded in sedimentary successions. We are expecting to quantify differences between various processes of till formation and ice sheet variability in regard to sedimentological characteristics of tills. This project is related to the present interests of glacial geology regarding the recognition of depositional and deformational processes beneath contemporary and palaeo-ice sheets and their dynamics from sedimentary record. A new approach is proposed in this project with regards to the issue of subglacial processes and the differentiation of ice sheet dynamics from sedimentary record. This will shade light on till properties, and their description, interpretation and classification. It is very important in respect of paleoglaciological reconstructions and also in the reconstruction of paleoclimate variability. The project is also a significant step towards the development of quantitative analysis in the sphere of subglacial processes which is compatible in wider sense with the efforts focused on quantification of natural phenomena.