The Polar CLIMATE **SvalGlac** Project
Sensitivity of Svalbard Glaciers to Climate Change
Scientific Steering Committee Meeting
at the University of Oslo
30 October 2011: 9.00-12.30 AM

Minutes

1. Welcome

The SC Meeting was chaired by **Jacek Jania** – Coordinator who welcomed everyone to the meeting and asked for round table presentation of participants:
Jacek Jania, **Poland** (PI) – Coordinator, Joanna Szafraniec – Coordination Office Scientific Secretary, Piotr Głowacki – Research Team Leader, Małgorzata Błaszczyk, Dariusz Ignatiuk, Dariusz Puczko;
Francisco Navarro, **Spain** (PI) – Co-Coordinator, Alba Martin;
Daniela Mansutti **Italy** (PI);
Marco Möller, **Germany** (representant of PI) – Project Researcher;
Martina Schäfer, **Finland** (representant of PI) – Project Resercher;
Veijo Pohjola, **Sweden** (PI), Rickard Pettersson;
Friedrich Obleitner, **Austria** (PI), Florian Karner - Project Researcher;
Rein Vaikmäe, **Estonia** (PI), Tõnu Martma – Project Researcher;
Jon Ove Hagen, **Norway** – Associated Partner, Jack Kohler;
Carleen Tijm-Reijmer, **the Netherlands** – Associated Partner.

2. Adoption of the agenda

Proposed agenda (see Portfolio) and the aim of the meeting were presented and accepted by Members of the Steering Committee.

3. National reports on project progress: field and laboratory work in 2011, budget execution

Report of activities of SPANISH (& RUSSIAN) national team:

- Members: Rodríguez-Cielos Ricardo, Corcuera María Isabel, Cuadrado María Luisa, Lapazaran Javier, Machío Francisco, Martín-Español Alba, Navarro Francisco, Otero Jaime, Vasilenko Evgeny (Russia);
- Main activities of the team:
  - Fieldwork: Barentsburg-based GPR campaign, spring 2010, together with Russian team (Machío, Macheret, Lavrentiev). Hornsund-based GPR campaign, spring 2011 (Navarro, Vasilenko), together with Polish (Grabiec, Puczko, Ignatiuk) and Finish (Schäfer) teams. Nearly all data processed;
  - Modelling: Modelling of Hansbreen dynamics (Spain/Poland-field data), modelling of Amundsenisen thermo-mechanics (Spain/Italy);
  - Inventory of Svalbard radio-echo sounded glaciers: Aimed at ice volume estimates;
  - Design, development and testing of new GPR system VIRL7. Team involved:

Vasilenko, Machío, Navarro, Frolovskiy, Lapazaran. **Paper**: E. Vasilenko, F. Machío, J. Lapazaran, F. Navarro & K. Frolovskiy, 2011: *A compact and lightweight multipurpose ground-penetrating radar for glaciological applications*. J. Glaciol., 57 (206);

- Budget status:
  - Summary: Granted 98 k€, spent 40 k€, remaining 58 k€;
  - Initial budget: 98 k€; 1-year post-doc contract: 35 k€, equipment: GPR equipment-12 k€; snow scooter-9 k€, consumables-fieldwork (3 campaigns): 12 k€, travel & per diem (3 campaigns, symposia, meetings): 21 k€, other: contrib. to helicopter costs-6 k€; pub. page charges-3 k€;
  - Spent: 40 k€ (fieldwork, heli. costs, consum., symp., meetings);
  - Remaining: 58 k€; 1-year post-doc contract: 35 k€, GPR equipment: 12 k€, fieldwork (1 campaign), heli. costs, symp. & meetings: 11 k€;
  - Main deviation: discarded the purchase of snow scooter (instead: metal sledge, VIRL7 remote control & other complem. equipment, heli. costs).

- Published & planned papers to the end of the project – see the report on the website (http://svalglac.eu/SvalGlac-SpanishNatTeamActivRep.pdf).

Report of activities of the Netherlands:

In cooperation with Swedish team – Lomonosovfonna: GPS velocity, maintained the AWS, snow surface model, mass balance model (PhD student). Details in the report on the website (http://svalglac.eu/Fieldwork_2011.pdf).

Report of activities of GERMAN team:

- Field campaigns May and August 2011:
  - May 9 – May 29: 4 persons (Christoph, Dieter, Marco, Roman), base at Norwegian camp, maintenance of AWS (Vestfonna, De Geerfonna), measuring stake network, digging of snow pits;
  - July 27 – August 11: 3 persons (Fabien, Marco, Roman), base at "MS Farm", maintenance of AWS (Vestfonna, De Geerfonna), measuring stake network.
- Scientific achievments in 2011:
  - Climatic mass-balance model for Vestfonna:
    Möller, M., R. Finkelnburg, M. Braun, R. Hock, U. Jonsell, V.A. Pohjola, D. Scherer & C.
    Schneider (2011), Climatic mass balance of the ice cap Vestfonna, Svalbard: A spatially distributed assessment using ERA-Interim and MODIS data, J. Geophys. Res., 116, F03009, doi:10.1029/2010JF001905;
  - Weather type classification for Svalbard:
    Käsmacher, O. & C. Schneider (2011), An objective circulation pattern classification for the region of Svalbard, Geogr. Ann., doi:10.1111/j.1468-0459.2011.00431.x;
  - Snow pit based analysis of accumulation pattern on Vestfonna:
    Möller, M., R. Möller, É. Beaudon, O.-P. Mattila, R. Finkelnburg, M. Braun, M. Grabiec, U. Jonsell, B. Luks, D. Puczko, D. Scherer & C. Schneider (2011), Snowpack characteristics of Vestfonna and De Geerfonna (Nordaustlandet, Svalbard) – a spatiotemporal analysis based on multiyear snow-pit data, Geogr. Ann., in press;

  - Time series of outlet glacier changes at Vestfonna:
    Braun, M., V.A. Pohjola, R. Pettersson, M. Möller, R. Finkelnburg, U. Falk, D. Scherer & C. Schneider (2011), Changes of glacier frontal positions of Vestfonna (Nordaustlandet, Svalbard), Geogr. Ann., in press.
- State of WRF modeling:
  - 30 km domain: 2000-2010,
  - 10 km domain: 2000-2010,
  - 2 km domains: 2006-2010.
- In preparation: setup of an albedo model for Vestfonna, setup of a snow-drift model for Vestfonna, analysis of air-temperature data of 6 AWS in the Kinnvika/De Geerfonna/ Vestfonna area, cooperation regarding two-way coupling of CMB model and ELMER for Vestfonna, continuation of WRF-model runs (2000-2005 for 2 km domains).

Report of activities of ITALIAN team:

- Italian team: Daniela Mansutti, Edoardo Bucchignani, Maria M. Cerimele, Alessandro Forieri, Giuseppe Pontrelli; Rossella Cossu and Andrea Di Mascio (new entries);

- Activity: implementation, debugging and validation of in-house code for the diagnostic study of a subglacial lake. Testing (in progress) on Amundsenisen area upon data provided by Jaime O. and Paco (see figures in the report on the website – http://svalglac.eu/Oslo_report_Italy.pdf);
- Tested aspects: viscosity dependency on temperature (polythermal ice field), ice/water phase change temperature dependency on hydrostatic pressure, steady air/ice (material) interface, no accumulation/ablation, ice overburden pressure effect on ice field motion, ice sheet sliding on rocky bottom, water density dependency on temperature. In preparation: viscosity dependency on deformation tensor (Glen's law, n=3), water filtration at rocky bottom below ice field, water density dependency on pressure, further calibration of: flow rate factor (ice), sliding law constant (ice/rock), eddy viscosity/diffusion coefficients (lake), thermodynamics of firn and effect of its weight, estimation of the geothermal heat flux;
- Development of several tests of application of a segmentation technique for SAR images, based on level set modeling and in-house numerical code, aimed to identify different ice zones (snow, firn, ice) for comparison within time sequences (feasibility under evaluation with Jacek J., Malgorzata B.);

- Test case: Amundsenisen, section upon conjectured subglacial lake (see the report on the website – http://svalglac.eu/Oslo_report_Italy.pdf).

Report of activities of AUSTRIAN team:

- Field work: maintenance of the Kongsvegen AWS network, 01 April 2011 - 13 April 2011 and 29 April 2011 until 04 May 2011, 4 persons, setup of a temporary eddy covariance measurement system in the ablation area (cooperation Univ. Bergen supporting CICCI/NILU activities; perform snow investigations, assist NPI mass balance work.

- Data analysis: first one-year record of along glacier elevation profiles of the basic meteorological parameters is avaialable and is currently anaylized, similar regarding snow characteristics (height, density, we, hardness) at these sites (see the raport on

the website – http://svalglac.eu/Svalglac_Austria_field%20report_2011_final.pdf); new concept of meta data base will be developed.

- Model studies: Kongsvegen meteorological data have been provided to B. Claremar for WRF model validation (Veijo, yielding common manuscript (Adv. Met.). Data have also been provided to R.Giessen and H. Oerlemans (IMAU) supporting development of a new global mass balance model. Development of own manuscript on mdoeling 10 years mass and energy balance of Konsvegen glacier is in progress.
- Report from the PolarCLIMATE Networking Meeting, Bologna 1 June 2011.
- Plans of field activities for 2012: early April 2012, again coordinated with NPI field work in the area, reduce AWS network to 1-2 key stations, perform snow investigations.

Report of activities of NORWEGIAN team:

- Preparation the Svalbard glaciers database and climate model for Svalbard by the end 2011 (shapefiles centerline, hypsometry, DEM), regional climate model;
- With German team – equipment (main input), snow distribution data, radar campaign;
- Results: slow beginning of surge, winter velocity – earlier: gradual increase, now: very quick;
- Modeling with Finnish team – elevation model?;
- precipitation history on Vestfonna – snow precipitation model.

Report of activities of SWEDISH team (see the report on the web site – http://svalglac.eu/Fieldwork_2011.pdf):

- Research on Lomonosovfonna – with the Netherlands, Estonia, Norway, Finland; preparation the climate model, long time mass balance (present and future), survey of dGPS (topography), snow distribution – shallow radar (for the mass balance model), changes recorded in ice cores;
- Vestfonna – manuscript, 10 papers;
- The first set of calibrations of the climate model WRF have now resulted into a publication (*Björn Carlsson-Claremar, Friedrich Obleitner, Carleen Reijmer, Anna Waxegård, Anna Rutgersson, Veijo Pohjola. Applying a meso-scale atmospheric model to Svalbard glaciers. Submitted to Advances in Meteorology, Svalbard volume*; accepted March 2012);
- Ice cores: one 12 m ice core was drilled at Lomonosovfonna 2011, and is currently processed in Tallinn and Uppsala;
- Climate modeling: WRF is set-up for Svalbard, and the validation from 3 AWS sites proves a good potential to use WRF for dynamical downscaling of ERA gridded data in resolution up to 900 m grids locally.

Report of activities of FINNISH team:

- In spring 2011 – activity on Paierlbreen: installation of one time-lapse campera at the front, measurement of snow accumulation and installation of 3 mass balance stakes;
- Helicopter GPR flight which was a joined Finnish, Polish and Spanish activity, but the Finnish contribution was mainly of financial character;
- Modeling activity on basal conditions/present day surface velocity distribution on Vestfonna/Nordaustlandet.

Report of activities of ESTONIAN team:

- in laboratory – ice core calibration, deep drilling;
- data from different projects;
- Lomonosovfonna – obtain a new set of data, laboratory calibration;
- Amundsenisen – digging pits, shallow drillings (in plans?);
- isotope research – melting, meteorological point of view.

Report of activities of POLISH team:

- 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 in spring 2011 (Hansbreen, Werenskioldbreen, Amundsenisen, Paierlbreen, Recherchebreen):

– GPR measurements;

– Additional radar soundings from helicopter: Paierlbreen, austreTorellbreen and terminal part of Hansbreen (leading partner – Technical University of Madrid - Francisco Navarro, Evgeny Vasilenko);

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

– Shallow snow/firn corings for mass balance calculation were obtained on Paierlbreen, Hansbreen, Werenskioldbreen and Ariebreen;

– Acquisition of data for energy balance and renovation of AWS on Hansbreen and Werenskioldbreen has been made;

– Continuations of mass balance measurements and calving processes program; 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;

– 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).

- Field campaign in summer 2011 (first part) – the Werenskioldbreen forefield:

– Participants – Joanna Szafraniec, Jarosław Hałat (partly Michał Ciepły, AWAKE); Base – Stanisław Baranowski Polar Station of University of Wrocław;

— 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.);

measurements locations (see in the report on the website – http://svalglac.eu/Fieldwork_2011.pdf);

- Transport of the suspended and bedload matter in the Lodowcowa River;

— Morphometry of Elveflya – an extramarginal outwash fan at the Werenskioldbreen forefield: GPS survey (Leica) in the Kvisla gorge and the Elveflya „rooted" zone (http://svalglac.eu/Fieldwork_2011.pdf);

— Measurements of the Elveflya sediments grains parameters – spatial differentation (http://svalglac.eu/Fieldwork_2011.pdf).

- Field campaign in the late summet 2011 (second part) – 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.

- Remote sensing studies of S Spitsbergen glaciers (Błaszczyk et al.) - Nathorstbreen & Zawadzkibreen, Dobrowolskibreen:

- 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 (see map in the report on the website – http://svalglac.eu/Fieldwork_2011.pdf);

- Estimation the rate of diminishing of the total area of tidewater glaciers terminating into Hornsund Fjord between 1900-2010: 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 – echosandings 2010, 2011 (see profiles in the report on the website – http://svalglac.eu/Fieldwork_2011.pdf);

— Analysis of last surges of Paierlbreen and Mendelejevebreen have been made for future estimation of long term geodetic mass balance in recent past – dependence on water depth (see graphs in the report on the website – http://svalglac.eu/Fieldwork_2011.pdf);

- New estimation of calving flux from Southern Spitsbergen glaciers - updated estimation 2006-2010 for Hornsund: 0.9 km^3a^{-1} (w.eq.) and for S Spitsbergen: 1.2 km^3a^{-1} (w.eq.);
- Calving flux from the whole Svalbard: average retreat of tidewater glaciers in 2006-2010 ~45 m a^{-1}; mass loss due to calving ca 8.0 ±2 Gt a^{-1} (w.e. without effects of surge

events).

4. ESF Polar CLIMATE reporting and conference

Report from the PolarCLIMATE Networking Meeting in Bologne (Italy) in June 2011 – draft agenda in portfolio.
In addition to the presentation of the main results by the different projects, and the difficulties encountered in the project's management, the discussion focused on how to avoid, in future ESF calls, the problems that arose in the present one when not all partners in a project received funding from the corresponding national funding agencies. The consensus proposal by the workshop participants was that a part of the funding (e.g. 10-20%) from the national agencies should be allocated to a 'common pot' to be used to complement the funding for those projects that had got the highest evaluations but included some national partner that could not receive funding from its national agency (because of having reached the limit of funding available at the national level).

The European Science Foundation acknowledged the contribution of SvalGlac to the European Polar Newsletter No. 7-June 2011 (pages 10-11).

5. Reports from Working Groups

Glacier dynamics modeling group (http://svalglac.eu/SvalGlac-GlacDynModelGroupActivRep.pdf):

- Participants: Bucchignani Edoardo (Italy), Cerimele Maria Mercede (Italy), Corcuera María Isabel (Spain), Cuadrado María Luisa (Spain), Dunse Thorben (Norway), Forieri Alessandro (Italy), Mansutti Daniela (Italy), Navarro Francisco (Spain), Otero Jaime (Spain), Pettersson Rickard (Sweden), Schäfer Martina (Finland);
- Spanish team: performed 2D full-Stokes (Elmer) modelling of the transient dynamics of Hansbreen, including test of a Benn-type calving low; simulated period 1936-2007; analized model sensitivity to changes in mass balance & amount of water filling the crevasses (constant, and as function of temperature); performed 3D full-Stokes (Elmer) modelling of the steady-state dynamics of the Amundsenisen icefield. The flow field has been used to define flowline geometry, as well as initial and boundary conditions, supplied to the Italian team for more detailed 2D-modelling of thermo-mechanics, including moving boundary between basal ice and possible subglacial lake (see maps and graphs in the report on the website);
- Italian team: implementation, debugging and validation of in-house made code for the diagnostic study of a subglacial lake; testing (in progress) on Amundsenisen area upon data provided by Jaime Otero and Paco Navarro; aspects already included: viscosity dependence on temperature, ice/water phase change temp. dependence on hydrostatic pressure, steady air/ice (material) interface, no accumulation/ablation, ice body sliding on bedrock, effect of pressure on sliding, water density dependence on temperature (see details http://svalglac.eu/Oslo_report_Italy.pdf);
- Finnish team: modelling of Paierlbreen not initiated yet. Waiting for availability of data on: bedrock – to be provided very soon by Spanish-Russian teams upon processing of GPR data from helicopter flight spring 2011, plus some earlier ground-based Polish GPR data; surface; velocities – ongoing work by Chinese student. Velocity data also under analysis from time lapse camera;

- Related symposium contributions/publications in preparation:

– J. Otero, F.J. Navarro, J.J. Lapazaran, M. Grabiec, D. Puczko, C. Molina and A. Vieli (2011): Modelling the variations of the calving front position of Hansbreen, Svalbard. International Symposium on Interactions of Ice Sheets and Glaciers with the Ocean. La Jolla, California, USA, 5-10 June 2011. *Poster contribution and paper in preparation for J. Glaciol.;*

– J. Otero, F.J. Navarro, J.J. Lapazaran, E.V. Vasilenko and P. Glowacki: A three-dimensional dynamical model of Amundsenisen icefield, Svalbard. Geophysical Research Abstracts, Vol. 13, EGU2011-6257, 2011. EGU General Assembly 2011. *Poster presentation. To be used partly in paper, in preparation for J. Glaciol., on surface changes and dynamics of Amundsenisen.*

Ground Penetrating Radar Working Group (http://svalglac.eu/reports.htm):

- Teams involved: Departamento de Matemática Aplicada, ETSI de Telecomunicación, Universidad Politécnica de Madrid, Department of Geosciences, University of Oslo, Department of Earth Sciences, Uppsala University, Institute of Geography, Russian Academy of Sciences, Institute of Geophysics, Polish Academy of Sciences, Department of Geomorphology, University of Silesia;
- Terrain campaigns with VIRL 6, 20 MHz (maps in the report on the website):
  - Gleditschfonna: 19.5 km of RES profiles performed; maximal ice thickness is 63.6 m, average ~30 m;
  - Tungebreen: 12.5 km of RES profiles performed; maximal ice thickness is 88 m, average 43.4 m;
  - Fridtjovbreen: a few RES profiles to examine hydrothermal state;
  - Vestfonna (Nordaustlandet): low-frequency data and compilation a new bedrock map;
  - Austfonna (Nordaustlandet): snow radar surveys across several profiles over the ice cap (ca. 400 km), with 800 MHz Ramac and with a 12 GHz radar for CryoSat calibration;
  - Hansbreen & Amundsenisen: shallow soundings with 800 MHz cental frequency; total lenght of GPR profiles: c.80 km (Hansbreen) and 66 km (Amundsenisen); snow structure and depth supported by shallow coring and snow pits study;
  - Werenskioldbreen: profiling of frontal part and forefield with 100 MHz central frequency; study of basal conditions (in connection with AWAKE project).
- Fieldwork carried out in spring 2011 with VIRL 7 antenae 20 MHz (Spain-Russia-Poland-Finland); profiles lenght: Amundsenisen 52.5 km, Recherchebreen 48.8 km, flight using helicopter 111.3 km (details in the report on the website);
- Inventory of radio-echo sounded glaciers in Svalbard (some of glaciers with available thickness data) (see the map in the report on the website).

Mass Balance and AWS group:

Meta data base conception – selected measured parameters (with location, height a.s.l. and storage interval) in a form of a table (months, years) with information about the quality of data (missing, bad, average, high quality).

Proposal – information about acquired data (what we have) in a form of questionaire; separately both for mass balance and meteorological data.

Atmospheric Modeling Group:

No information.

Ice Coring Group:

Not connected with SvalGlac in this year.

Remote Sensing Group:

Develop metadata – problem with made available of data and to obtain sceneries without clouds.

Needed questionaire – similar to this mentioned above (like in Mass Balance and AWS Group).

6. Plans of activities for 2012 and scientific/logistic co-operation in the field work

Poland – in March, south part of Spitsbergen, mass balance, shallow radar sounding, ice thickness, ice coring on Amundsenisen. In cooperation with Finland (Martina) – Paierlbreen.

Germany – finishing field work on Nordaustlandet: dismounting of AWSs on De Geerfonna and Vestfonna, removing of mass-balance stakes on De Geerfonna and Vestfonna (needed cooperation with Sysselman); one field campaign planned for late September 2012: two transportation options (by "MS Farm" and ATV back to Longyearbyen or by helicopter to Kinnvika and "Nordsyssel" to Longyearbyen).

Spain – Russia – second helicopter flight with GPR campaign, all glaciers around Hornsund along their central line.

The Netherlands – AWS, stakes with mass balance.

Italy – modeling.

Estonia – campaign with Polish team, shallow ice coring and with Swedish student.

Norway – cooperation in the helicopter campaign in Hornsund, fieldwork on Austfonna.

Austria – AWS maintance (reduce), snow investigations.

Sweden – fieldwork near Pyramida?

Finland – participation in the 2012 spring fieldseason (main focus: camera maintenance + photo retreaval); 6-months postdoc on Austfonna modeling.

7. SvalGlac web site and TU-Berlin Knowledge Base – remarks and suggestions

Ask for data (maps, graphs, photos, posters and presentations, links etc.) needed for website purposes (especially for Scientific Research and Outreach sites).

8. Preliminary planning of publications consistent with the project proposal for reporting of final results

Breakdown of published and planned papers – details in national reports on the website.

Proposal – brochure preparation and results widespreading.

9. Place and date of the next SSC meeting in 2012 and info on other relevant scientific meetings

9-13 January 2012, Zieleniec, Poland – Workshop on the Dynamics and Mass Budget of Arctic Glaciers & the IASC Network on Arctic Glaciology Annual Meeting, possibility to meet.

Next SSC meeting, last week of October 2012 – Nordic Branch Meeting in Uppsala.

14-20 April 2013 – Arctic Science Summit Week, Cracow, Poland.

Proposal – Skype conferences.

10. Other issues

11. Adjourn