ACE-DATA:
Delivering Added value To Antarctica

Jenny Thomas[1] (jenny.thomas@epfl.ch) and Julia Schmale[2]
[1]Swiss Polar Institute, Lausanne, Switzerland,
[2]Paul Scherrer Institute, Villigen, Switzerland.
Polar2018, June 2018

SWISS POLAR INSTITUTE

INTRODUCTION

Over 30 TB of data and almost 27,000 samples from a wide variety of scientific disciplines, collected simultaneously as part of the Antarctic Circumnavigation Expedition (ACE), offer us the unique opportunity of a holistic view of the Southern Ocean in the austral summer of 2016/17. The ACE-DATA: Delivering Added value To Antarctica project will provide a collaborative data-sharing platform and explore cross-disciplinary questions using data science techniques.

ACE data summary

- **90 days** of measurements (20th Dec 2016 – 19th March 2017)
- > **300 variables** measured (ocean, atmosphere, land, ice, biodiversity)
- **continuous** (down to 1 sec resolution), **semi-continuous** (~once a day) and **discrete** (event-based) measurements
- in-situ, remote sensing and simulation data

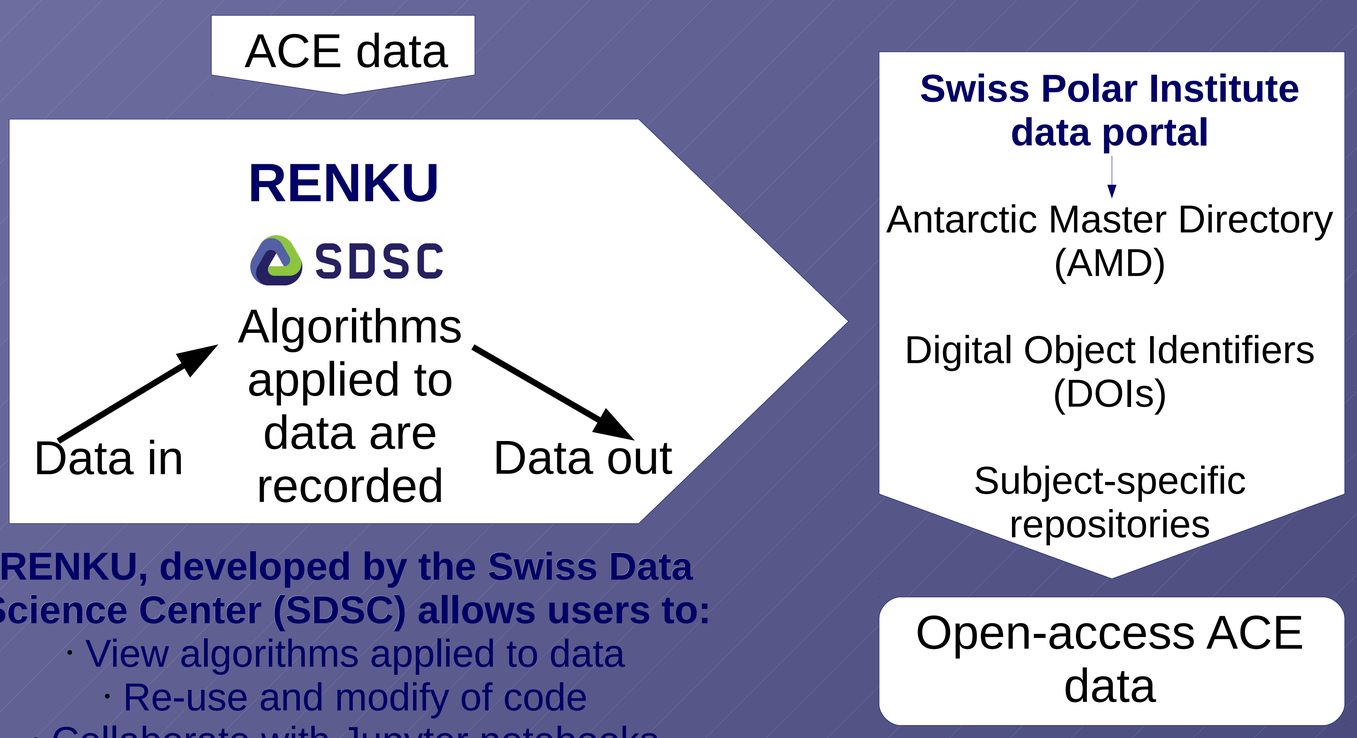
COLLABORATIVE DATA-SHARING PLATFORM

What?

Open-access ACE data available through a data-sharing platform.

Why?

- Antarctic Treaty requires that all data collected south of 60°S is openly available.
- Easier inter-project collaboration with data in a common format in one place.
- Data are available to the international community to allow benchmarking of global change.



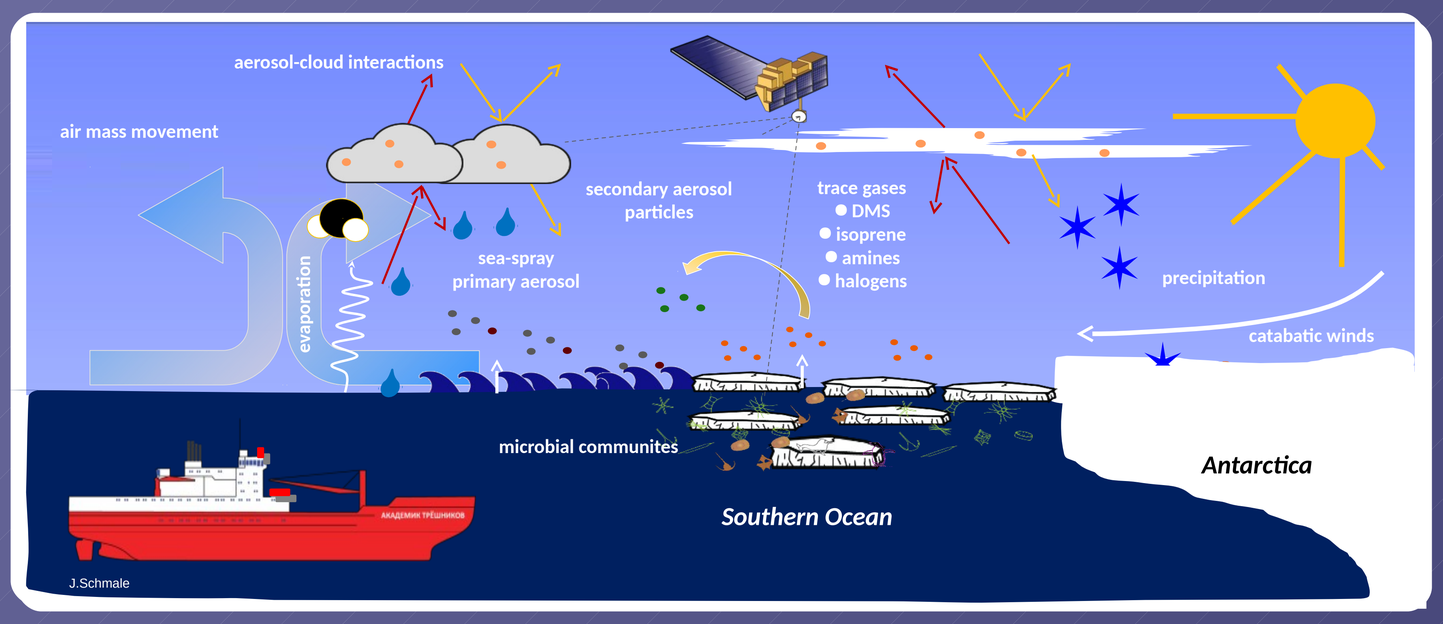
RENKU, developed by the Swiss Data Science Center (SDSC) allows users to:

- View algorithms applied to data
- Re-use and modify of code
- Collaborate with Jupyter notebooks

CROSS-DISCIPLINARY DATA EXPLORATION

What? **Antarctic Sea-Atmosphere Interactions Data (ASAID) project**

A subset of data from ACE will be used to explore air-sea interactions in the Southern Ocean using machine learning techniques.



Why?

- Current models struggle to simulate Southern Ocean processes.
- Interactions are still very unknown, yet influence clouds, radiation and climate worldwide.

Approach

Data science methods are used to identify relationships between various sets of a small number of variables, followed by a statistical model that will be based on these relationships. Resulting information will be fed into coupled ocean-atmosphere models

ACKNOWLEDGEMENTS

The Antarctic Circumnavigation Expedition was funded and made possible by the ACE Foundation and Ferring Pharmaceuticals.
ACE-DATA is funded by the Swiss Data Science Center and the Swiss Polar Institute.

REFERENCES

Antarctic Master Directory, https://gcmd.gsfc.nasa.gov/KeywordSearch/amd/about_us.html
Jupyter, http://jupyter.org/
Renku, Swiss Data Science Center https://datascience.ch/renku-platform/