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

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

Retrieval of pan-Arctic sea ice concentration using deep learning

Junhwa Chi [1], **Hyun-cheol Kim** [2] **and Sung Jae Lee** [3]

[1] Korea Polar Research Institute; jhchi@korpri.re.kr
[2] Korea Polar Research Institute; kimhc@korpri.re.kr
[3] Korea Polar Research Institute; sungjae@korpri.re.kr

Abstract: Due to the importance and popularity of sea ice concentration (SIC) in polar research, many retrieval algorithms have been proposed to generate SICs from passive microwave data. However, the most SIC retrieval algorithms employ linear combinations of brightness temperatures in different frequencies and polarizations to identify open water, first- and multi-year ice because of the large emissivity differences between water and ice. Additionally they often require tie-point selection, weather filters and land-ocean spillover masks. To handle these limitations, in this research, deep learning (DL), which has recently received increased attentions in diverse fields of study, is incorporated into passive microwave and optical remote sensing data to retrieve more accurate SIC information than the past. To create true SIC labels which is the most critical part in DL model training and evaluation, we first propose a spectral unmixing based true SIC calculation algorithm. The true SIC labels are then used to train a DL-based Arctic SIC retrieval model. Therefore, we obtained visually and statistically improved Arctic SIC maps, and the results outperformed popular Bootstrap and ASI SIC retrieval algorithms at global and local scales. Our proposed method especially captured more detailed SIC representations and variability in difficult-to-estimate thin and melting ice zones in summer than other algorithms. The consistency in time and space of the proposed retrieval model enables it to be a new operational SIC retrieval algorithm in practice. Further, more accurate SIC products as initial conditions can allow capability to improve climate models

Keywords: AMSR2; Arctic; Deep learning; Sea ice concentration