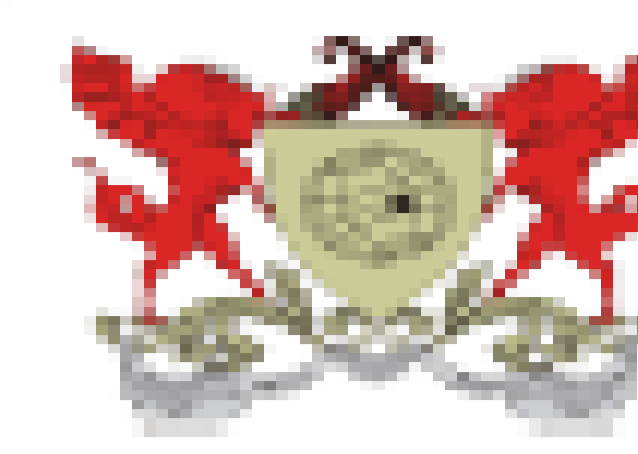




Glacial and periglacial geomorphology of Low Head promontory, King George Island, Antarctica.



Caio Vinícius Gabrig Turbay¹, Ivan Carlos Carreiro Almeida³, Raphael B. A. Fernandes³, Eduardo de Sá Mendonça² & Carlos Ernesto Schaefer³

1-Universidade Federal do Espírito Santo / Curso de Geologia, Brazil, cturbay@gmail.com ; 2- Universidade Federal do Espírito Santo / Departamento de Produção Vegetal, Brazil; 3 – Universidade Federal de Viçosa / Departamento de Solos, Brazil;

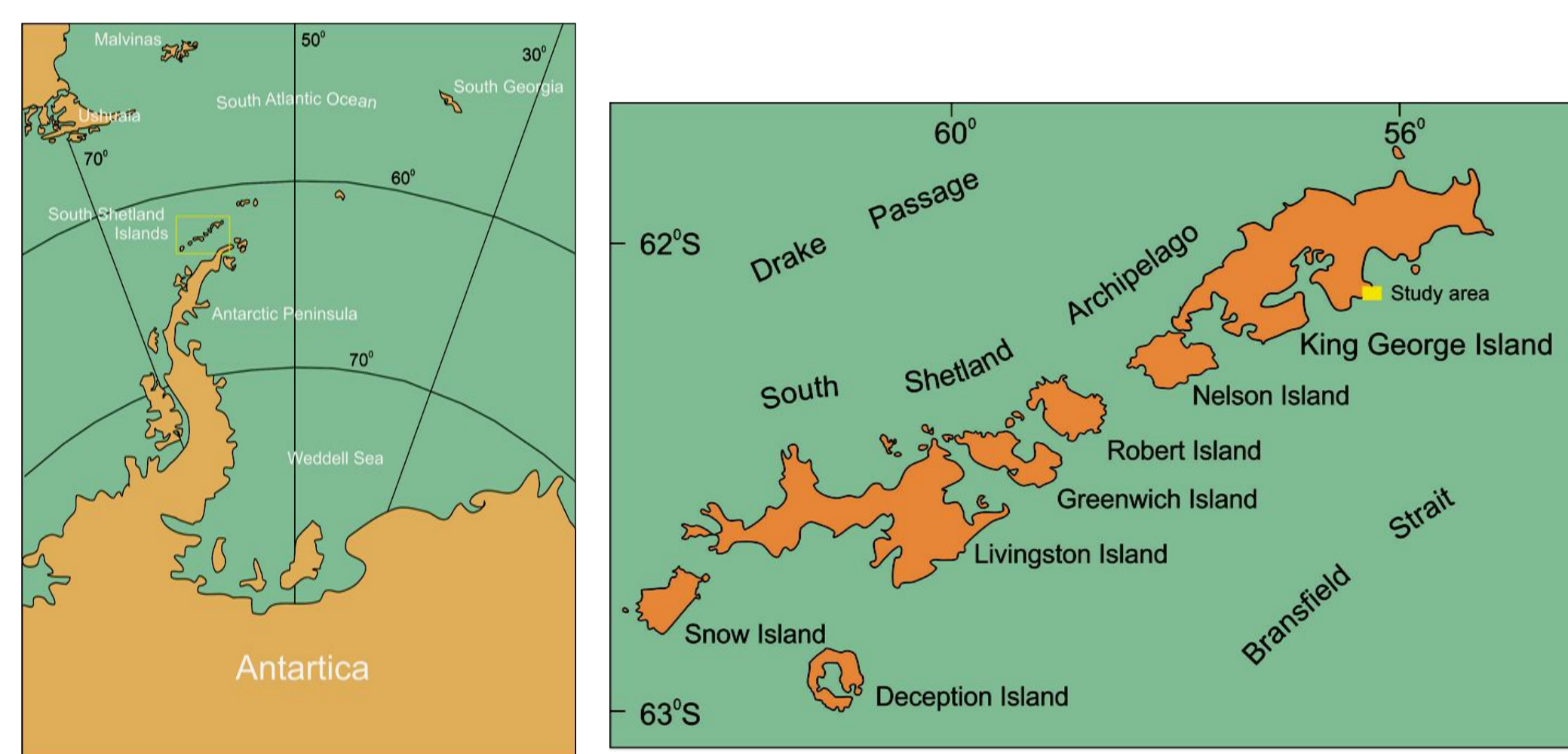
Introduction

The King George Island is located in the South Shetlands archipelago, northern portion of the Antarctic Peninsula.

Between the Oligocene and Miocene, large ice sheets developed in the islands and continent, although the most powerful glaciation developed on the end of Miocene (Birkenmajer, 2001; Martini et al, 2001).

The oceanic influence in the Shetlands is responsible for the higher humidity found in these islands compared to mainland during the summer. This condition creates an own landscape with climatic characteristics similar to those found in the tundra of the northern hemisphere. The positive temperatures in summer are responsible for the melting and retreat of glaciers and permafrost.

This work presents a brief description of the geomorphological features observed in the Low Head region during the Brazilian polar expedition in the summer of 2011.



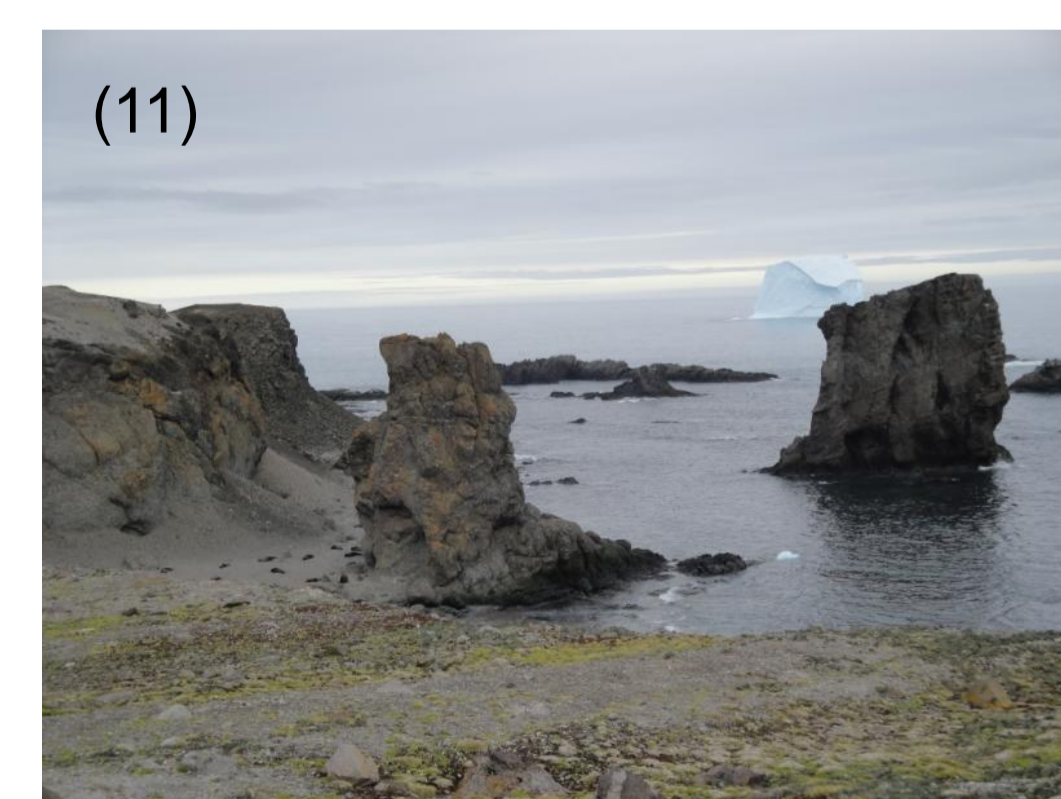
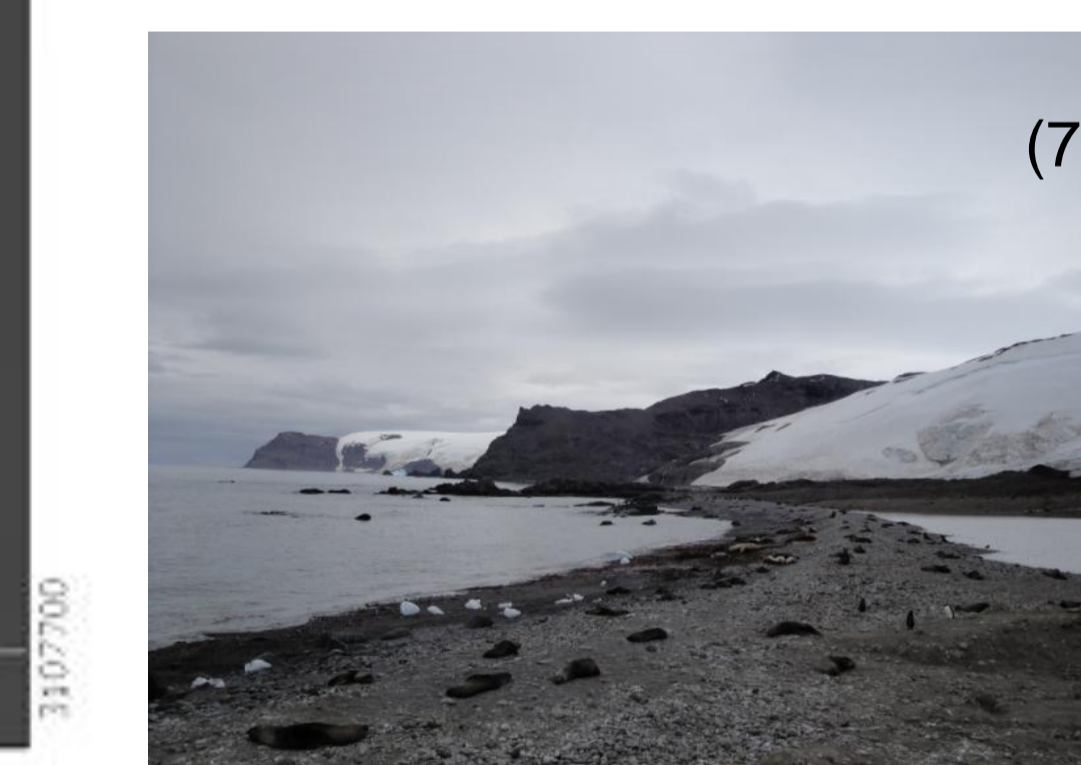
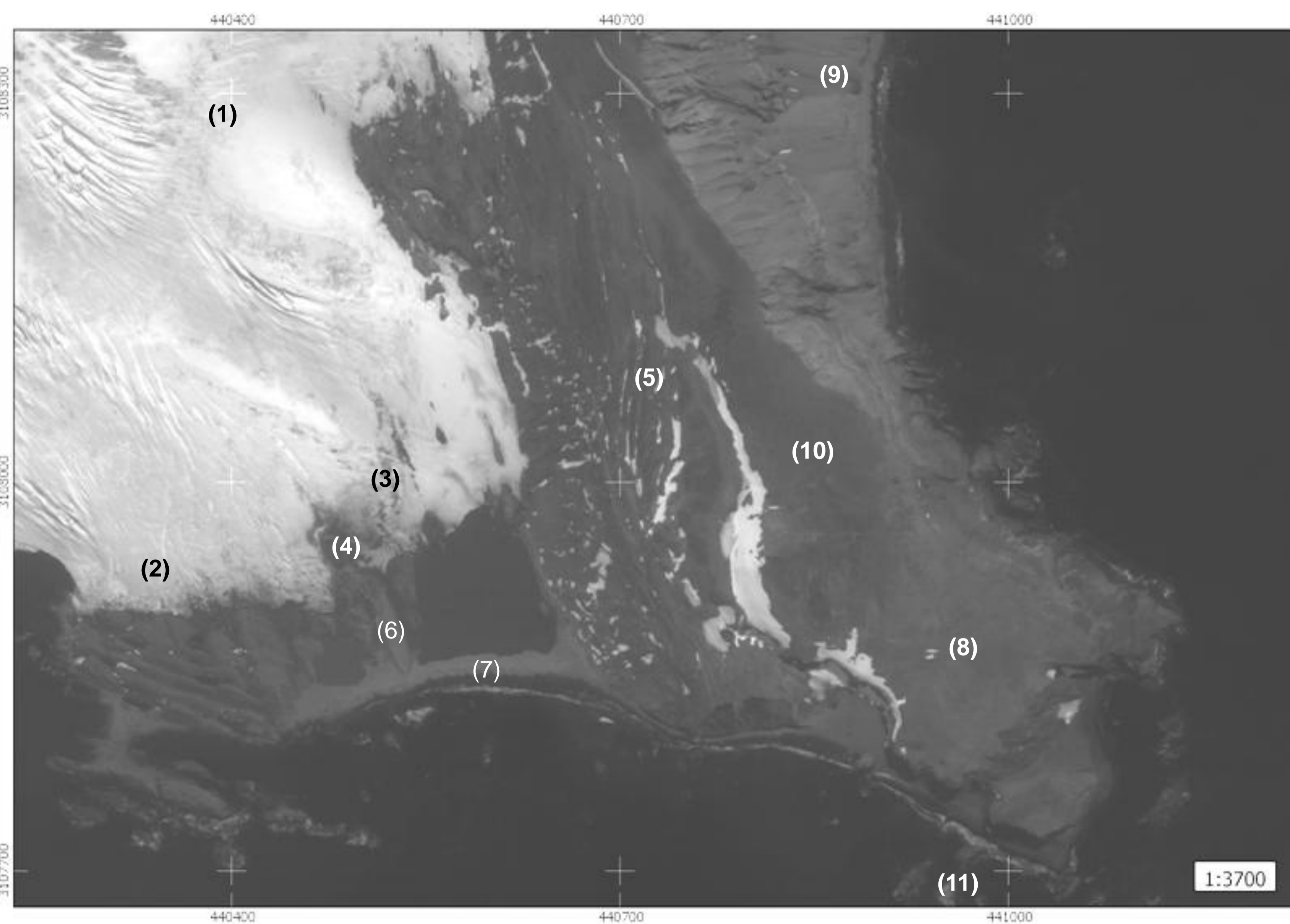
Results:

GLACIAL AND PROGLACIAL LANDFORMS:

- Peripheral portion of the Kraków Ice Field*: formed by an Icefall glacier (Wypianski Icefall), with highest portion characterized by straight crevasses, developed on a rock basement failed and staggered. The downstream portion is characterized by lunate crevasses; (1).
- Terminal portion of the Icefall*: marked by intense deformation of the ice cap, where is possible to observe folds and thrusts in slices of ice, shear zones as well as normal faults; (2), (3).
- Moraines*: with heights of four to six meters and lengths that may exceed fifty feet, are formed by till accumulation from glacier ablation. Recent lateral moraines in the east flank of the valley are uncharacterized because of the existence of normal faults, possibly reactivated by isostasy; (4).
- Sedimentary general forms*: features of sediment accumulation that appear to be related to typical englacial and proglacial deposits. Reveal geometry that reflects the action of sediment accumulation conditioned by melt of ice buildings previously described, instead of a simple ice deflation, (3).

PERIGLACIAL LANDFORMS:

- Older moraines*: are lateral moraines, forming long ridges with smooth rounded top, alternate with "U" type drainage. Toward west, a talus slope may reflect the retreat of the glacier, associated with the presence of normal faults. Often develop vegetation, permafrost and pedogenesis; (5).
- Periglacial lakes*: Are shallow lakes, with a few meters deep, located between the beach and sedimentary deposits from the front of the glacier, with contribution of melt water. The genesis of these lakes appears to be associated with depressions in the basement rock, similar to small grabens; (6).
- Beaches*: at least three beaches fringe exist in the Low Head peninsula. Are composed of dark sand and gravel, with a predominance of granules and pebbles of basalt and other locals lithologies, although may appear exotic clasts, rarely blocks, that comes from the cliffs nearby or carried by icebergs; (7).
- Low Head Plateau*: Low Head is a promontory built on subhorizontal layers of rocks from Polonez Cove and Point Boy formations (Birkenmajer, 2001). It has flat-undulating surface, covered with grass and moss, developing soils with varying characteristics and permafrost. Its limits are steep, probably derived from normal faults with subsequent marine erosion and formation of cliffs. Its southwest end is connected to a volcanic neck of columnar basalt; (8).
- Structural hills*: dominate the west region of Low Head, constituting the cliffs of Oberek and west portion of Wesele Cove. Are formed from normal faults and are subsequently reworked by marine erosion in the base or slopes; (9).
- Colluvium and talus ramps*: are formed mainly at the interface with the glacier in the eripheral regions of the ancient moraines. They are composed by angular and oblate pebbles, with low sphericity, derived from thermal fragmentation of rocks (frost-shattered clasts) from peaks located upstream; (10).
- Rocky pinacles*: remnants of the erosive action of the sea, consisting of rocks found in the region, mainly basaltic breccias from Polonez Cove Formation; (11).



Conclusions:

Geological studies on the same expedition showed strong structural control in the formation of relief features. Further studies using ground penetrating radar on the sediments and ice sheets may further elucidate this issue.

References

- BIRKENMAJER, K. 2001. Mesozoic and Cenozoic stratigraphic units in parts of the South Shetland and Northern Antarctic Peninsula. *Studia Geologica Polonica*, 118: 5-188.
- MARTINI, I.P., BROOKFIELD, M.E. & SADURA, S. 2001. *Principles of Glacial geomorphology and geology*. Prentice Hall, New Jersey, 381p

