



# Collaborative, reproducible and transparent science for seasonal sea-ice forecasting

## Digital assets supporting SDG 13: Climate action

## Anne Fouilloux

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*Pan-European digital assets supporting research communities - Benefits & opportunities, 5th December 2022*

# Overview

- Introduction to the use case
- Scenario for the demo
- Demo

# Seasonal Arctic sea ice forecasting SCENARIOS OVERVIEW

Accurate seasonal Arctic sea ice forecasts are used to:

- Better plan, find safer routes and reduce operational costs of navigating in the Arctic;
- Understand and minimise impact on the environment;
- Provide meaningful insight to local communities;
- Engage with ecologists and biodiversity scientists.



Photo by [NOAA](#) on [Unsplash](#)

# Use case scenario

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## Seasonal Arctic sea ice forecasting with probabilistic deep learning

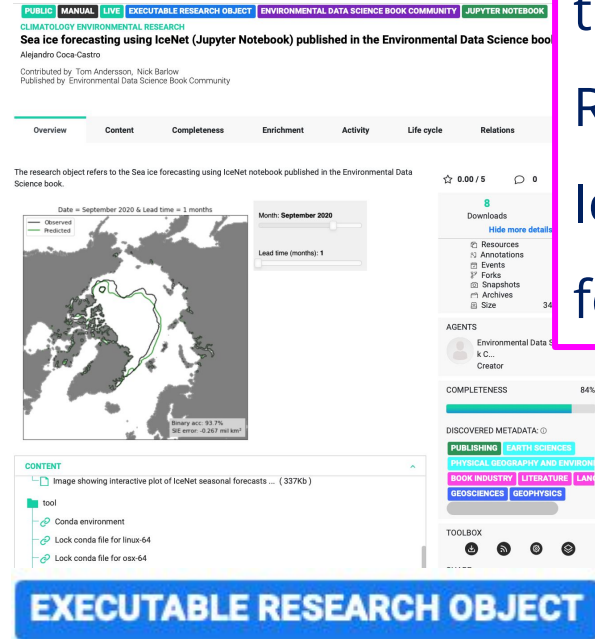
[Tom R. Andersson](#) ✉, [J. Scott Hosking](#), [María Pérez-Ortiz](#), [Brooks Paige](#), [Andrew Elliott](#), [Chris Russell](#), [Stephen Law](#), [Daniel C. Jones](#), [Jeremy Wilkinson](#), [Tony Phillips](#), [James Byrne](#), [Steffen Tietsche](#), [Beena Balan Sarojini](#), [Eduardo Blanchard-Wrigglesworth](#), [Yevgeny Aksenov](#), [Rod Downie](#) & [Emily Shuckburgh](#)

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### Abstract

Anthropogenic warming has led to an unprecedented year-round reduction in Arctic sea ice extent. This has far-reaching consequences for indigenous and local



**Alejandro Coca-Castro** (The Turing Institute, UK) is an early adopter of the RELIANCE services and created a Research Object showing how to use IceNet to make seasonal sea ice forecasts.



Find an **Open Access paper** in *Nature Communications* where IceNet, a probabilistic deep learning method, has been developed for seasonal sea ice forecasts: **data and codes are available and can be reused.**



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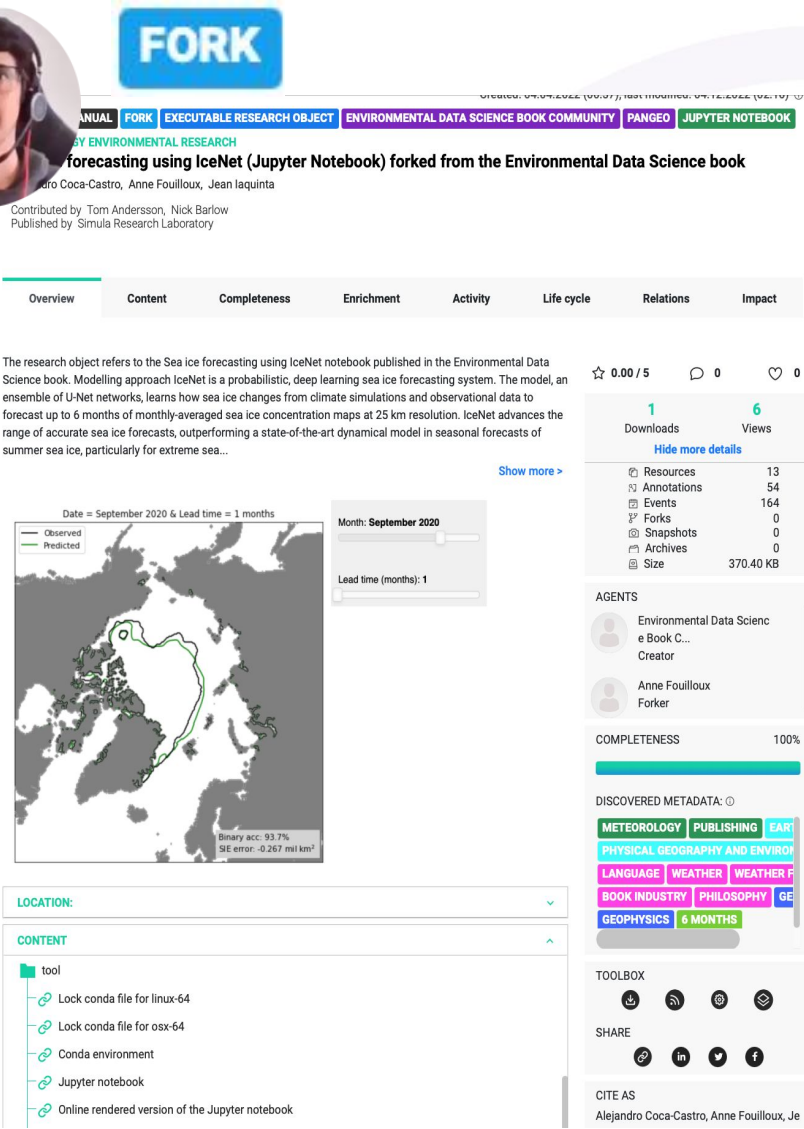
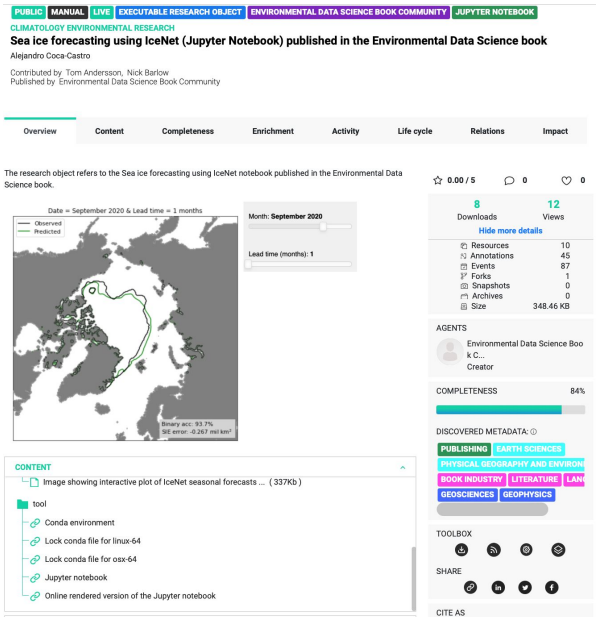
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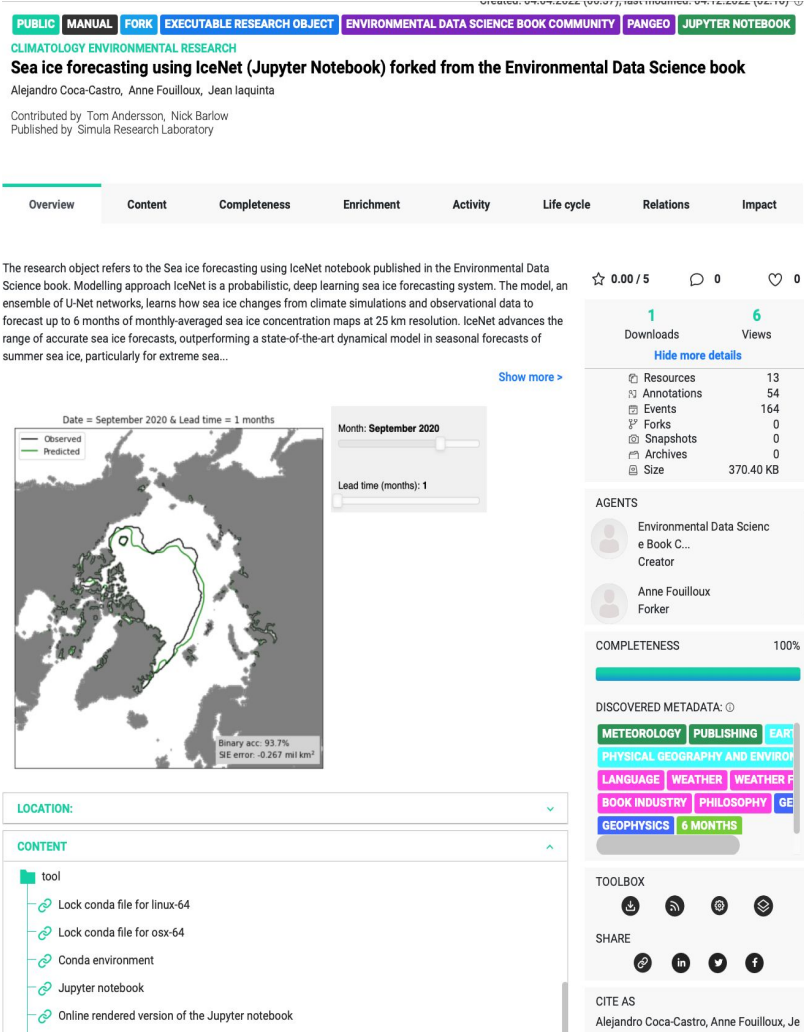
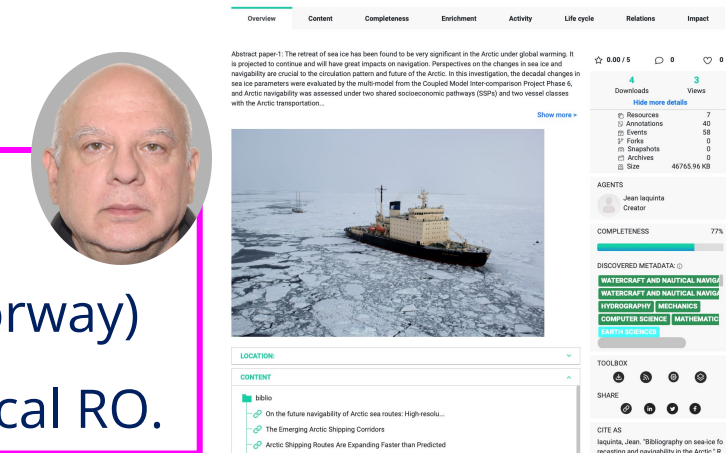
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Jean Iaquina

(University of Oslo, Norway)

created a bibliographical RO.



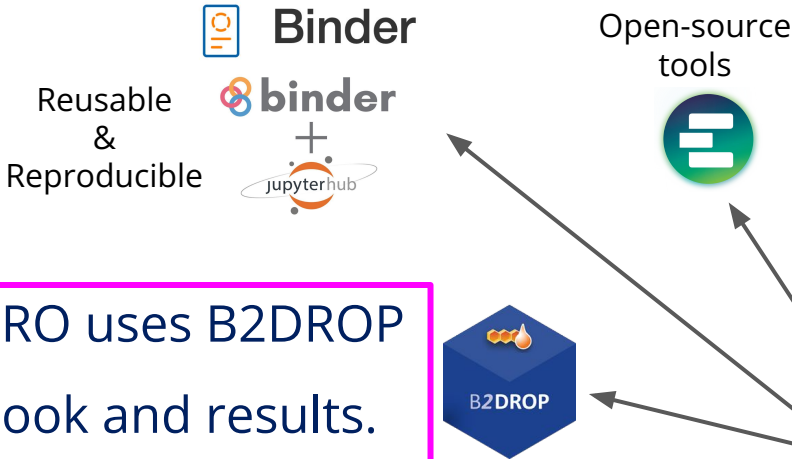
# Use case scenario



Use EGI Notebook and EGI Datahub to foster collaborative work.



Sharing while doing: RO uses B2DROP to store Jupyter Notebook and results.



**PUBLIC** **MANUAL** **FORK** **EXECUTABLE RESEARCH OBJECT** **ENVIRONMENTAL DATA SCIENCE BOOK COMMUNITY** **PANGE** **JUPYTER NOTEBOOK**

**CLIMATOLOGY ENVIRONMENTAL RESEARCH**

## Sea ice forecasting using IceNet (Jupyter Notebook) forked from the Environmental Data Science book

Alejandro Coca-Castro, Anne Fouilloux, Jean Jaquinta

Contributed by Tom Andersson, Nick Barlow  
Published by Simula Research Laboratory

Overview Content Completeness Enrichment Activity Life cycle Relations Impact

The research object refers to the Sea ice forecasting using IceNet notebook published in the Environmental Data Science book. Modelling approach IceNet is a probabilistic, deep learning sea ice forecasting system. The model, an ensemble of U-Net networks, learns how sea ice changes from climate simulations and observational data to forecast up to 6 months of monthly-averaged sea ice concentration maps at 25 km resolution. IceNet advances the range of accurate sea ice forecasts, outperforming a state-of-the-art dynamical model in seasonal forecasts of summer sea ice, particularly for extreme sea...

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**AGENTS**

Environmental Data Science Book C...  
Creator

Anne Fouilloux  
Forker

**COMPLETENESS** 100%

DISCOVERED METADATA: ⓘ

**METEOROLOGY** **PUBLISHING** **EARTH**

**PHYSICAL GEOGRAPHY AND ENVIRONMENT**

**LANGUAGE** **WEATHER** **WEATHER FORECASTING**

**BOOK INDUSTRY** **PHILOSOPHY** **GEOGRAPHY**

**GEOPHYSICS** **6 MONTHS**

**TOOLBOX**

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**CITE AS**

Alejandro Coca-Castro, Anne Fouilloux, Je...

Date = September 2020 & Lead time = 3 months (June 2020)

Month: September 2020

Lead time (months): 3

Observed Predicted

Binary acc: 90.7%  
SIE error: -0.175 mil km<sup>2</sup>

**LOCATION:**

**CONTENT**

- tool
  - Lock conda file for linux-64
  - Lock conda file for osx-64
  - Conda environment
  - Jupyter notebook
  - Online rendered version of the Jupyter notebook



# Use case scenario



OverviewContentCompletenessEnrichmentActivityLife cycleRelationsImpact

Mode

Key Elements

Key Elements

Sentences

Sentences

Score

The research object refers to the Sea ice forecasti...26.1

Description

1

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Text mining enrichment service to support inter-disciplinary research and facilitate reuse.

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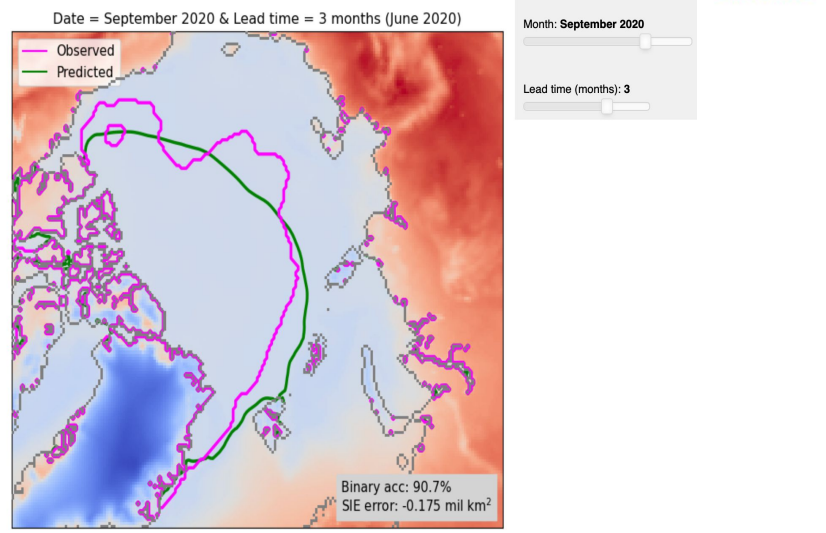
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# Demo