O.M.D.Ś.M.m.W.S.O.A!

Brief report on field and laboratory work in 2011
University of Silesia, Poland

SvalGlac
ESF Project

Cooperation with
Institute of Geophysics, PAS, Warszawa, Poland
Technical University of Madrid, Spain
Arctic Centre, University of Lapland, Rovaniemi, Finland
University of Colorado, Boulder, USA
Institute of Oceanology, PAS, Sopot, Poland *[AWAKE]*

. Field campaign - spring 2011

Hansbreen, Werenskioldbreen, Amundsenisen, Paierlbreen, Recherchebreen

2. Field campaign - summer 2011 / the first part

The Werenskioldbreen forefield

3. Field campaign – late summer 2011 / the second part

Hansbreen, Paierlbreen, Samarinbreen, Werenskioldbreen

4. Remote sensing studies of S Spitsbergen Glaciers

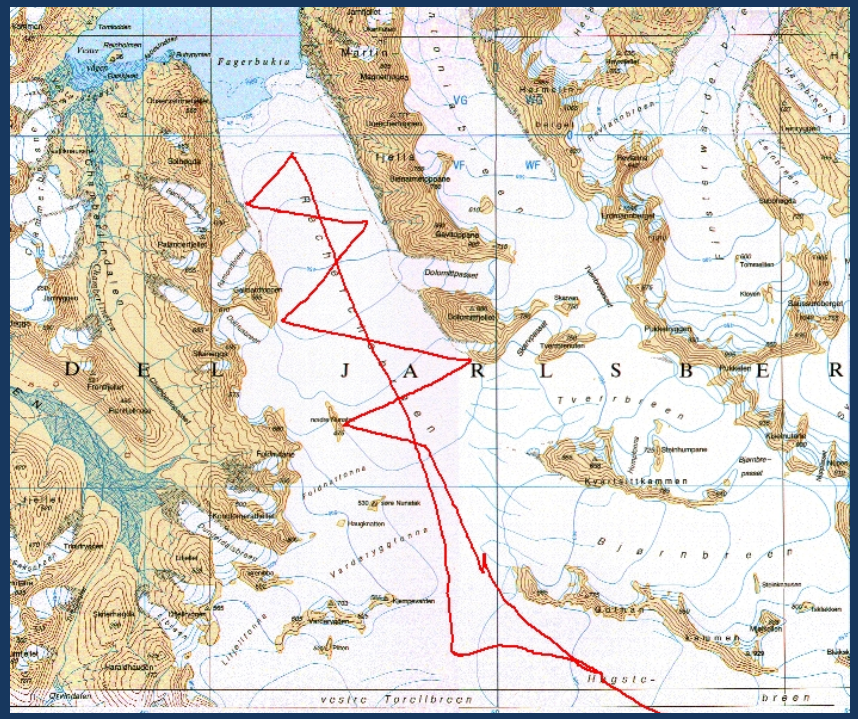
Photo by J.A. Jania

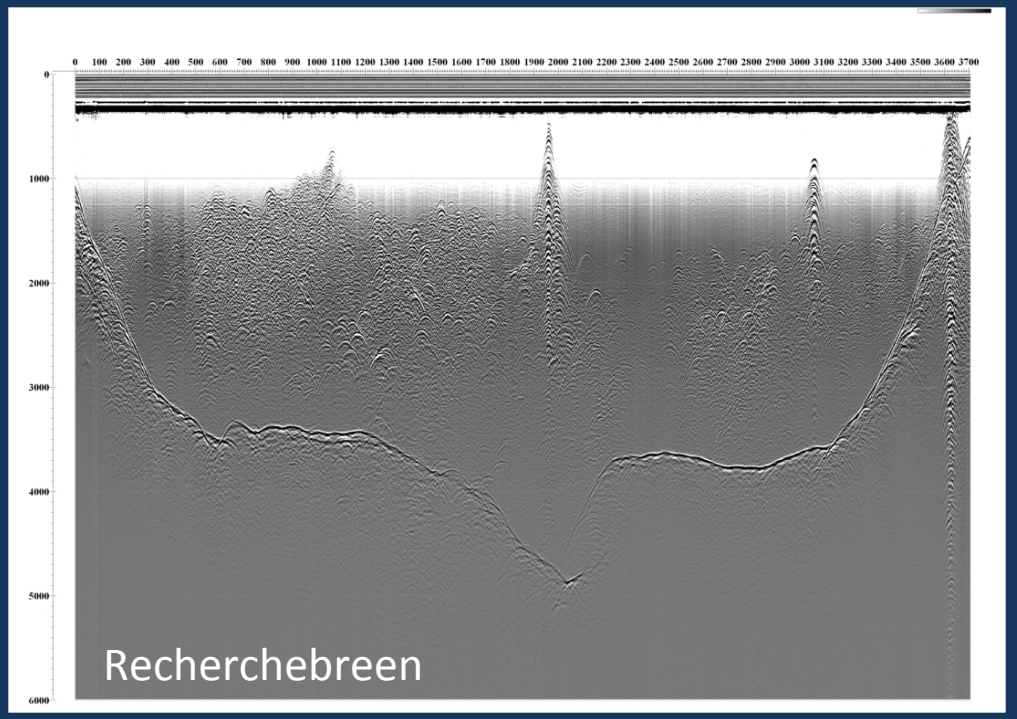
1b)

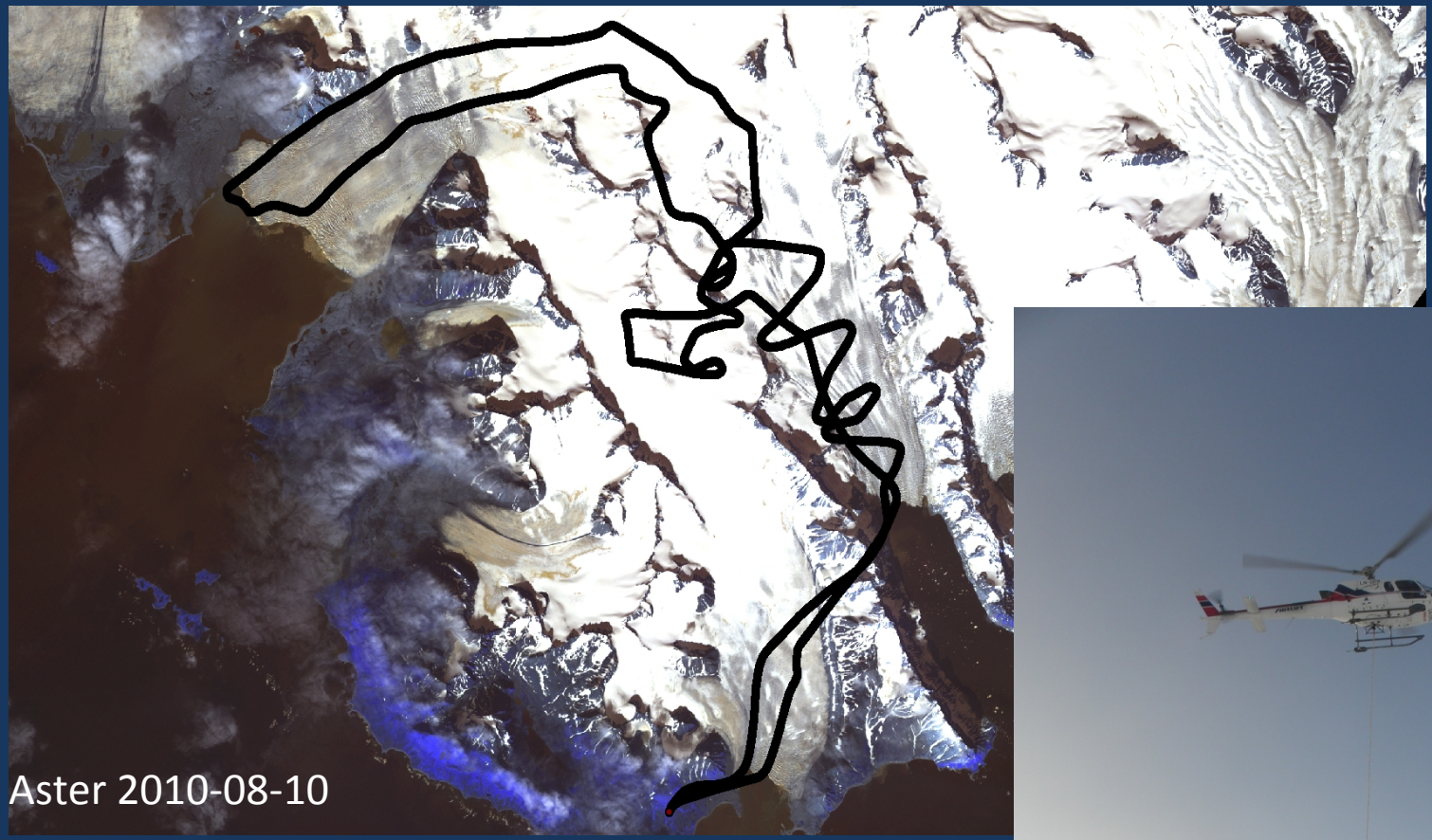
Echo-soundings campaigns: Field campaign at spring 2011 on the Wedel Jarlsber Land has included GPR measurements from land on Hansbreen, Amundsenisen and Recherchebreen.



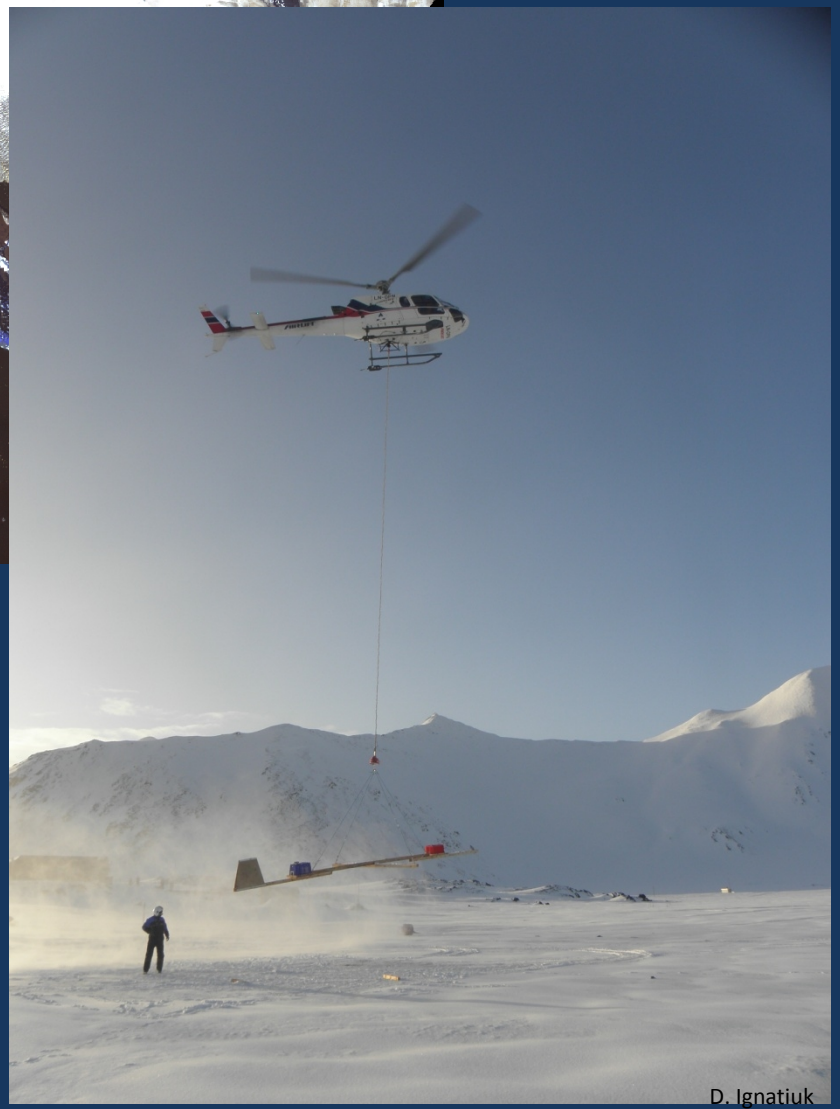
D. Ignatiuk





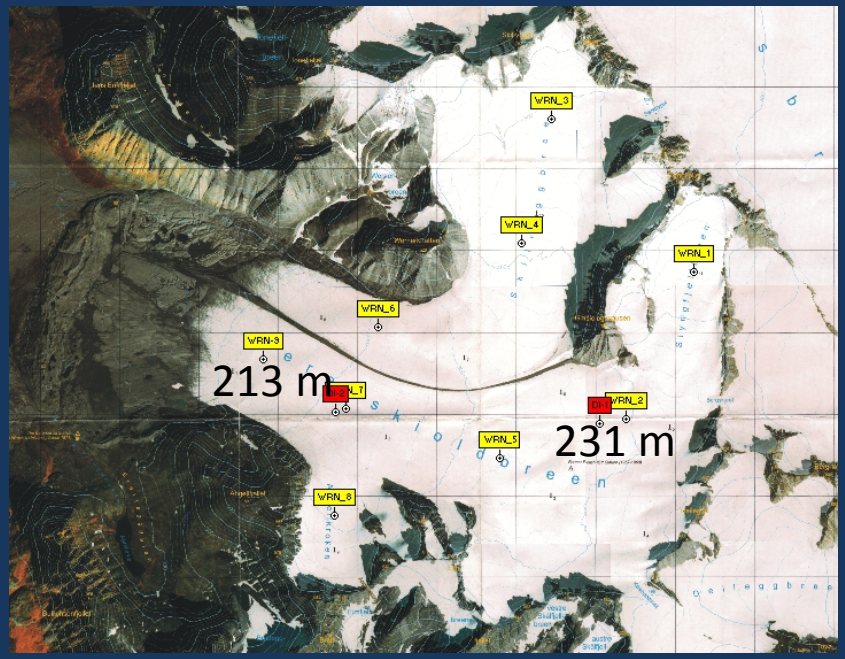


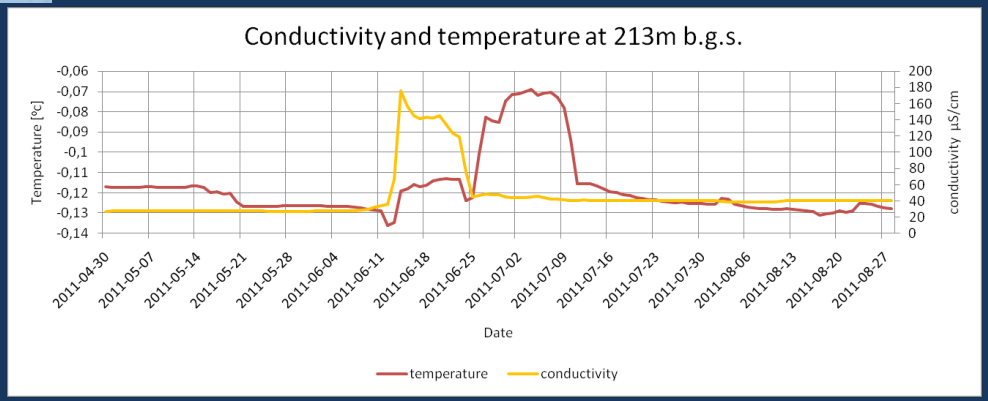
1b)
Additional radar soundings from helicopter had been performed. Paierlbreen, austreTorellbreen and terminal part of Hansbreen were objects of these studies (leading partner – Technical University of Madrid - Francisco Navarro, Evgeny Vasilenko).

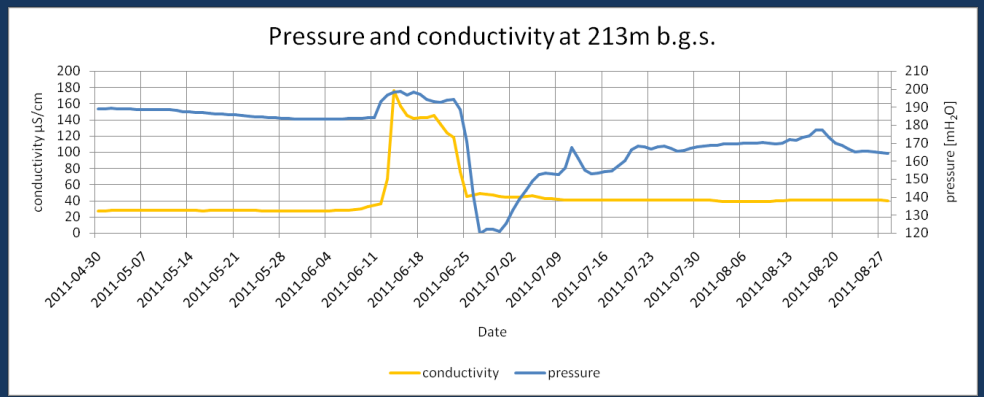



E. Majchrowska

1c)
New subglacial water pressure sensors have been installed on Werenskioldbreen.
(cooperation with the project granted by the Ministry of Science and Higher Education , Poland)





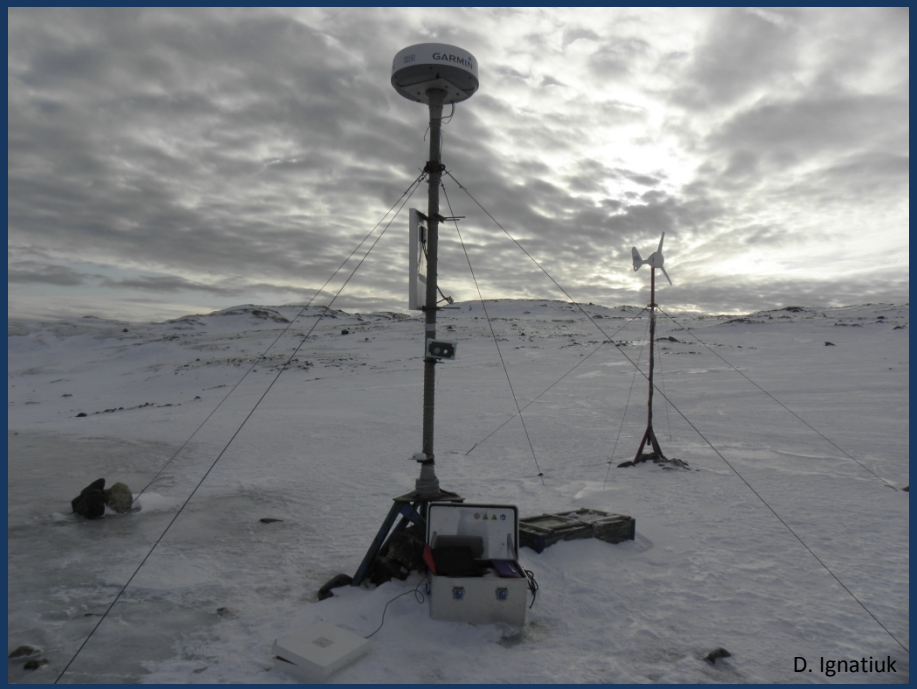


1d)
Shallow snow/firn corings for mass balance calculation were obtained on Paierlbreen, Hansbreen, Werenskioldbreen and Ariebreen.
1e)
Acquisition of data for energy balance and renovation of AWS on Hansbreen and Werenskioldbreen has been made.


E. Majchrowska


D. Ignatiuk


D. Ignatiuk



D. Ignatiuk

1f)

Already running programs of in situ mass balance measurements and calving processes have been continued. Ablation stakes network on glaciers has maintained the same as time-laps cameras on Hansbreen. Ablation stakes in frontal part of Hansbreen have been measured in September 2010 and May 2011. Station for monitoring of glacier cliff was repaired and works properly.

1g)

Study of processes responsible for calving intensity included maintained of working AWS network, permanent GPS station on Hansbreen and station for glacier cliff monitoring. Fluctuations of Svalbard'scalving glaciers have been worked out the same as velocity of terminal part of selected tidewater glaciers (on base of ASTER, Landsat, QuickBird, WorldView). Measurements of mass balance and calving processes in new area of Paierlbreen were begun. Ablation stakes and time laps camera have been installed (cooperation with Martina Schafer, Arctic Centre – University of Lapland)


D. Ignatiuk

2. Field campaign - summer 2011 / the first part

The Werenskioldbreen forefield

July 16th – August 20th 2011



Participants:

- **Joanna Szafraniec (University of Silesia);**
- **Jarosław Hałat (University of Silesia).**
- **Michał Ciepły (AWAKE Project, University of Silesia; field assistant)**

Field base:

Stanisław Baranowski Polar Station, University of Wrocław

Fieldwork:

Temporal and spatial variability of the outflow from the Werenskioldbreen basin:
- channel morphometry and the water flow velocity measurements (hydrometric current meter) in the Werenskioldbreen supraglacial streams;
- the water flow velocity measurements in proglacial rivers within the internal marginal zone;
- channel morphometry changes in the Lodowcowa River profile and the water flow velocity measurements (2 times per day: at 8.00-9.00 a.m. and 6.00-7.00 p.m.)

Transport of the suspended and bedload matter in the Lodowcowa River



Measurements on Werenskioldbreen

The Lodowcowa River profile

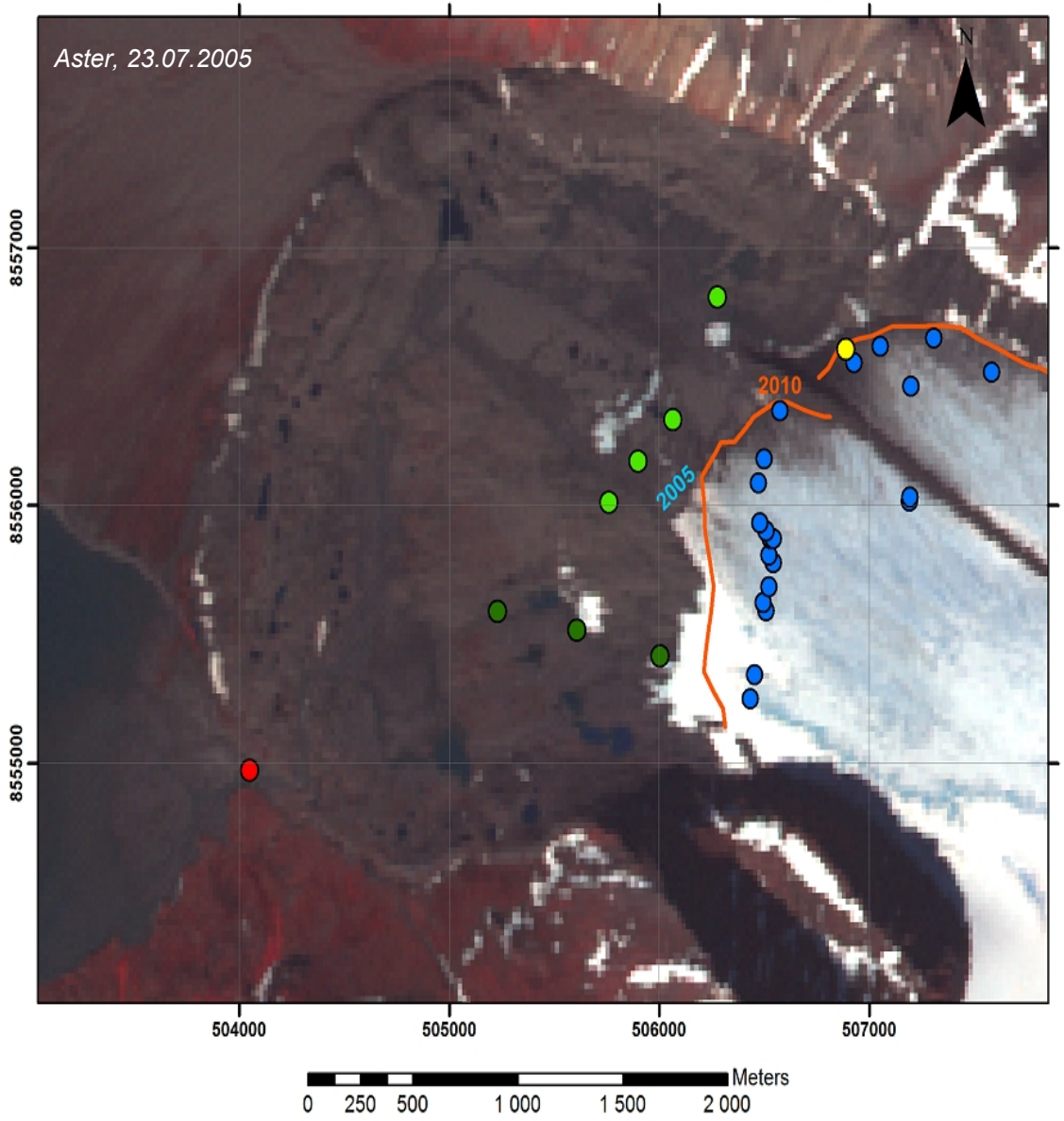




Bedload trap constructed by K. Sendobry



Werenskioldbreen and its marginal zone



Points of measurements:

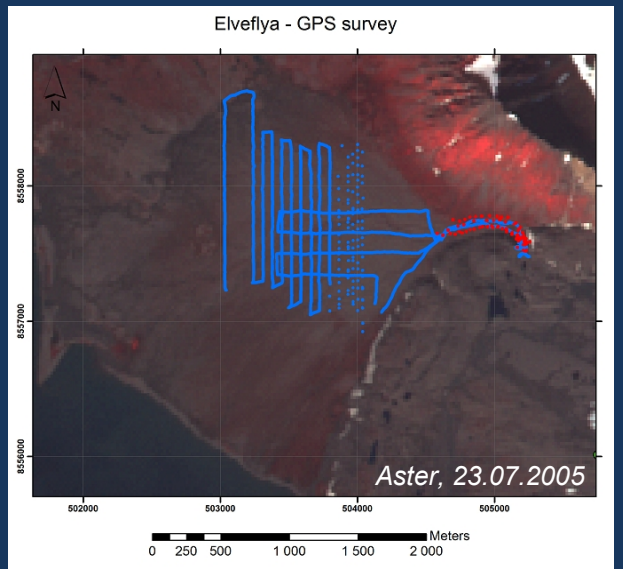
- supraglacial streams
- Kvisla
- proglacial streams
- measurements with the distance from the glacier front
- the Lodowcowa River profile

Fieldwork:

Morphometry of Elveflya – an extramarginal outwash fan at the Werenskioldbreen forefield:
GPS survey (Leica) – the Kvisla gorge and the Elveflya „rooted" zone



The Werenskioldbreen marginal zone – view from Jens Erikfjellet





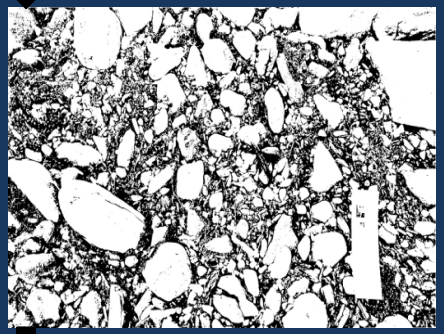
The Kvisla gorge

Fieldwork:

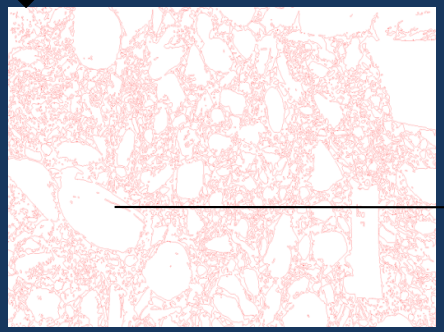
Measurements of the Elveflya sediments grains parameters – spatial differentation



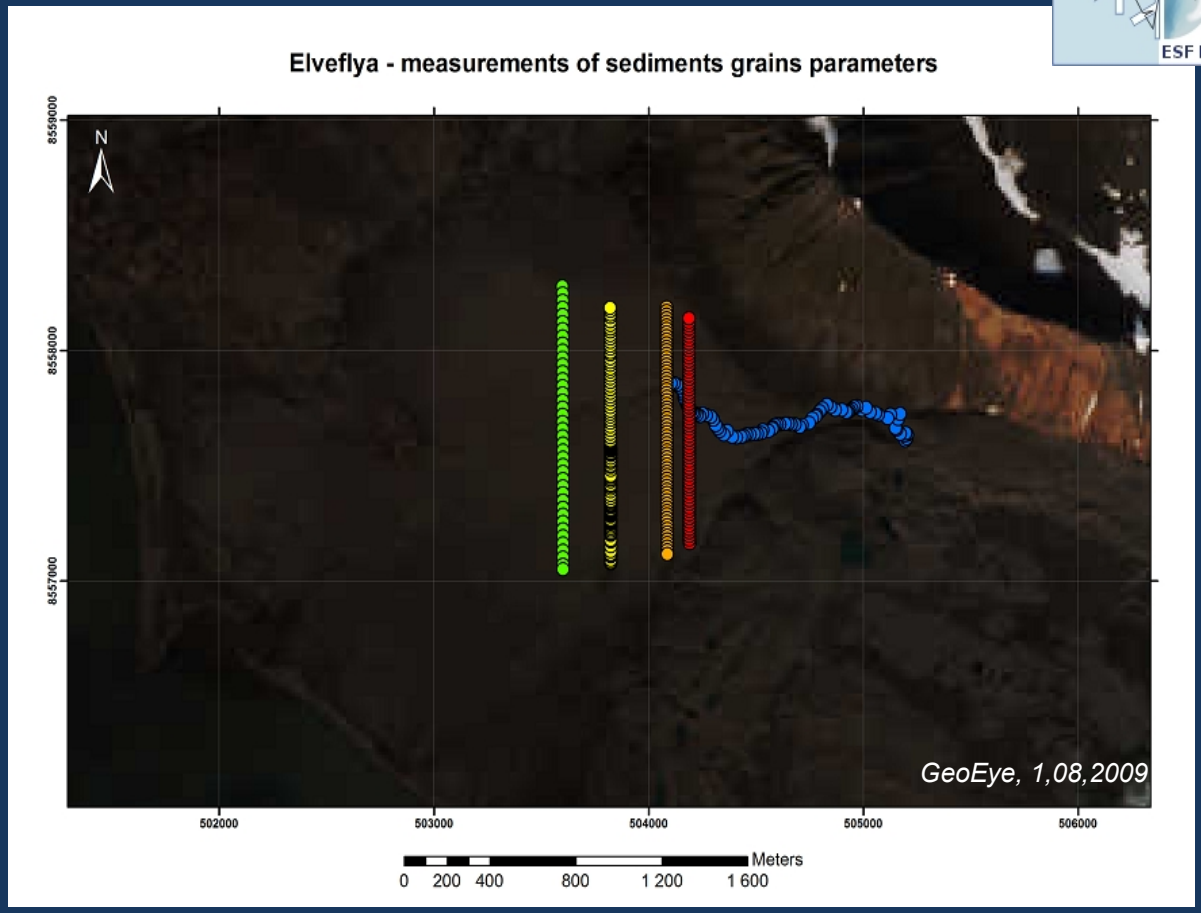
photo



processing filters (Didger 4)



vectorize image (Didger 4)



Polygon Item Properties	
Layer	Layer - 1
Visible	True
Length	0.526165
Area	0.018566
Point Count	23

parameters calculations (Didger 4)



3. Field campaign – late summer 2011 / the second part

21 August – 9 September 2011

Hansbreen, Paierlbreen, Samarinbreen, Werenskioldbreen

Participants:

Jacek Jania (University of Silesia)

Jarek Hałat , Marcin Tukalski , until 26 August (University of Silesia)

Etan Z. Welty (University of Colorado, Boulder)

Agnieszka Piechota (University of Silesia)

Darek Ignatiuk (University of Silesia)



Resurvey of the Samarinbreen front position by terrestrial digital photgrammetry

Sea depth sounding at the glacier front forefield
Waldek Walczowski (Institute of Oceanology, PAS)

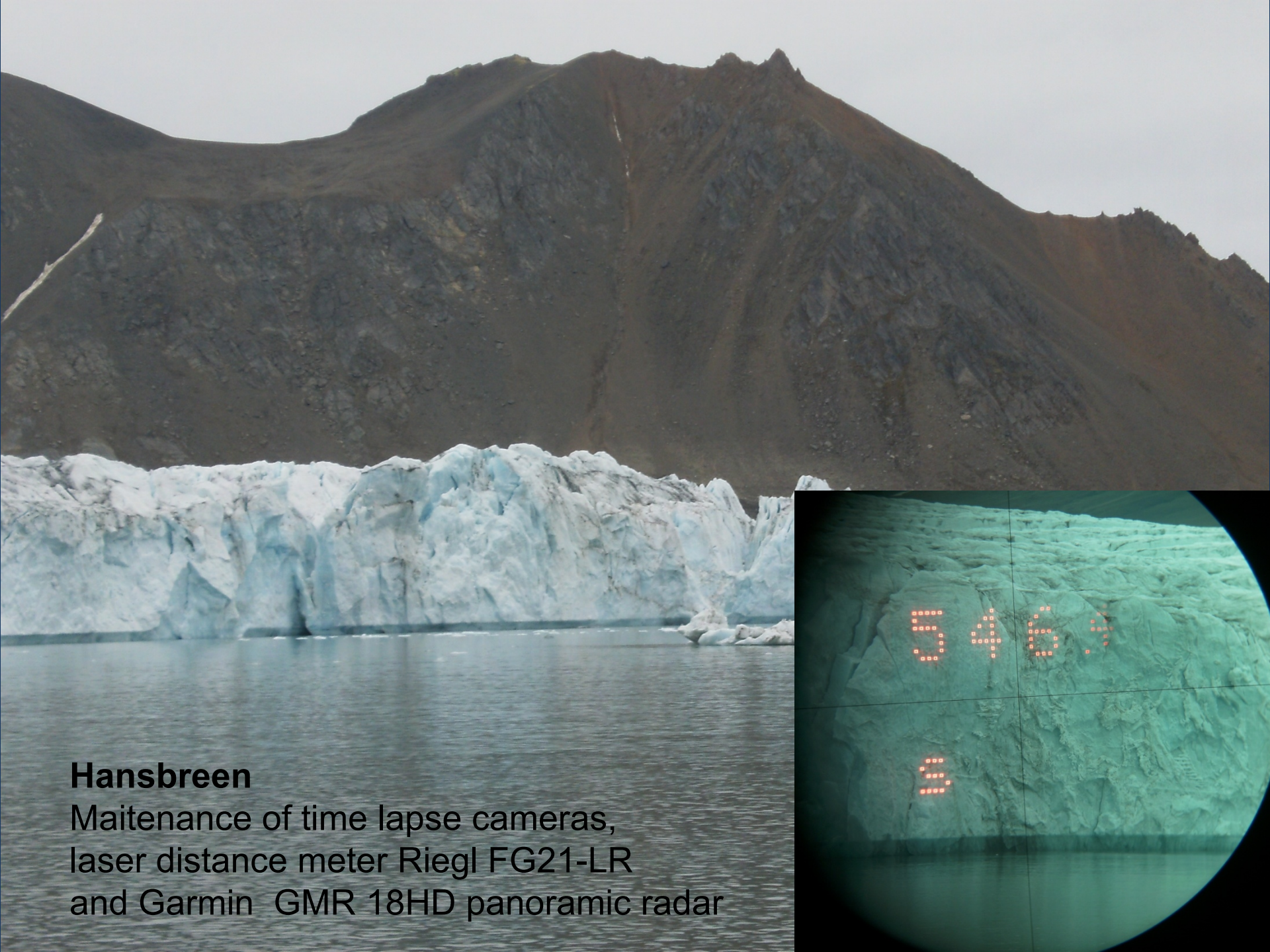
Paierlbreen
Maitenance of time lapse camera
Canon 1000D established in April 2011

Mounting of the second time lapse
Camera Canon 1000D (8 September)
(for stereoscopic pictures)



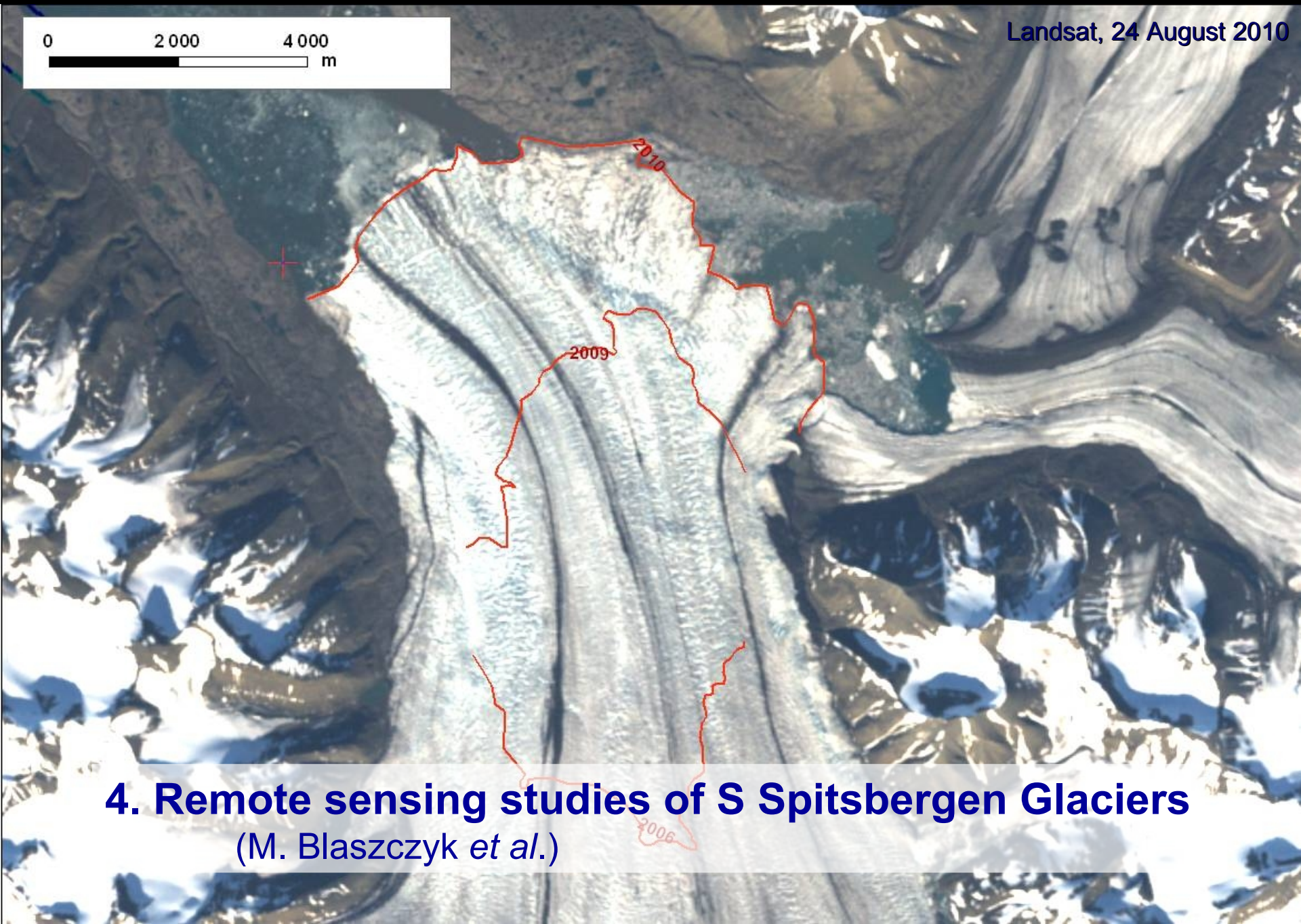






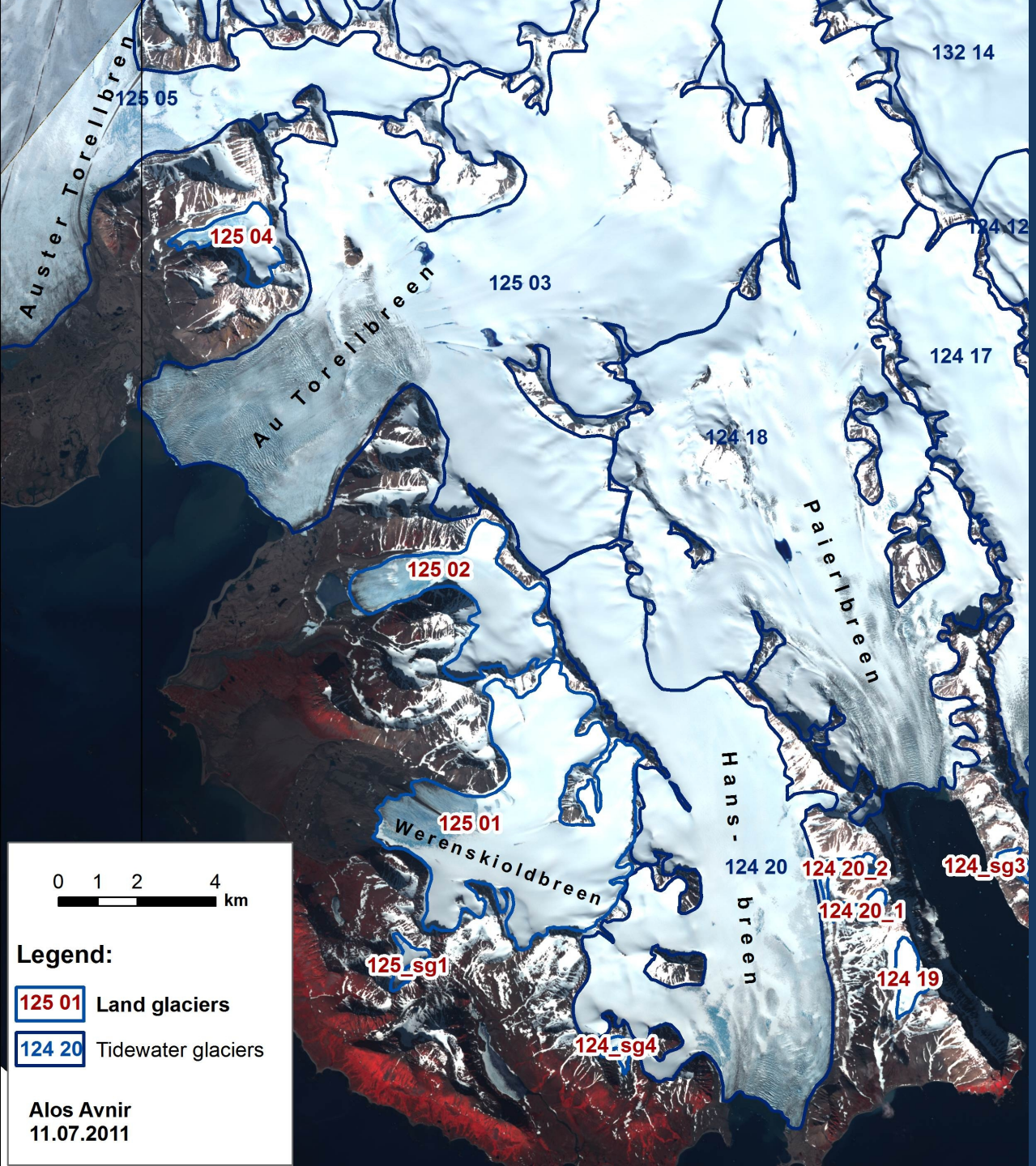
Hansbreen
Maitenance of time lapse cameras,
laser distance meter Riegl FG21-LR
and Garmin GMR 18HD panoramic radar

Nathorstbreen & Zawadzkibreen, Dobrowolskibreen *(Van Keulenfjorden)*



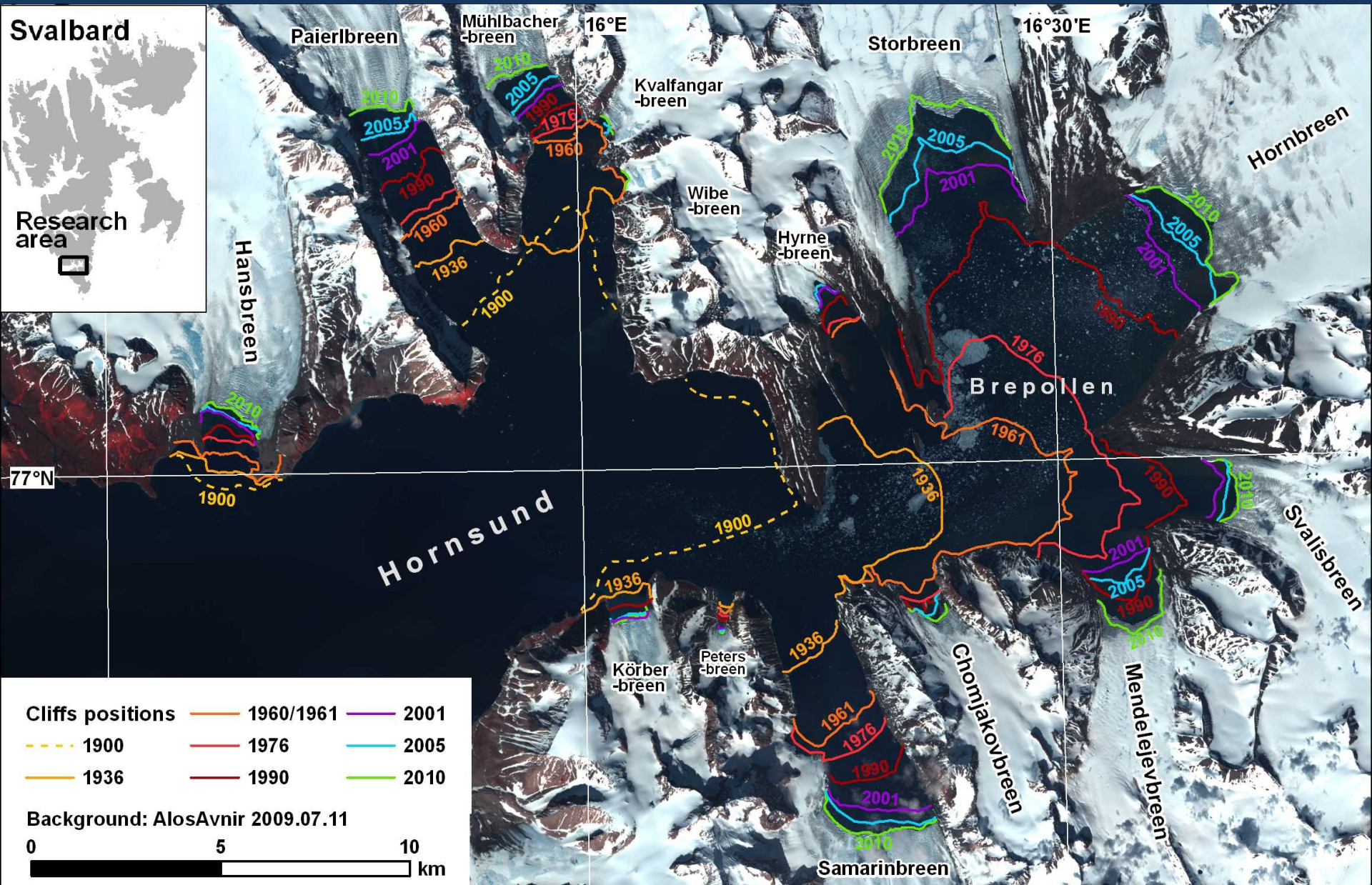
4. Remote sensing studies of S Spitsbergen Glaciers

(M. Blaszczyk *et al.*)



Updating of South Spitsbergen glaciers inventory on the base of new satellite images and DEM with better resolution and heigth quality – in progress.

Fluctuation of Hornsund glaciers: 1900 - 2010



Rate of diminishing of the total area of tidewater glaciers terminating into Hornsund Fjord between 1900-2010

	1900-1936	1936-1960/61	1960/61-1976	1976-1990	1990-2001	2001-2005	2005-2010	Average
Retreat rate [km^2a^{-1}]	0.8	1.6	1.5	2.4	2.1	2.6	3.2	1.6

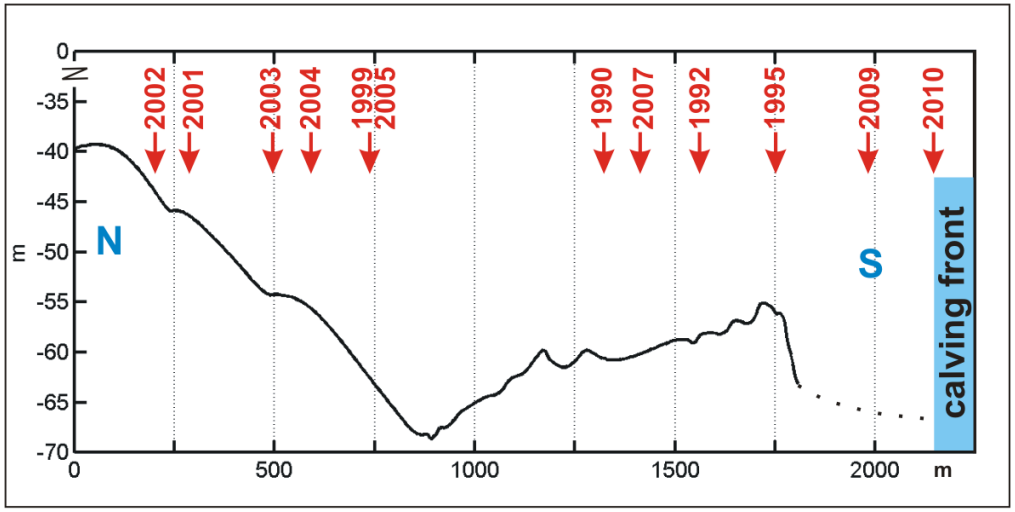
The total area of glacier cover diminishing in Hornsund Fjord amounts to about 171 km^2 with an average retreat rate of 1,6 km^2a^{-1}. Recession rate increased from c. 1 km^2a^{-1} in the first part of the 20th century up to c. 3 km^2a^{-1} in the first decade of the 21th century.

Paierlbreen



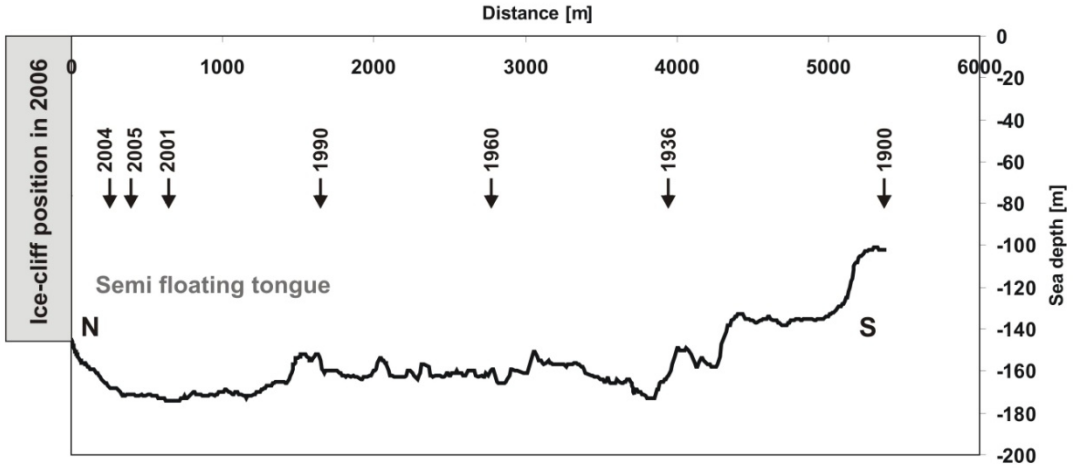
Analysis of last surges of Paierlbreen and Mendelejevebreen have been made for future estimation of long term geodetic mass balance in recent past

Mendelejevbreen



Sund et al., 2011, in publish

Paierlbreen



Surge type depending on water depth:

Mendelejevbreen, surge ~ 1995-2000

Paierlbreen,

surge ~1995-2000

New estimation of calving flux from Southern Spitsbergen glaciers

Hl – glacier thickness at the cliff – **100 m**

X – front retreat - **measured for each glacier**

Velicity of fast flowing glaciers – **250 m/year**

	Updated estimation 2006-2010	**Previous estimation 2000-2006**
Hornsund:	**0.9 km^3a^{-1} (w.eq.)**	**0.37 km^3a^{-1} (w.eq.)**
S Spitsbergen:	**1.2 km^3a^{-1} (w.eq.)**	**0.9 km^3a^{-1} (w.eq.)**

Calving flux from the whole Svalbard

2000-2006	2006-2010
Average retreat of tidewater glaciers	
~ 30 m a^{-1}	~45 m a^{-1}
Mass loss due to calving*	
6.75 ±1.7 Gt a^{-1}	c. 8.0 ±2 Gt a^{-1} (w.e.)
	(without effects of surge events)

* an average thickness of glaciers at the calving front has been estimated as 100 m

Photo by Piotr Glowacki

In situ mass balance measurements and calving processes have been continued. Ablation stakes in frontal part of Hansbreen have been measured in September 2010 and May 2011. They correspond to time-laps cameras on Hansbreen and radar mesurements near the glacier cliff

