Reaping the Fruit of the Sea Ice Drift Forecast Experiment

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BMBF Research Group Seamless Sea Ice Prediction

SIDFEx Team:

Axel Schweiger, Ed Blanchard-Wrigglesworth, Thomas Krumpen, Marcel Nicolaus, Ignatius Rigor, Bob Grumbine, Frank Kauker, Rüdiger Gerdes, and Simon Reifenberg, Wendy Ermold, François Massonnet, Quentin Dalaiden, Pam Posey, Joe Metzger, Michael Phelps, Laurent Bertino, Malte Müller, Maxime Beauchamp, Amy Solomon, Janet Intrieri, Frédéric Dupont, Yukie Hata, Ed Blockley, Nick Szapiro, Mario Hoppmann, Steffen Tietsche, Jennifer Hutchings, Thomas Rackow, Till Rasmussen

YOPP Science Workshop, 17—18 February 2020, Bremerhaven

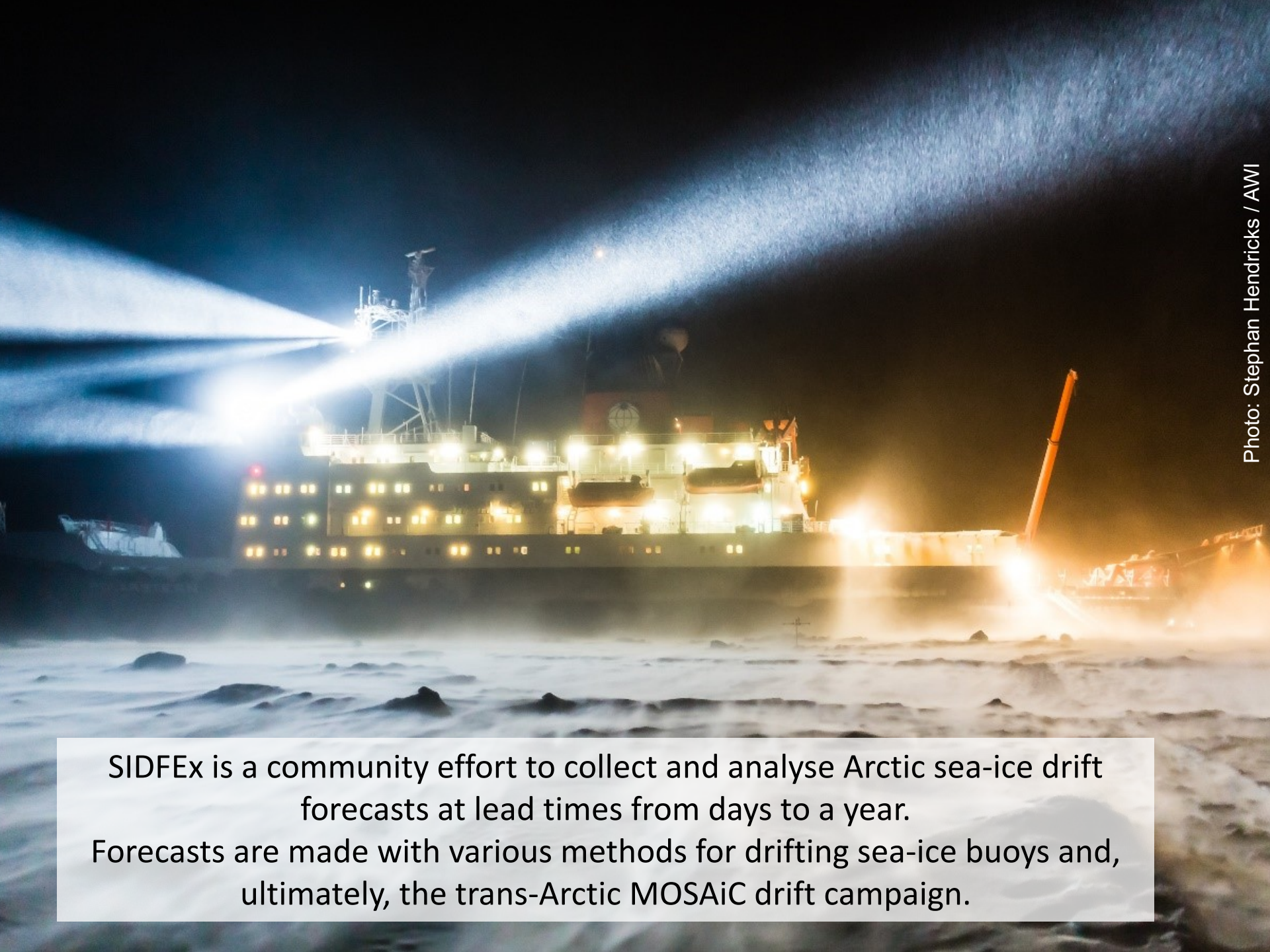

Photo: Stephan Hendricks / AWI

SIDFEx is a community effort to collect and analyse Arctic sea-ice drift forecasts at lead times from days to a year.
Forecasts are made with various methods for drifting sea-ice buoys and, ultimately, the trans-Arctic MOSAiC drift campaign.

Why?

... to intercompare ice drift forecast skill across various systems

... to find hints toward forecast system improvements

... to support the MOSAiC campaign

... to develop “consensus drift forecast” techniques for future applications

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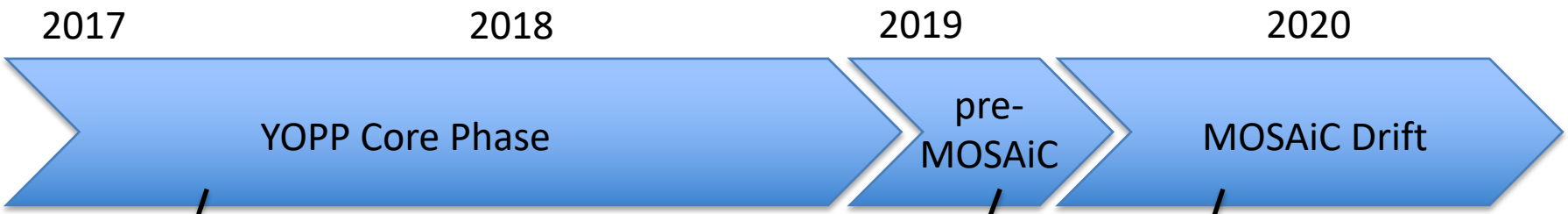
Implementation



Phase I)
Collect forecasts for 5⁺ selected IABP buoys, start 1st June 2017

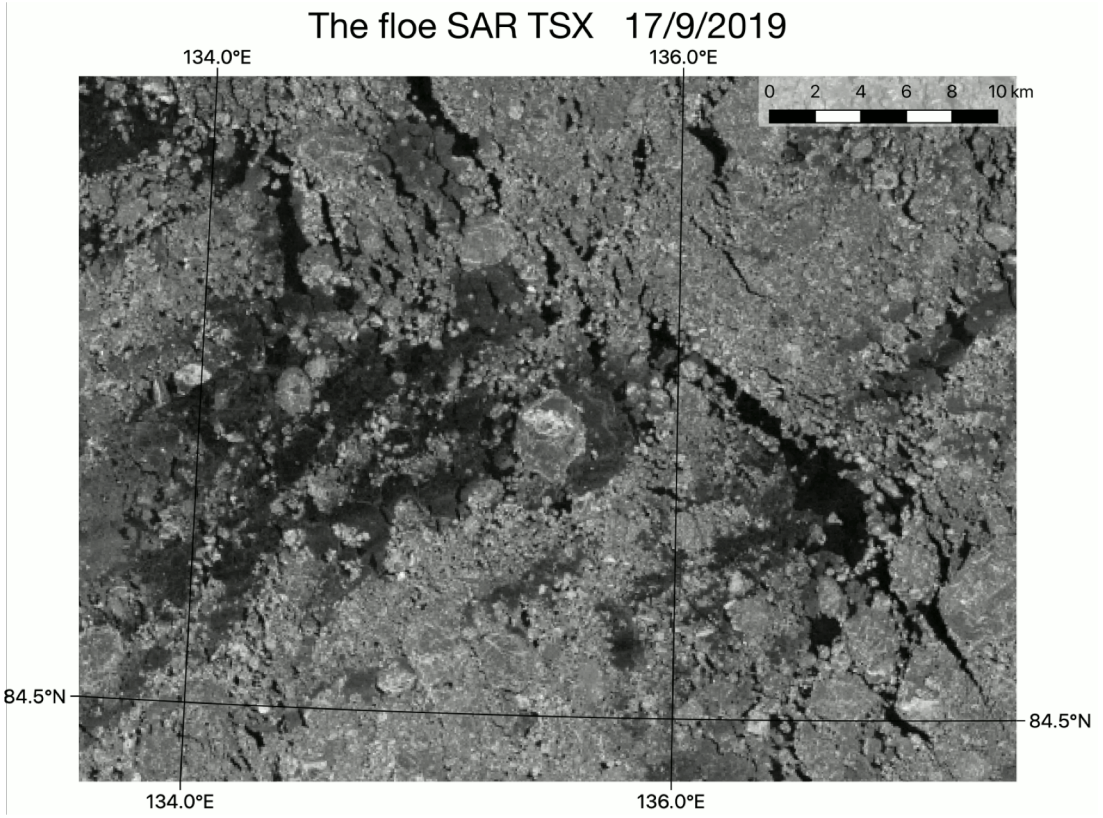
Phase II)
In addition, target points relevant for *Polarstern* drift start position

Phase III)

During drift, provide forecasts for operational planning support

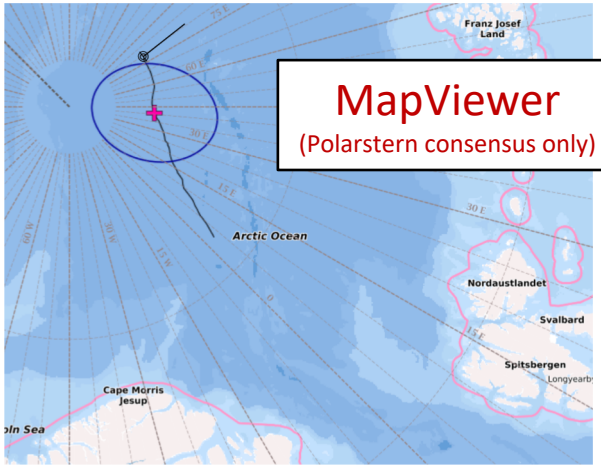
Use case: satellite data ordering

- Comprehensive satellite remote sensing dataset
- Especially, almost all SAR sensors:
  - Sentinel-1 (C-band)
  - Radarsat-2/Radarsat Constellation Mission (C-band)
  - COSMO-SkyMed (C-band)
  - ALOS-2 PALSAR (L-band)
  - TerraSAR-X & PAZ (X-band)
  - KOMPSAT-5 (X-band)
  - SAOCOM (L-band)
- Several acquisitions per day
- Sentinel-1 and TerraSAR-X available onboard
- Great for floe search and sea ice dynamics



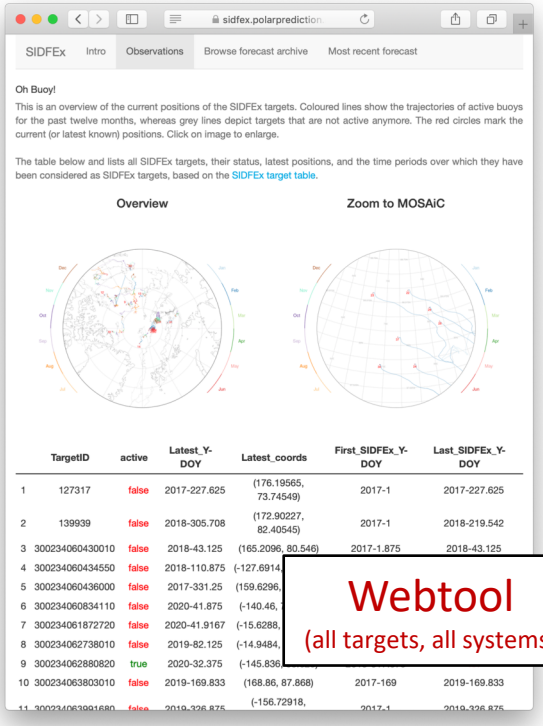
slide courtesy Gunnar Spreen

Live Demo



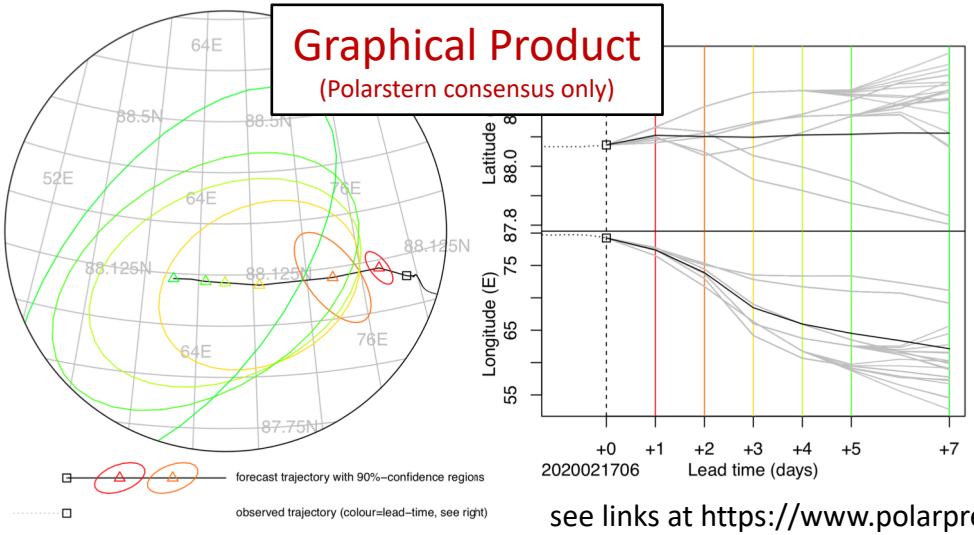
MapViewer
(Polarstern consensus only)

non-public URL



Webtool
(all targets, all systems)

https://sidfex.polarprediction.net/



Graphical Product
(Polarstern consensus only)

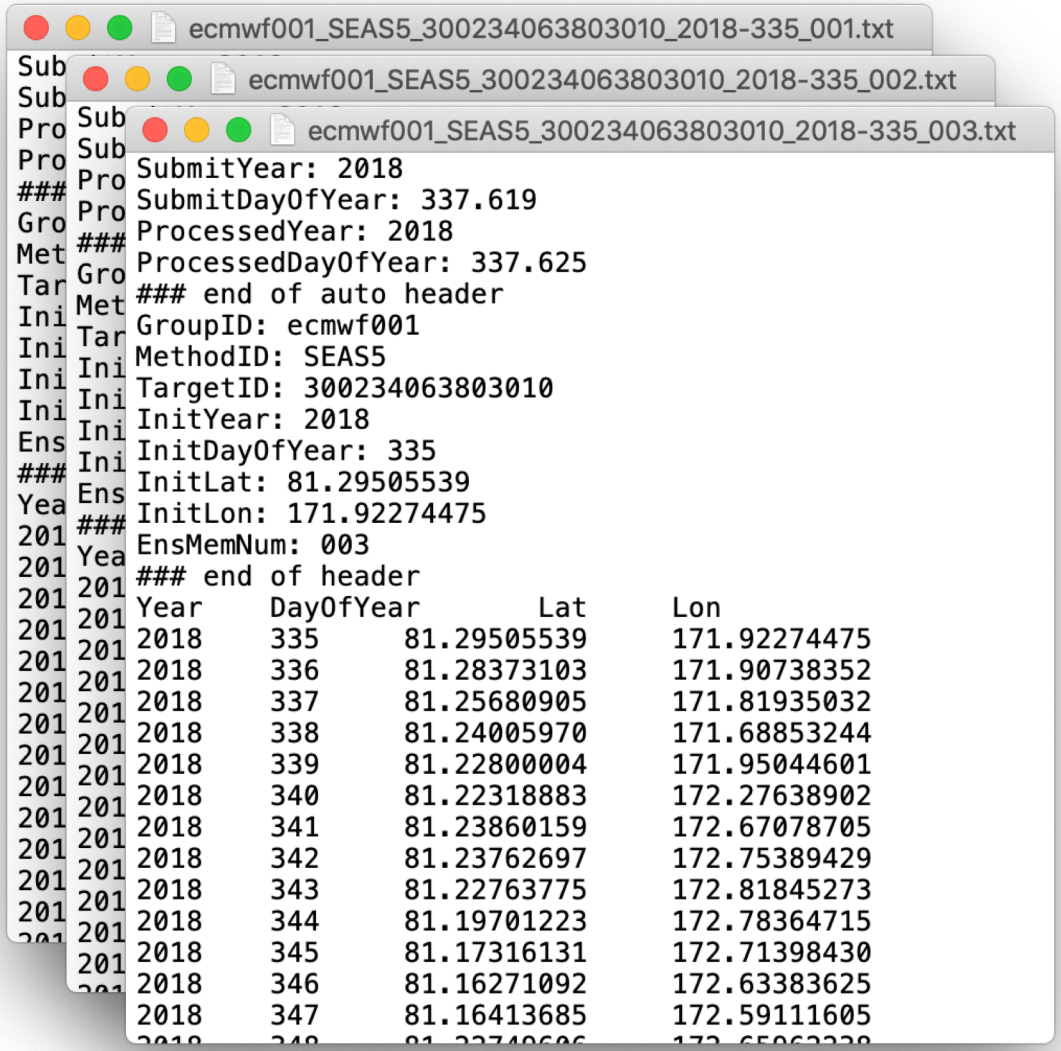
spheRlab

R-package
(everything)

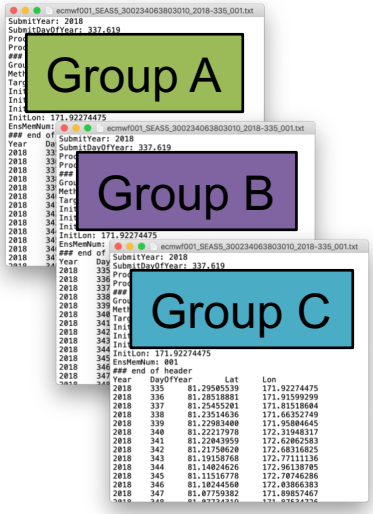
https://github.com/helgegoessling/SIDFEx

see links at https://www.polarprediction.net -> SIDFEx

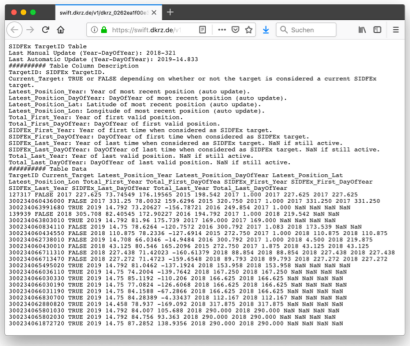
Implementation



Implementation



Public list of targets
(positions updated hourly)



Upload through „CURL“ to DKRZ Cloud Service
(automatable, credentials per group)

Automatic format check and addition of header
(documentation of submission and processing time)

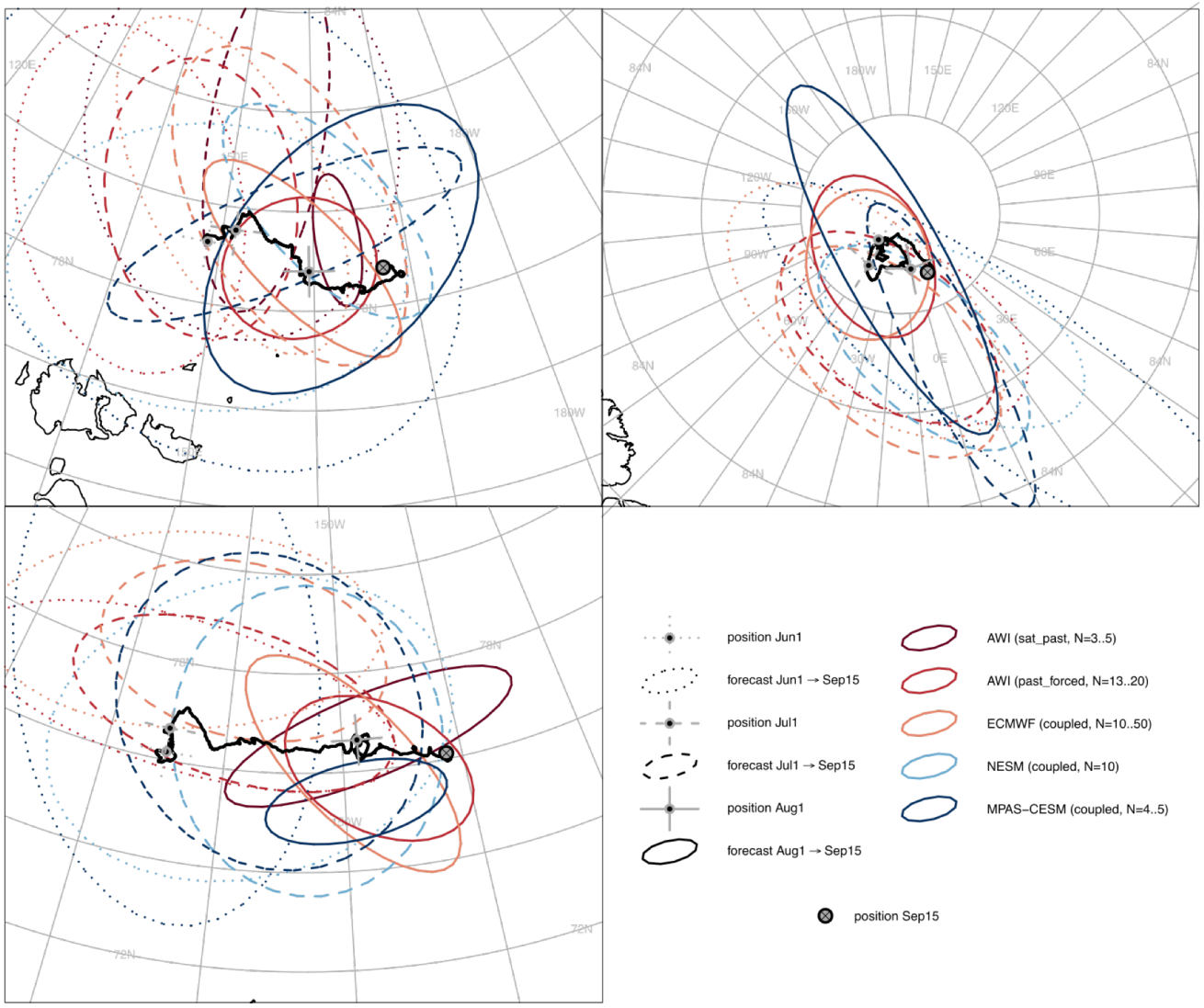
Update of data index & tar.gz archive

Upload to public folder of DKRZ Cloud Service

Hourly CRON-job

R package (GitHub) & „Shiny App“

Results – seasonal



see SIO 2017, 2018, 2019 post-season report

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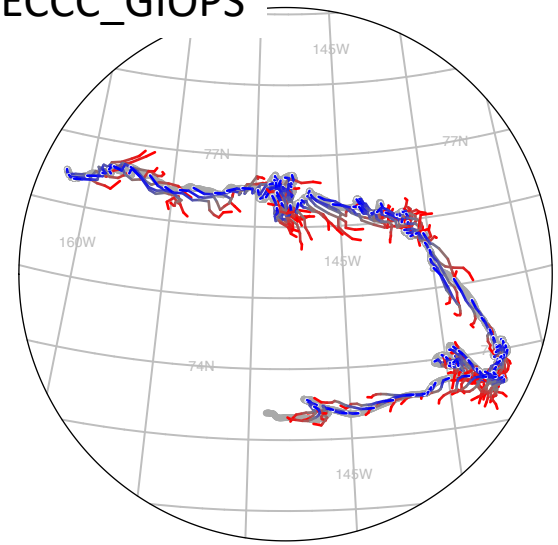
Results – short-term

TargetID 300234063991680
Time range 10 Jul – 20 Dec `18

ECCC_GIOPS



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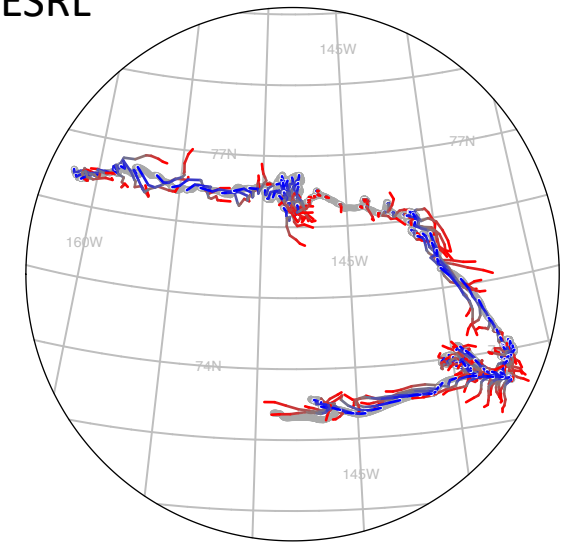
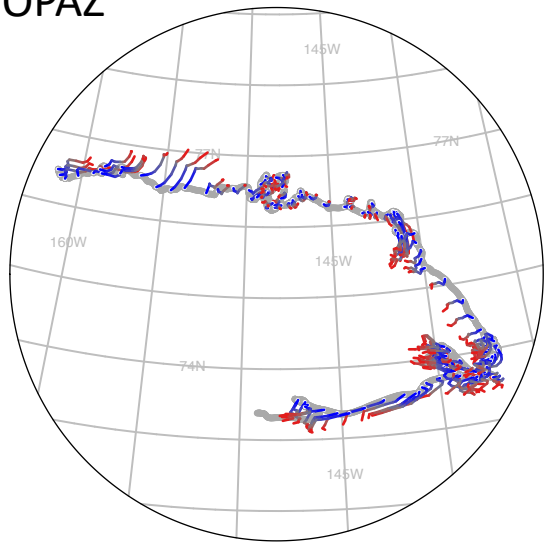
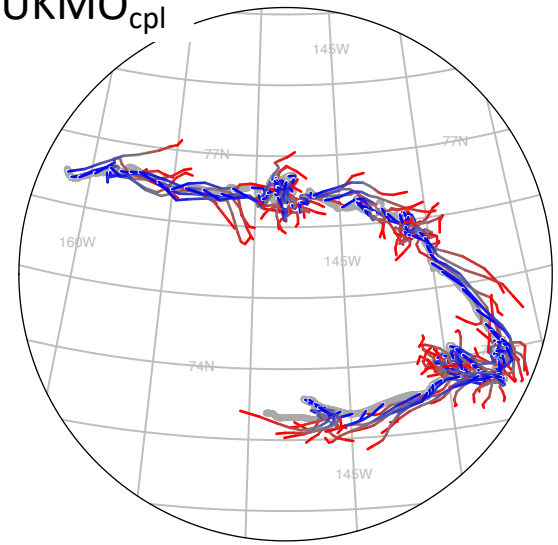


TOPAZ



$UKMO_{cpl}$



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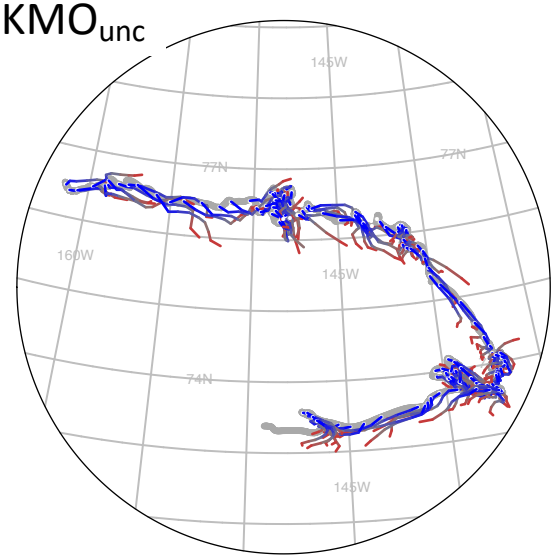
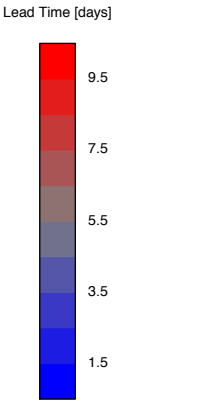


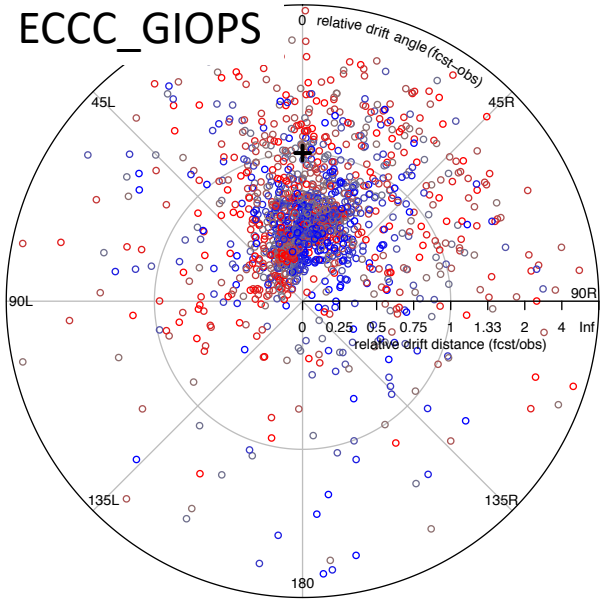


FirstInit.Year=2018 FirstInit.DayOfYear=191
LastInit.Year=2018 LastInit.DayOfYear=341

Results – short-term

TargetID 300234063991680
Time range 10 Jul – 20 Dec `18

ECCC_GIOPS



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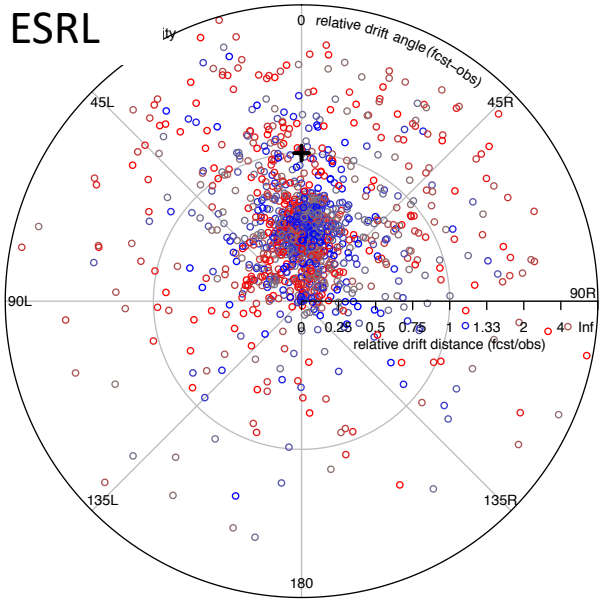

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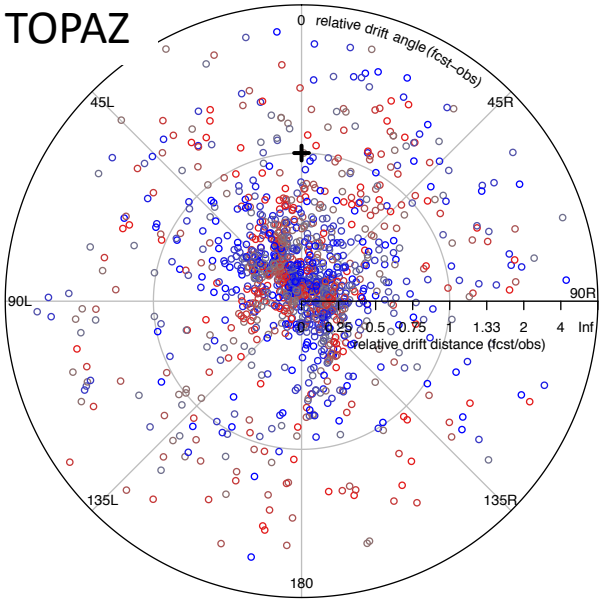

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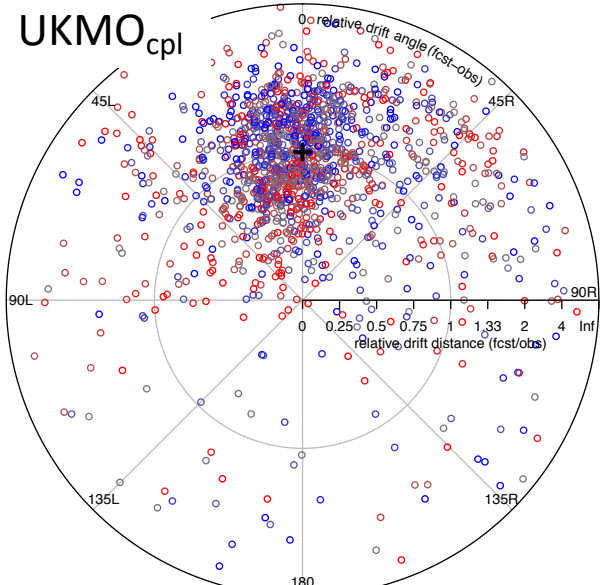

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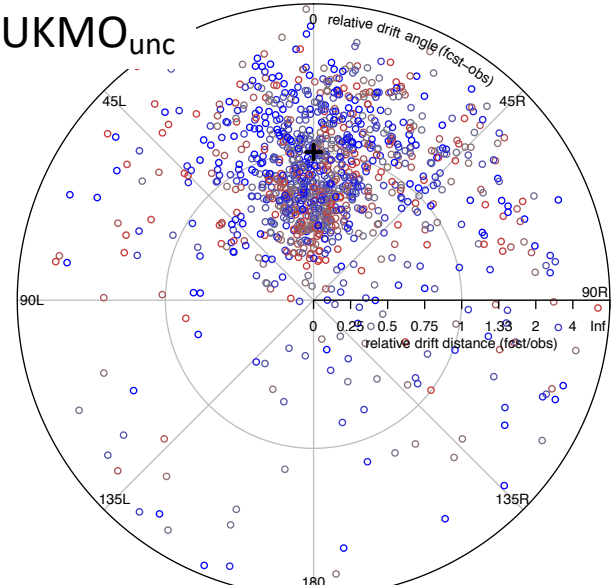

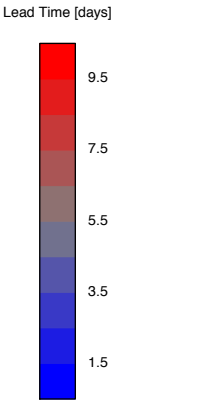

FirstInit.Year=2018 FirstInit.DayOfYear=191
LastInit.Year=2018 LastInit.DayOfYear=341

Results – short-term

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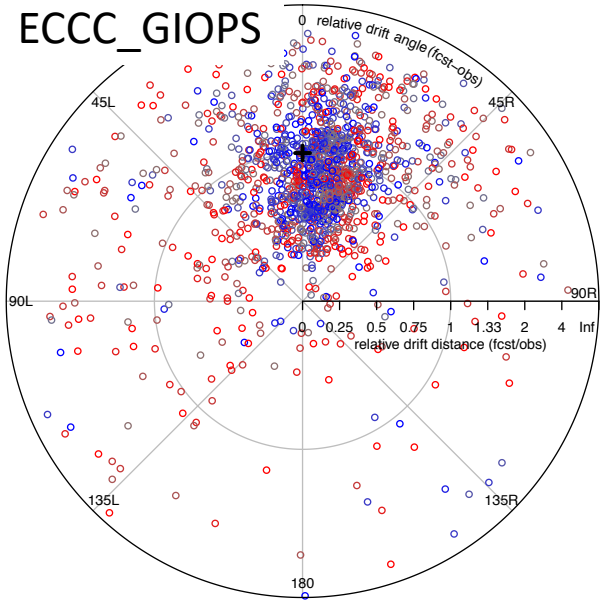
Time range 10 Jul – 20 Dec `18

ECCC_GIOPS



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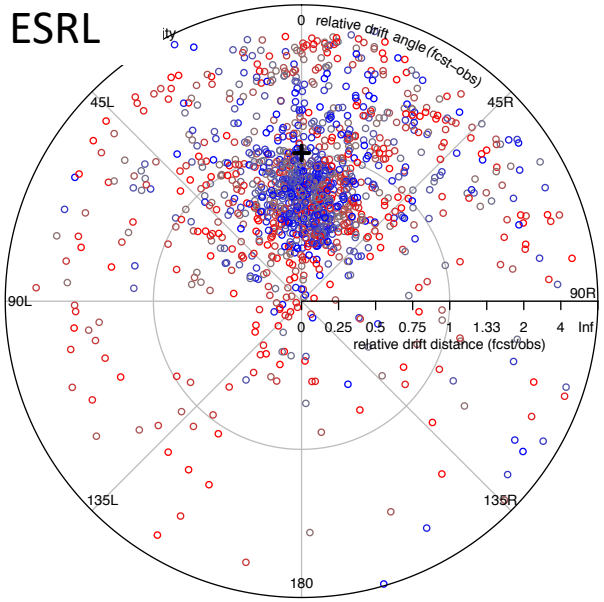

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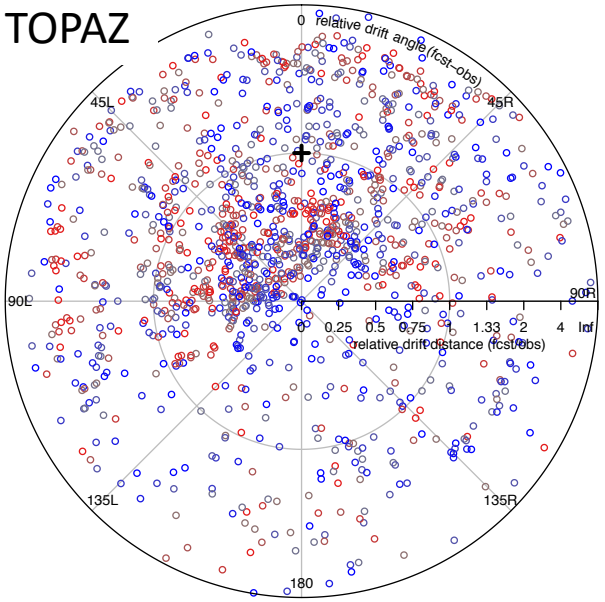

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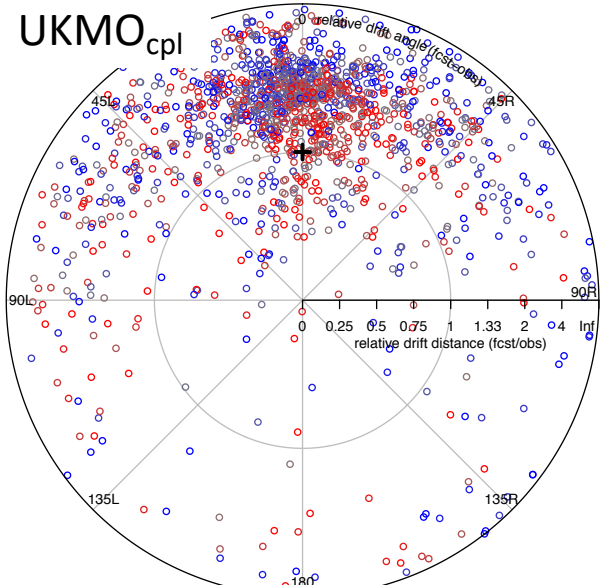

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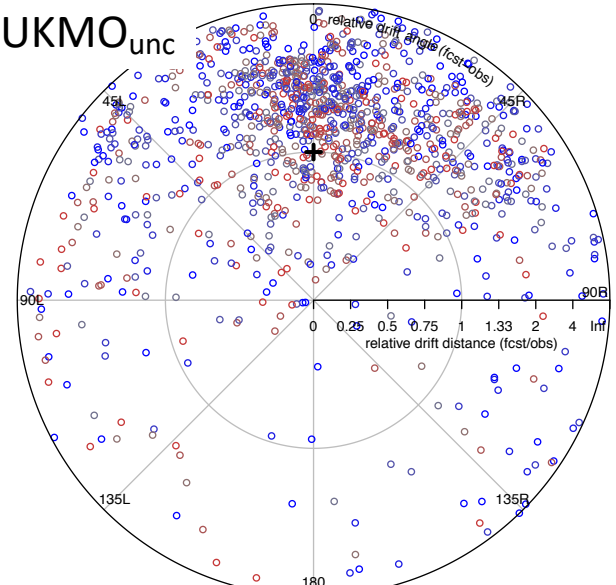

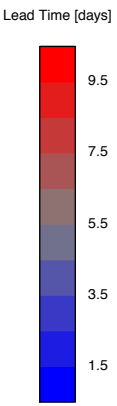

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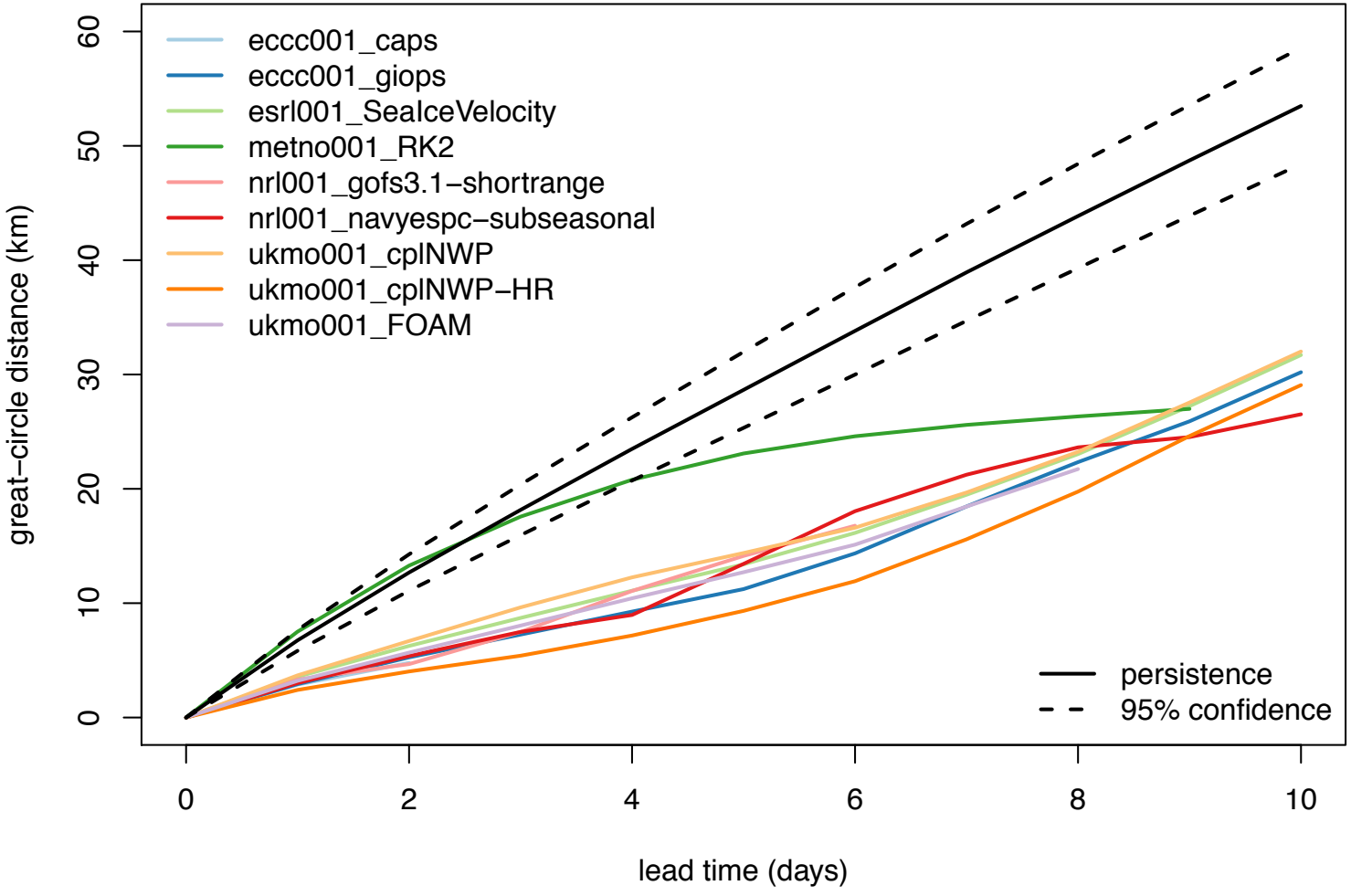
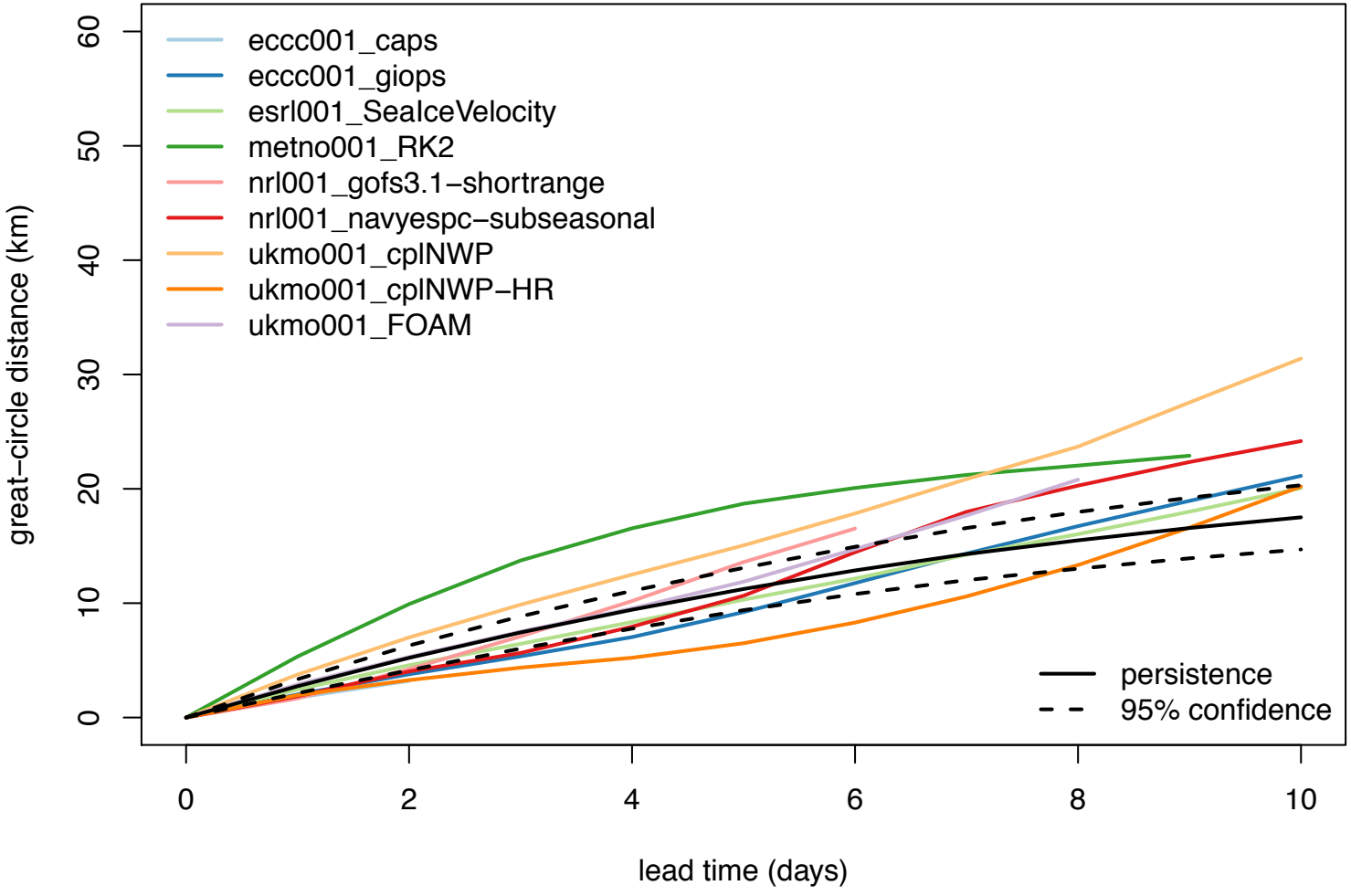
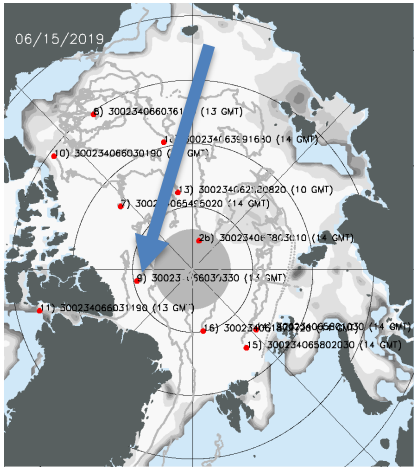
Results – short-term



Results – short-term





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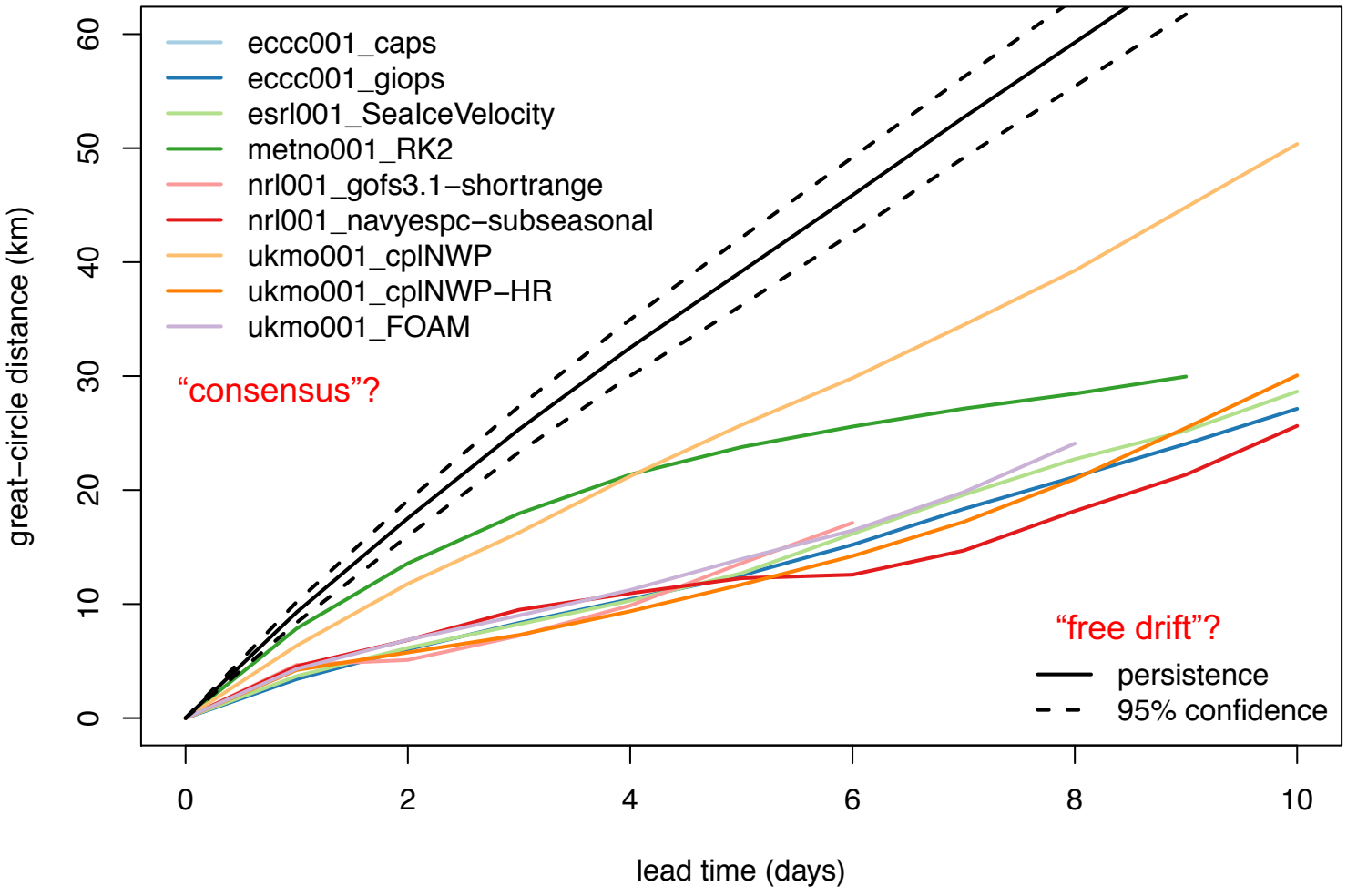
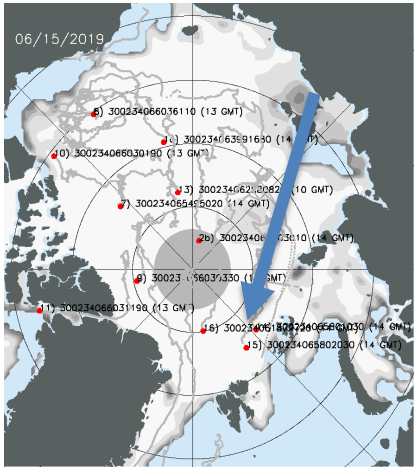
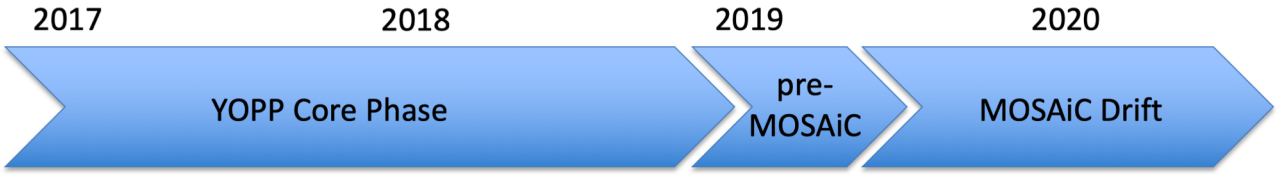
Results – short-term





Outlook

- SIDFEx community papers
- Deformation forecasts (MOSAiC Distributed Network)
- Upgrade the consensus forecast (level of sophistication to be determined)
- How best to exploit the SIDFEx dataset to learn about model deficits and improve the forecast systems?
- Continuation beyond MOSAiC?
- „Knowledge transfer“ for Search-And-Rescue?