

SIPN South

SIPN South: Coordinating Seasonal Predictions of Sea Ice in the Southern Ocean for 2017-2019



Principal investigator

François Massonnet

francois.massonnet@uclouvain.be

Georges Lemaître Centre for Earth and Climate Research, Earth and Life Institute, Université catholique de Louvain

Other contact

Phil Reid (phillip.reid@bom.gov.au)

Areas of contribution

User-aspects and verification

Polar atmospheric processes

Oceanic processes

Modelling and forecasting

Sea ice processes

Summary

Like many regions of our planet, the Antarctic is currently undergoing profound environmental changes. Not all of these changes are well understood, partly due to a lack of comprehensive observational datasets describing this region. The Antarctic is one of the most under-sampled places on Earth, well behind the already sparsely monitored Arctic.

Floating at the interface between a hostile atmosphere and a highly dynamic and weakly stratified ocean, sea ice

is a major element of the Antarctic climate. Sea ice is also a major obstacle for vessels operating in the Antarctic coastal region. Compared to the Arctic, there is a key scientific gap in understanding to what extent the seasonal development of austral sea-ice cover is predictable, what the sources of this predictability are and whether it is possible at all to extract any useful information for stakeholders from these predictions.

Inspired by the Sea Ice Prediction Network, SIPN South has the ambition to explore the initial potential (or lack thereof) of current sea ice prediction systems in Antarctica. The end-objective of this two-year project is to coordinate a real-time exercise of regional forecasting of austral summer sea ice conditions coincident with the YOPP Special Observing Period of early 2019. Forecasts will be analysed retrospectively to determine if they can be utilized to support decision-making for the logistics of observational field campaigns or touristic expeditions, that are expected to boom in the next decade.

SIPN South, beyond the assessment of seasonal sea ice predictability in the Southern Ocean, has also the ambition to become a new hub around which the polar prediction community can discuss selected topics related to Antarctic sea ice in general.

Description

Leadership team: F. Massonnet, P. Reid, J. L. Lieser, C. M. Bitz, J. Fyfe, W. Hobbs, K. Kusahara

BACKGROUND

After the dramatic retreat of Arctic sea ice in summer 2007, a team of U.S. researchers initiated the Sea Ice Outlook (SIO), a community-wide effort to assess seasonal forecasts of Arctic summer sea ice. The initiative rapidly gained momentum: up to now, the SIO managed since 2014 by Sea Ice Prediction Network (SIPN)? has received more than 500 unique forecasts, the team has grown substantially (it is now comprised of 13 members) and SIPN has become a must-visit portal to learn about the seasonal evolution of Arctic sea ice and the way it is forecasted.

Currently, a similar initiative does not exist for the Southern Ocean. Being much thinner and almost entirely seasonal, Antarctic sea ice is thought to be inherently less predictable than its Arctic counterpart – although the large thermal inertial of the Southern Ocean and the numerous atmospheric teleconnections from outside this region might in fact represent a key source of sea-ice predictability, as recent research suggests. Besides, the need for Antarctic sea-ice predictions has often been viewed as less pressing, due to the lower strategic and socio-economic relevance of this region compared to the Arctic. But tourism in the southern polar regions is booming, and intense observing campaigns are planned within the next few years, in the framework of the ongoing Year Of Polar Prediction (www.polarprediction.net/yopp).

OBJECTIVES & IMPLEMENTATION

SIPN South is driven by the following scientific question: "How well do current prediction systems forecast the seasonal evolution of circumpolar and regional Antarctic sea-ice conditions?"

The project has 3 strategic objectives:

1. Provide a focal point for seasonal outlooks of Antarctic sea ice (winter and summer), where the results are

exchanged, compared, discussed and put in perspective with those from the Arctic thanks to interactions within SIPN;

2. Provide news and information on the state of Antarctic sea ice, highlight recent published research, report ongoing observational campaigns and disseminate upcoming events (conferences, workshops, webinars, et cetera);

3. Coordinate a realistic prediction exercise targeting austral summer 2019, in conjunction with the Year Of Polar Prediction (YOPP)'s Special Observing Period that will take place in January-February 2019.

SIPN South is implemented in 7 phases:

1. Identification of potential contributors (mid-2017). A request to provide September Antarctic total sea-ice extent will be added to the regular calls for contributions released by SIPN in June, July and August 2017. Groups running global dynamical models should be able to provide this additional figure almost automatically. The goal of this initial exercise is to identify a network of potential contributors for subsequent forecast experiments.

2. Website (mid-2017 to end-2017). A website will be created and hosted by the Australian Bureau of Meteorology. Results of the various outlooks collected during the lifetime of SIPN South will be documented and commented there. In addition, Antarctic sea-ice news and ongoing work related to the Year of Polar Prediction (YOPP) will be reported there.

3. Simple summer forecast (end 2017-early 2018). A call to contributions will be sent out to the polar community to contribute a first set of coordinated summer austral sea-ice predictions (targeting February 2018). Simple metrics, such as the monthly-average sea-ice extent and date of ice retreat in key regions of the Southern Ocean will be used to establish the baseline skill of the forecast systems.

4. Design of the YOPP prediction experiment (mid-2018). Based on the lessons learnt from the first set of forecasts (previous point) and depending on the specific location of YOPP field campaigns that will take place during the Special Observing Period of January-February 2019, a tailored forecast experiment will be designed for austral summer 2019. The goal of this experiment will be to test the ability of prediction systems to support the deployment of field campaigns.

5. Prediction for Special Observing Period (mid 2018 - Feb 2019). Following phase 4, an invitation to submit austral sea-ice forecasts will be sent out to the community. Specific questions directly related to the YOPP activities will be formulated such as "What is the probability that site X is ice-free for at least 20 days of January".

6. Post-prediction analysis (early-2019). A critical review of the three prediction exercises (September 2017, February 2018 and February 2019) will be conducted with special emphasis on the last prediction. Results of the analyses will be advertised through joint presentations at workshops and international conferences and through a joint peer-reviewed paper.

7. Legacy (2019-). The possibility to sustain SIPN South will be investigated, depending on interest, enthusiasm and possibilities of funding.

CONCLUSIONS

SIPN South will coordinate the expanding interest of the ever-growing community of polar prediction to the Southern Ocean. Given the limited existing resources, SIPN South will make maximal use of the leverage effect of SIPN. A two-year plan is proposed in this document in order to better evaluate sea-ice prediction capabilities around Antarctica and bring together many groups that may not even know each other today.

SIPN South is designed as an academic and a practical exercise. Results obtained will be certainly insightful for SIPN – they will definitely put into perspective the results of Arctic predictions. SIPN South is also tightly

linked to the ongoing Year Of Polar Prediction. By coordinating for the first time a Southern Ocean sea-ice forecast in realistic conditions, SIPN South will assist to evaluate whether current seasonal sea-ice prediction systems are apt tools for decision-making in Antarctica.

Timeline

2017-06-01 - 2019-06-30

Regional emphasis

Northern hemisphere: No

Southern hemisphere: Yes

Further specification

Particular attention will be paid to the Ross Sea, Weddell Sea and Amundsen-Bellingshausen Sea.

Key project deliverables

June-September 2017: circumpolar Antarctic sea ice extent forecasts collected as part of the regular SIPN activities

September 2017: Website up and running

November 2017-February 2018: Simple coordinated forecast experiment + analyses

September 2018: Design the YOPP's Special Observing Period coordinated sea ice forecast

February 2019: Coordinated forecasts for the YOPP Special Observing Period

March 2019: Post-prediction analysis

June 2019: Legacy

Data management

First year: on regular SIPN's data base

Second and third year: on a personal webpage

Data will be open to anyone.

Is data provided to WMO Global Telecommunication System

No

Other information

A more detailed and graphical view on the project can be obtained at this URL:

http://www.climate.be/users/fmasson/SIPN-South_20170531.pdf

In addition, it is worth knowing that SIPN South runs on a non-funded and voluntary basis. It is coordinated by a team of passionate people whose individual research themes are –for all of them- much broader than Antarctic sea-ice prediction itself. Since SIPN South will be maintained entirely thanks to in-kind contributions, the aim is to make it as “light” as possible and make maximal use of existing resources, notably from SIPN. It is appropriate to highlight that SIPN South has received a full and much welcome endorsement from the SIPN steering group.