

AI4EO

AutoICE Challenge

Prize Catalogue



#AutoICE

Initiated by  In collaboration with:     

Implemented by     

Introducing AI4EO

AI4EO is an initiative from the ϕ -lab of ESA's Directorate of Earth Observation Programmes. It strives to bring the worlds of Artificial Intelligence (AI) and Earth Observation (EO) closer together to kindle and encourage interaction and collaboration.

AutoICE Challenge

The Norwegian Computing Center, the Danish Meteorological Institute (DMI), the Technical University of Denmark (DTU), Polar View, Nansen Environmental Remote Sensing Center (NERSC) and ESA (European Space Agency), have created an extraordinary sea ice challenge, intending to bring together AI and EO players to address the challenge of "automated sea ice mapping" from Sentinel-1 SAR data.

The Objective

The objective of the AutoICE challenge is to advance the state of the art of sea ice parameter retrieval from SAR data resulting in an increased capacity to derive **more robust and accurate automated sea ice maps**. In this challenge, we aim to push forward the new capability to retrieve multiple parameters, specifically, **sea ice concentration, stage of development, and floe size (form)**.

The Importance

Manual ice charting from multi-sensor satellite data analysis has for many years been the primary method at the National Ice Services for producing sea ice information for marine safety. Ice analysts primarily use satellite synthetic aperture radar (SAR) imagery due to the high spatial resolution and the capability to image the surface through clouds and in polar darkness, but also optical imagery in a clear sky and daylight conditions, thermal-infrared and microwave radiometer data from e.g., AMSR2. Ice analysts mention the spatial resolution of microwave radiometers as the primary limitation of using the data.

The traditional manual ice charting method is **time-consuming** and **limited in spatial and temporal coverage**. Further, it is challenged by an increasing amount of available satellite imagery, along with a growing number of users accessing wider parts of the Arctic due to the thinning of the Arctic Sea ice.

The automation of the time-consuming and labour-intensive sea ice charting process has the potential to provide users with **near-real-time sea ice products** of higher spatial resolution, larger spatial and temporal coverage, and increased consistency.

Convolutional Neural Network (CNN) has great potential within the automated prediction of sea ice from satellite images. Automating the process on SAR data alone is challenging. SAR images show patterns related to ice formations, but backscatter intensities can be ambiguous, complicating the discrimination between ice and open water, e.g., at high wind speeds. To tackle the challenges, the training dataset made available in this challenge contains Sentinel-1 active microwave data and corresponding Microwave Radiometer (MWR) data from AMSR2, to enable challenge participants to exploit the advantages of both instruments. Is your method the best to detect and create sea ice charts?

How it works: The AI4EO Prize catalogue

This catalogue presents the available prizes for the top five teams and their members. The teams in the 2nd, 3rd, 4th, and 5th place will receive "AI4EO points" that can be used to assemble their prize bundle from the catalogue – It's like redeeming points from a consumer rewards and loyalty programme!

Restrictions

Some prizes come with restrictions. These can be found in small print in the description of those specific prizes.

Order for choosing prizes on a "first come first served" basis is the following: 2nd, 3rd, 4th, and 5th prize. The assigned team leader is responsible for communicating the selected prize(s) to the organisers.

SpaceTec Partners (one of the implementers of the challenge) will pay the prize money to the 1st place winners or the person authorised by them according to the competition [Terms & Conditions](#) and in the name or for the account of the respective contracting authority. The prize money will be paid in the currency of the contracting authority or organiser using the exchange rate of the bank executing the transfer on the day of payment. Bank charges will be

covered by the recipient. Any resulting tax obligations which are caused or affected by the receipt of prize money are to be borne by the recipient himself.

To be eligible for the cash prize, at least one participant of the winning team must be a national of an ESA Member State, including Canada (as Cooperating State), Slovakia, Slovenia, Latvia, and Lithuania (as Associate Member States). Check the full list of ESA members and cooperating states [here](#).

If the team in the 1st place is not eligible, an equivalent of 7,500 AI4EO points will be additionally attributed to being used on picking a prize from this catalogue.

AI4EO points

1st Prize
3,000 EUR

2nd Prize 5,000
AI4EO points

3rd Prize 4,000
AI4EO points

4th Prize 3,000
AI4EO points

5th Prize 1,500
AI4EO points

1st Prize



AutoICE Challenge

€3,000 cash prize

| AI4EO points | Amount | Unit |
|--------------|--------|----------|
| None | 1 | Monetary |

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Take part in the #AutoICE Challenge to win AI4EO points and exchange them for prizes!

Help us create the next state-of-the-art for automated sea ice mapping from Sentinel-1 SAR data.



Resources worth €15.000

| AI4EO points | Amount | Unit |
|--------------|------------|-------|
| 1500 | 10 x 1,500 | euros |



Reliable maps of sea-ice conditions and forecasts are of vital importance for maritime safety, safe navigation and planning.



Six months Polar TEP Machine Learning Environment (Hopsworks) access valued at €9,000

| AI4EO points | Amount | Unit |
|--------------|--------------|--------|
| 3000 (each) | 3 x 2 months | months |



Manual ice-charting from multi-sensor satellite data has been used for years, but it is time-consuming because of the vast area of the Arctic Ocean. In order to provide relevant ice data, there is a need for automated ice observations from satellite data, to integrate into ice forecast models.

ESA



SINERGISE

***one annual Enterprise-S Sentinel Hub subscription**
(worth €5000)

| AI4EO points | Amount | Unit |
|--------------|--------|--------|
| 5 000 | 1 | module |

***one annual Basic subscription**
(worth €999)

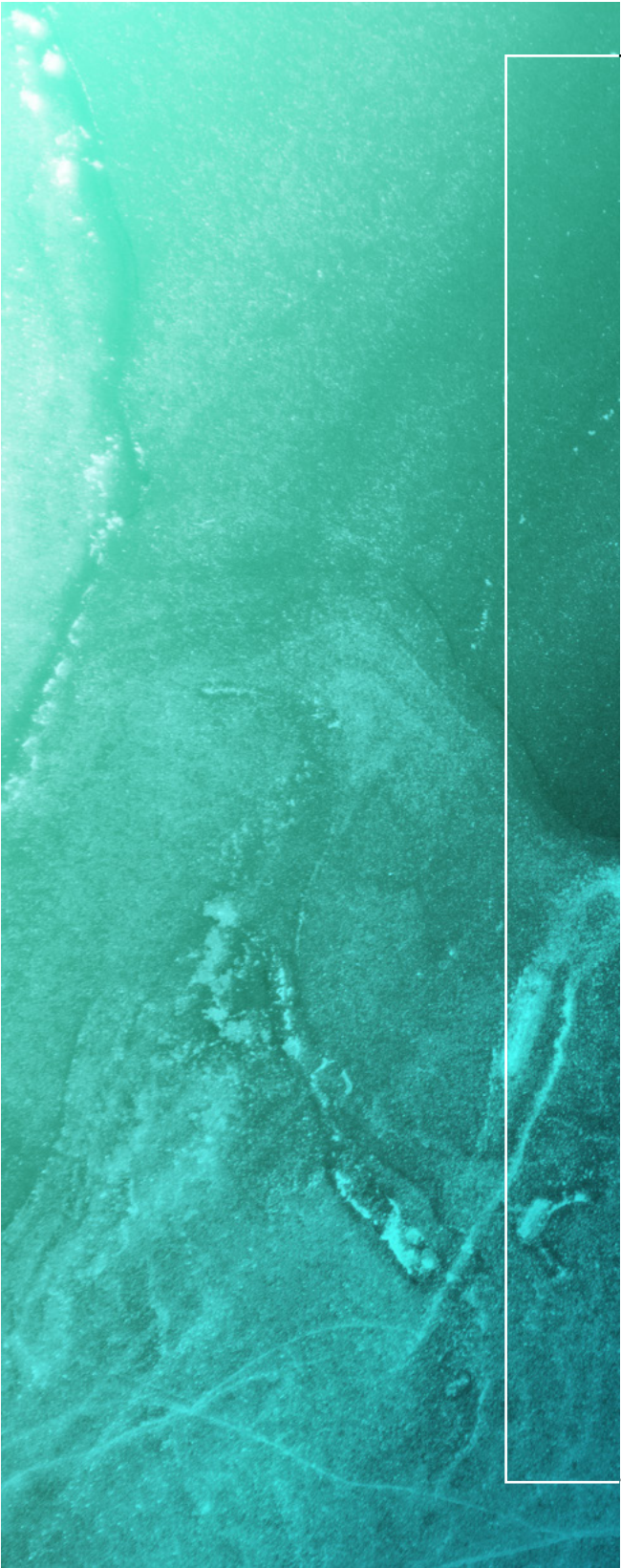
| AI4EO points | Amount | Unit |
|--------------|--------|--------|
| 5 000 | 1 | module |



NVIDIA

2 vouchers for self-paced online training courses (8 each) from the NVIDIA Deep Learning Institute

| AI4EO points | Amount | Unit |
|--------------|--------|----------|
| 1,000 (each) | 2 | vouchers |



AI4EO

www.ai4eo.eu



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