# Arctic Science Summit Week 2019

*Draft Scientific Program*

| | Date | Time | Person | Topic |
|---|---|---|---|---|
| **Science Conference Opening** | 24-May | 9:00 | *Governor of the Region* | *Science Conference Opening* |
| *Chair TBD* | 24-May | 9:15 | *Vladimir Pavlenko, IASC VP* | *Welcome by Local Host* |
| | 24-May | 9:30 | *Larry Hinzman, IASC President* | *Welcome by IASC* |
| | 24-May | 9:45 | *Elena Kudryashova, Rector of NArFU* | *Welcome by NArFU* |
| | | 10:00 | *Other Speakers TBD* | *Other Speakers TBD* |
| | 24-May | to 10:30 | *NCA?* | *International Cooperation in the Arctic* |
| **Plenary** | 24-May | 11:00 | *TBD* | *TBD* |
| *Chair TBD* | 24-May | 11:40 | Gabriela Schaepman-Strub | Vegetation in the Arctic |
| | 24-May | 12:20 | Dmitry Drozdov | Cold Arctic Resources |
| **Plenary** | 24-May | 16:00 | Alexander Volkov | Mineral resources of the Arctic regions of Russia and the problems of their development |
| *Chair TBD* | 24-May | 16:40 | Yoo-Kyung Lee | Microbes in the Arctic |
| | 24-May | 17:20 | *TBD* | *TBD* |
| **Plenary** | 25-May | 11:00 | Liliya Dobrodeeva | Features of the neuro-immune-endocrine regulation of human adaptation in the Arctic |
| *Chair TBD* | 25-May | 11:40 | Michelle Mack | Increasing fire severity, alternate successional trajectories, and the carbon balance of Alaskan boreal forests |

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| TBD | - | Leonid Yurganov | leonid.yurganov@gmail.com | A1 | Arctic Ocean as a significant source of atmospheric methane: year-round satellite data |
| TBD | 27 | Jilda Caccavo | ergo@jildacaccavo.com | B1 | The benefits to Arctic science of including Early Career Scientists as peer-reviewers |
| TBD | 55 | Mariusz Grabiec | mariusz.grabiec@us.edu.pl | B1 | Glacier geometry changes derived from aerial and satellite images over southern Spitsbergen |
| TBD | 78 | Thorsteinn Thorsteinsson | thor@vedur.is | B1 | A new WMO Guide for the measurement of cryospheric variables: Status of the glacier chapter |
| TBD | 105 | Barbara Barzycka | bbarzycka@us.edu.pl | B1 | Hansbreen’s facies, their changes and a relation to mass balance over the last decade (2008-2018), Svalbard |
| TBD | 150 | Julia Boike | julia.boike@awi.de | B1 | A 16-year record (2002–2017) of permafrost, active layer, and meteorological conditions at the Samoylov Island Arctic permafrost research site, Lena River Delta, northern Siberia: an opportunity to validate remote sensing data and land surface, snow, and permafrost models |
| TBD | 165 | Helena Bergstedt | helena.bergstedt@sbg.ac.at | B1 | The Permafrost Young Researchers Network - The Next Generation of Permafrost ECRs |
| TBD | 177 | Hyangsun Han | hyangsun@kopri.re.kr | B1 | Summer sea ice concentration in the Chukchi Sea derived from AMSR2 and NWP data with machine learning approach |
| TBD | 185 | Chang-Uk Hyun | chyun@kopri.re.kr | B1 | High-resolution arctic sea ice image acquisition and mosaicking using helicopter-borne sensors |
| TBD | 195 | Junhwa Chi | jhchi@kopri.re.kr | B1 | Retrieval of pan-Arctic sea ice concentration using deep learning |

# Summer sea ice concentration in the Chukchi Sea derived from AMSR2 and NWP data with machine learning approach

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**Abstract:** Arctic sea ice concentration (SIC) is a primary information for the prediction of climate change and the development of sea route in polar oceans. Passive microwave (PM) sensors have provided SIC of the Arctic Ocean since the 1970s. The SIC retrieval algorithms for PM observations could produce inaccurate SIC in summer due to ice surface melting and/or atmospheric effects. In this study, we developed summer SIC estimation models for Advanced Microwave Scanning Radiometer-2 (AMSR2) observations in the Chukchi Sea by using numerical weather prediction (NWP) data from the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA-Interim reanalysis and rule-based machine learning approaches—Decision Tree (DT) and Random Forest (RF). We computed 42,480 values (samples) of SIC from KOrea Multi-Purpose SATellite-5 (KOMPSAT-5) synthetic aperture radar (SAR) images acquired in the Chukchi Sea during summer (July–September) from 2015 to 2017. Eighty percent of the KOMPSAT-5 SIC values were used as training dataset for the development of SIC estimation models and the remaining values were used as test dataset. The brightness temperatures measured at each channel of AMSR2 and their combinations, and the atmospheric parameters (atmospheric water vapor, wind speed, sea level pressure, 2-m temperature, and 925 hPa-temperature) predicted by the ERA-Interim reanalysis were used as input variables for the SIC estimation models. The RF model produced more accurate SICs than the DT model. The SICs estimated from the RF model showed the value of root mean square error (RMSE) less than 9% compared to the KOMPSAT-5 SAR SICs.

**Keywords:** sea ice concentration; Chukchi Sea; AMSR2; numerical weather prediction; machine learning; KOMPSAT-5