

The 24th International Symposium on Polar Sciences

**30 years of
footsteps
in Antarctica :**

Looking Back and Looking Forward

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INCHEON, REPUBLIC OF KOREA

KOREA POLAR RESEARCH INSTITUTE

SYMPOSIUM PROGRAM

PP 16	Junseok Hong (Chungnam Nat'l Univ., Korea)	<i>Optical features and ionospheric irregularities observed at a sub-auroral station (L=2.5) during the St. Patrick's day storm</i>
PP 17	Eun-Byeol Jo (Chungnam Nat'l Univ., Korea)	<i>An investigation of relation between sporadic E layer and vertical ion drift convergence using ionosonde data in Korea</i>
PP 18	Se-Heon Jeong (Chungnam Nat'l Univ., Korea)	<i>Manually scaling one year ionograms measured by Jeju ionosonde in 2012</i>
PP 19	Wonseok Lee (Chungnam Nat'l Univ., Korea)	<i>A first comparison of meteor radar and Fabry-Perot Interferometer winds at King Sejong Station</i>
PP 20	Hosik Kam (Chungnam Nat'l Univ., Korea)	<i>Propagation analysis of mesospheric gravity waves on OH and OI-557.7nm airglow layers over King Sejong Station</i>
PP 21	JeongHeon Kim (Chungnam Nat'l Univ., Korea)	<i>Developing a data-assimilated SAMI2-CNU model using Korean ionosonde data</i>
PP 22	Sung Jin Kim (KOPRI, Korea)	<i>Cryoprotective Effect and Partial Characterization of a Novel Exopolysaccharide (P-ArcPo 20) Produced by Pseudoalteromonas tetradonis Strain ArcPo 20</i>
PP 23	Ji-Hoon Kihm (UST, KOPRI, Korea)	<i>The new species of Dactylobiotus (Parachela, Eutardigrada) from King George Island, Antarctica</i>
PP 24	Jae-Ryong Oh (UST, KOPRI, Korea)	<i>Late carboniferous oncoid from the Brøggerhalvøya, NW Svalbard, Arctic Norway</i>
PP 25	Sookwan Kim (UST, KOPRI, Korea)	<i>Clues to late Cenozoic ice-sheet dynamics and bottom-current activity in the northwestern Ross Sea margin, Antarctica</i>
PP 26	Chang-Uk Hyun (KOPRI, Korea)	<i>Adélie penguin counting using very-high-resolution UAV images and deep learning-based object detection technique</i>
PP 27	Mauro Mazzola (Nat'l Research Council, Institute of Atmospheric Sciences and Climate, Italy)	<i>The Italy-Korea cooperative project SAMEECA: Surface-Atmospheric Mass and Energy Exchanges at a Coastal Antarctic site</i>
PP 28	Hye Jeong Kim (Seoul Nat'l Univ., Korea)	<i>Quartz grain microtextures of beach sands from the Punta Arenas area, southernmost Chile and King George Island, Antarctica</i>
PP 29	Eunsol Kim (Chungnam Nat'l Univ., Korea)	<i>Climatology of ionospheric density profiles in the auroral and polar cap regions from long-term incoherent scatter radar observations</i>
PP 30	Young Kyu Park (Yonsei Univ., Korea)	<i>Geochemical identification of sediment provenance during glacial-interglacial period: the Southern Drake Passage</i>

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FLOOR PLAN

Adélie penguin counting using very-high-resolution UAV images and deep learning-based object detection technique

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ABSTRACT

Climate changes in polar regions affect to environment that can be directly linked to the living conditions of mammals. Adélie penguin (*Pygoscelis adeliae*) is known as a species reflecting environmental changes such as sea ice condition and food supply in Antarctica, therefore monitoring the Adélie penguin is crucial to investigate the effects from environmental changes. In this study, we propose a deep learning-based object detection technique using very-high-resolution (VHR) images acquired from unmanned aerial vehicle (UAV) for counting individual Adélie penguin. The VHR images with a spatial resolution of less than 1cm were acquires in Cape Hallett around Ross Sea, Antarctica using commercial UAV. The image acquisition using UAV has merits from shorter operation duration over large area than field investigation by researcher, preventing disturbance to penguins. Penguin counter software was developed using Google's tensorflow object detection application programming interface (API), an open source framework, with an image segregation - aggregation approach. This automated method can be applied to other Adélie penguin colonies around Ross Sea and other species of penguins in Antarctica with additional training and testing procedures.