

Workshop on *in-situ* snow albedo measurements: toward a snow albedo intercomparison experiment

Helsinki, 24-25.08.2016 (UTC+3)

Agenda

Wednesday, 24 August

- 9:00-9:30 **Registration, welcome of participants**
- 9:30-9:45 **Introduction and goals of the workshop** – *Ali Nadir Arslan, Roberta Pirazzini, Ghislain Picard*
- 10:00-11:35 Snow albedo measurement techniques: overviews** (*chair Roberta Pirazzini*)
- 10:00-10:40 **KEYNOTE** Observation technique of spectral, narrowband and broadband albedos of snow surface -
Teruo Aoki, Okayama University, Japan
- 10:40-11:20 **KEYNOTE** The albedo of snow on sea ice: observations, results, and uncertainties - *Don Perovich, Thayer
School of Engineering, Dartmouth College, USA*
- 11:20-11:35 Discussion
- 11:35-12:35 Snow spectral albedo measurements: single-timed and continuous measurements** (*chair Michele
Citterio*)
- 11:35-11:50 Cryospheric spectral albedo measurements in high Arctic environments: instruments, setups and
uncertainties I – *Jean-Charles Gallet, Norwegian Polar Institute, Fram Centre, Tromsø, Norway*
- 11:50-12:05 Continuous spectral albedo measurements in Antarctica and in the Alps: instrument design, data post-
processing and accuracy - *Ghislain Picard, UGA / CNRS, Laboratoire de Glaciologie et Géophysique de
l'Environnement (LGGE) UMR 5183, Grenoble, France*
- 12:05-12:20 Continuous monitoring of spectral reflectance in Polar Regions (Ny-Ålesund and Dome-C) - *Roberto
Salzano, CNR-IIA, Italy*
- 12:20-12:35 SVC dual-sphere spectro-albedometer: a new instrument for continuous measurements of snow albedo
– *Roberta Pirazzini, Finnish Meteorological Institute, Finland*
- 12:35-13:30 **Lunch**
- 13:30-14:30 Snow spectral albedo measurements: single-timed and continuous measurements (continues)** (*chair
Michele Citterio*)
- 13:30-13:45 Seasonal snow albedo in the northeastern United States: measurement uncertainty and controls on
albedo evolution - *Adolph Alden, Thayer School of Engineering, Dartmouth College, Hanover, NH, USA*
- 13:45-14:00 Albedo of Sodankylä snow – *Outi Meinander, Finnish Meteorological Institute, Finland*
- 14:00-14:15 Discussion
- 14:15-16:00 Instrument calibration, characterization, and special features** (*chair Ghislain Picard*)

- 14:15-14:45 **KEYNOTE** Calibration of instruments measuring broadband and spectral solar UV irradiance - *Gregor Hülsen, Physikalisch-Meteorologisches Observatorium Davos, World Radiation Center (PMOD/WRC), Davos, Switzerland*
- 14:45-15:00 Spectral reflectance measurements of a forest and a forest opening from a 30-meter mast- *Henna-Reetta Hannula, Finnish Meteorological Institute, Finland*
- 15:00-15:15 Snow albedo measured by FIGFIGO – *Jouni Peltoniemi, University of Helsinki and Finnish Geospatial Research Institute, Finland*
- 15:15-15:30 Cryospheric spectral albedo measurements in high Arctic environments: instruments, setups and uncertainties II – *Jean-Charles Gallet, Norwegian Polar Institute, Fram Centre, Tromsø, Norway*
- 15:30-15:45 Discussion
- 15:45-16:15 Coffee break**
- 16:15-16:30 Welcome to workshop participants by COST Association – Deniz Karaca, Science Officer of COST, Belgium**
- 16:30-18:00 Impact of SSA, snow grain shape, snow impurities, and surface roughness on the measured albedo**
(chair *Roberta Pirazzini*)
- 16:30-16:45 Snow specific surface area retrieval from reflectance measurements: the question of snow grain shape – *Ghislain Picard, UGA / CNRS, Laboratoire de Glaciologie et Géophysique de l'Environnement (LGGE), France*
- 16:45-17:00 In situ continuous spectroscopy of alpine and polar snowpacks – *Marie Dumont, Météo-France -- CNRS, CNRM, Centre d'Etudes de la Neige, Grenoble, France*
- 17:00-17:15 Particulate Matter on glacier snow in Cerro Tronador: modeling and measurements – *Julián Constantin, Gerencia de Química, CAC, CNEA, San Martin, Buenos Aires, Argentina - Remote presentation (UTC-3)*
- 17:15-17:30 Study of black carbon impact on the broadband and spectral snow albedo in Poland – *Krzysztof Markowicz, Institute of Geophysics, University of Warsaw, Poland*
- 17:30-17:45 The effect of the surface roughness on the snow albedo – *Terhikki Manninen, Finnish Meteorological Institute, Finland*
- 17:45-18:00 Discussion
- 18:00 -19:00 Poster session**
- Observation of surface features and albedo of sea ice during the early ablation stage in Barrow, Arctic - *Hongmin An, State Key Laboratory of Cryospheric Sciences, China*
 - Effect of Arctic Vegetation on Snow Optical Properties – *Ghislain Picard, University Grenoble Alpes and CNRS, LGGE, France*
 - FIGFIGO – A portable Goniometer system and its applications in spectropolarimetry – *Maria Gritsevich, Finnish Geospatial Institute, Finland*
 - Snow broadband albedo over the Forni Glacier (Italy) - *Antonella Senese, University of Milan, Italy*
 - Measuring and characterizing snow surface roughness using plate photography and laser scanning data – *Kati Anttila, Finnish Meteorological Institute, Finland*
 - Snow specific surface area retrieval from reflectance measurements: the question of snow grain shape - *Quentin Libois, University Grenoble Alpes and CNRS, LGGE, France*
 - Snow properties and albedo measurements over sea ice based on observations from the N-ICE2015 field campaign in the Arctic Ocean - *Ioanna Merkouriadi, Norwegian Polar Institute, Fram Centre, 9296 Tromsø, Norway*
 - Meteorological and radiation budget component observations on the ice cap of King George Island, Antarctic Peninsula – *Ulrike Falk, University of Bremen, Germany.*
 - Measuring and modelling broadband albedo on Lewis Glacier, Mt Kenya – *Rainer Prinz, University of Graz, Austria*
 - The effects of mineral aerosol deposits on the albedo of snow – *Maxim Lamare, Royal Holloway University of London, United Kingdom.*

- Characterization of the BRDF (HDRF) of snow surfaces at Dome C, Antarctica, for the inter-calibration and validation of satellite remote sensing products - *Amelia Marks et al., Royal Holloway University of London, United Kingdom.*
- Spectral albedo measurements over the ice sheet in Queen Maud Land, Antarctica – *Leena Leppänen, Finnish Meteorological Institute, Finland*

19:00 *Dinner* in Dynamicum building (FMI, 5th floor)

Thursday, 25 August

9:00-10:00 **Snow broadband albedo measurements: instruments and measurement uncertainties** (*chair Roberta Pirazzini*)

- 9:00-9:15 Correction of broadband snow albedo measurements affected by unknown slope and sensor tilts – *Ursula Weiser, Zentralanstalt für Meteorologie und Geodynamik (ZAMG), Austria*
- 9:15-9:30 Comparison of in situ albedo measurements at two Mediterranean mountains in Spain – *Javier Herrero, IISTA/University of Granada, Spain*
- 9:30-9:45 Automated in situ albedo observations: PROMICE status and opportunities – *Michele Citterio, GEUS Glaciology and Climate Dept., Copenhagen, Denmark*
- 9:45-10:00 Discussion

10:00 – 11:15 **Users of the in-situ snow albedo observations** (*chair Ghislain Picard*)

- 10:00 -10:30 **KEYNOTE** Impact of albedo measurement errors on the retrieval of snow grain size and BC concentration – some naive sensitivity tests – *Petri Räisänen, Finnish Meteorological Institute, Finland*
- 10:30 -10:45 Challenges in the validation of satellite-based snow albedo retrievals – *Aku Riihelä, Finnish Meteorological Institute, Finland*
- 10:45-11:00 Improvements in Snow and Ice Albedo in Climate and NWP models – *Ruth Mottram, Danish Meteorological Institute, Denmark*
- 11:00-11:15 Discussion

11:15-11:30 *Coffee break*

11:30-13:00 **Working groups on:**

- Summary on measurement accuracy: presently achieved vs desired (*Leader: Roberta Pirazzini*)
- Best practices for calibration/characterization of instruments (*Leader: Gregor Hülsen*)
- Protocol to minimize and quantify measurement uncertainties due to measurement setup and environmental conditions (*Leader: Ghislain Picard*)
- Recommendations concerning the use of auxiliary tools to measure/monitor ancillary snow properties (surface roughness, SSA, BC, etc.) (*Leader: Michele Citterio*)

13:00-14:00 *Lunch*

14:00-14:40 10 min presentation for each working group

14:40-16:00 **Conclusions:** plans for a snow albedo inter-comparison campaign where the developed protocol and recommendations would be applied and further refined.