The SIDFEx Team*

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Attendance

14:00-15:45

The Sea Ice Drift Forecast Experiment (SIDFEx): Introduction and applications

1) In a nutshell

- SIDFEx contains >180k lagrangian drift forecasts for selected Arctic and Antarctic assets since 2017
- Forecasts are made using diverse approaches (dynamical models, free drift, climatology…, see 2) and 3)) at daily-to-seasonal lead times
- Use cases: Cruise planning and operational support (see 4)), deformation forecasts (see 5))
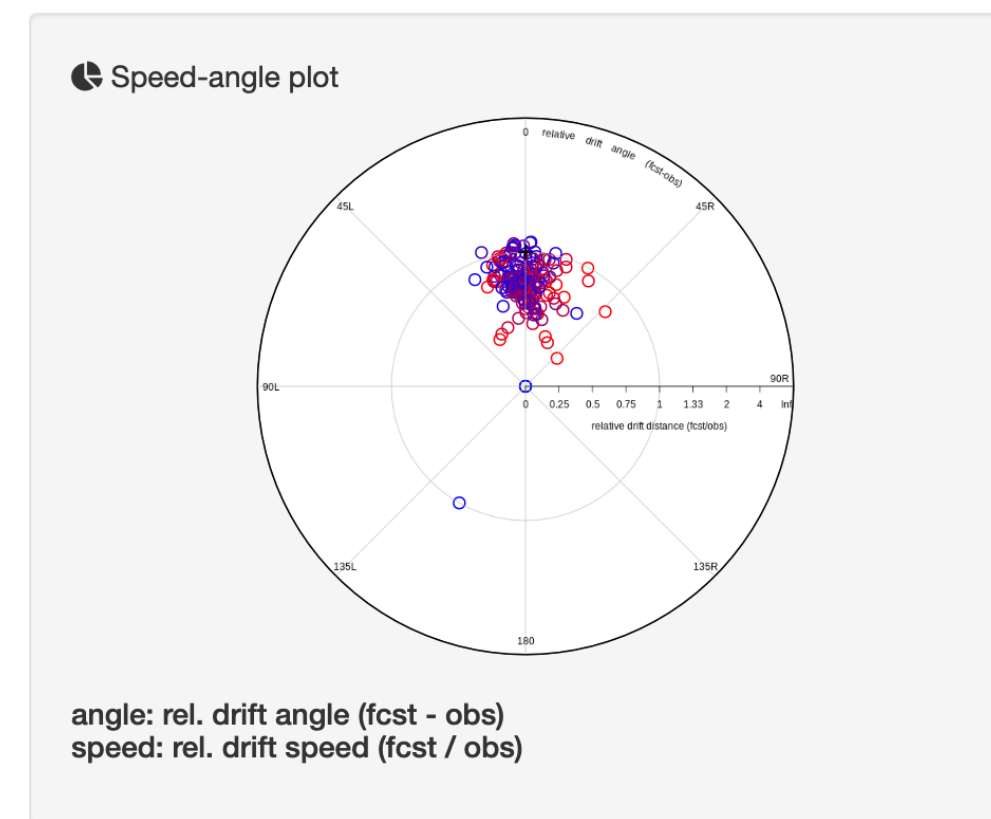- Interactive analysis:

Target ID
300234065495020

GroupID_MethodID
metno001_TOPAZ4calib

Initialization time
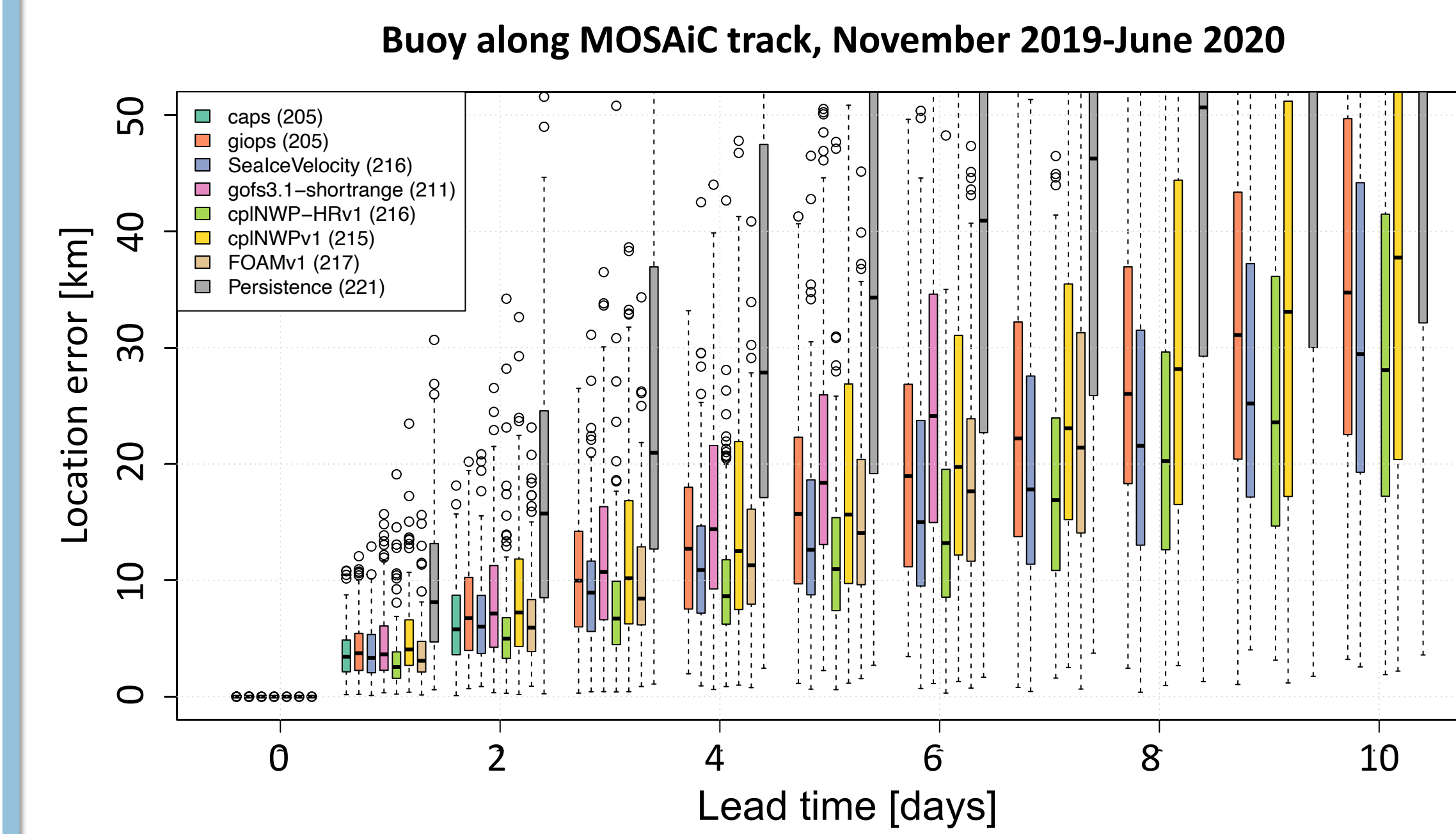2023-03-18   to   2023-04-18

✔ Done with that!

Select forecast(s) from list:
metno001_TOPAZ4calib_300234065495020_2023-77, me

Speed-angle plot

angle: rel. drift angle (fcst - obs)
speed: rel. drift speed (fcst / obs)

Scan for having a look at the forecasts!

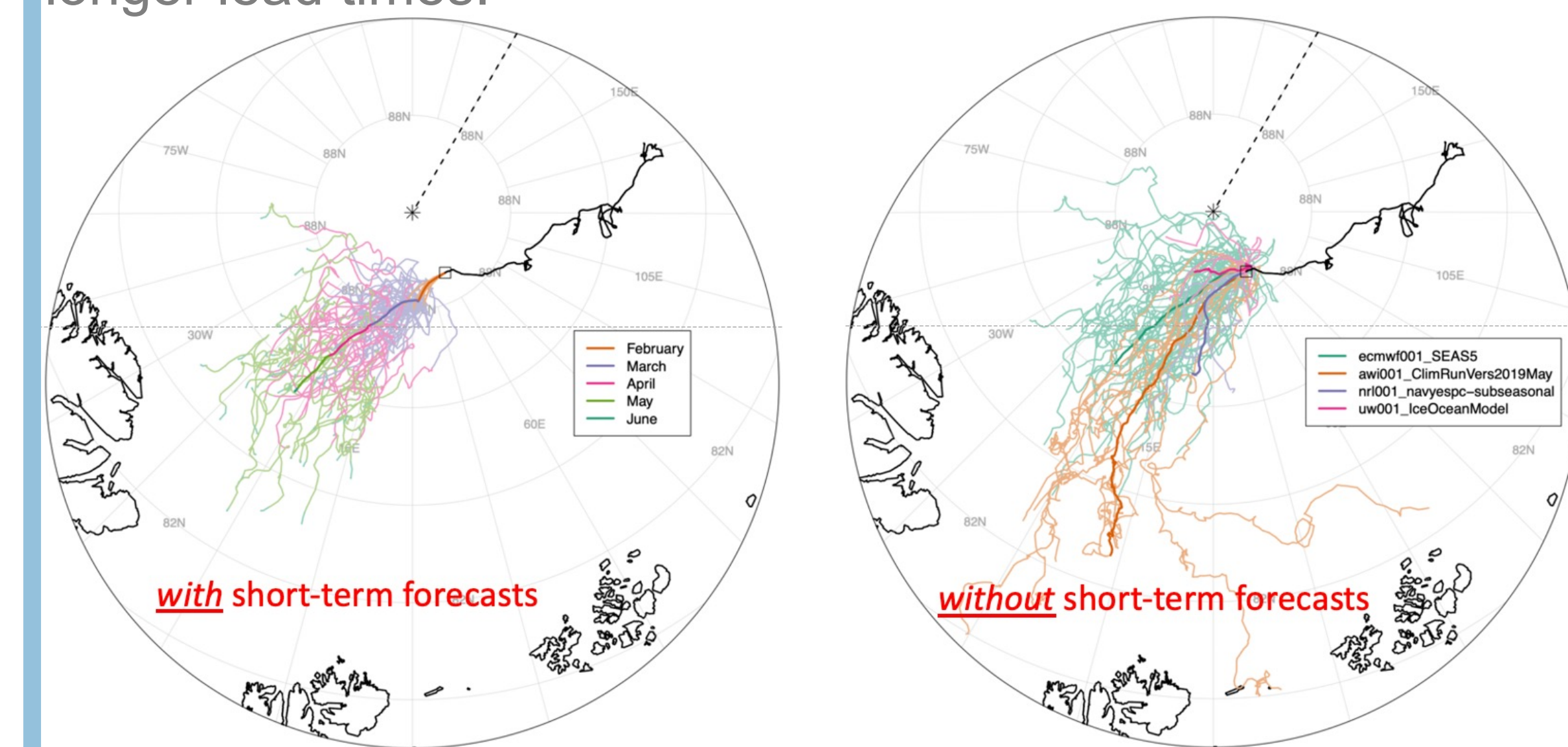## 2) Forecast system intercomparison

A decisive advantage of our database is that it comprises forecasts from different systems for a consistent set of targets, allowing quantitative intercomparison. Below, we show how the location error develops as a function of the lead time.

Buoy along MOSAiC track, November 2019-June 2020

Legend:
- caps (205)
- giops (205)
- SealceVelocity (216)
- gofs3.1–shortrange (211)
- cplNWP–HRv1 (216)
- cplNWPv1 (215)
- FOAMv1 (217)
- Persistence (221)

Location error [km] vs Lead time [days]

- Each coloured rectangle: one forecast system
- Grey rectangle: benchmark metric, assuming that drift continues linearly after day 0
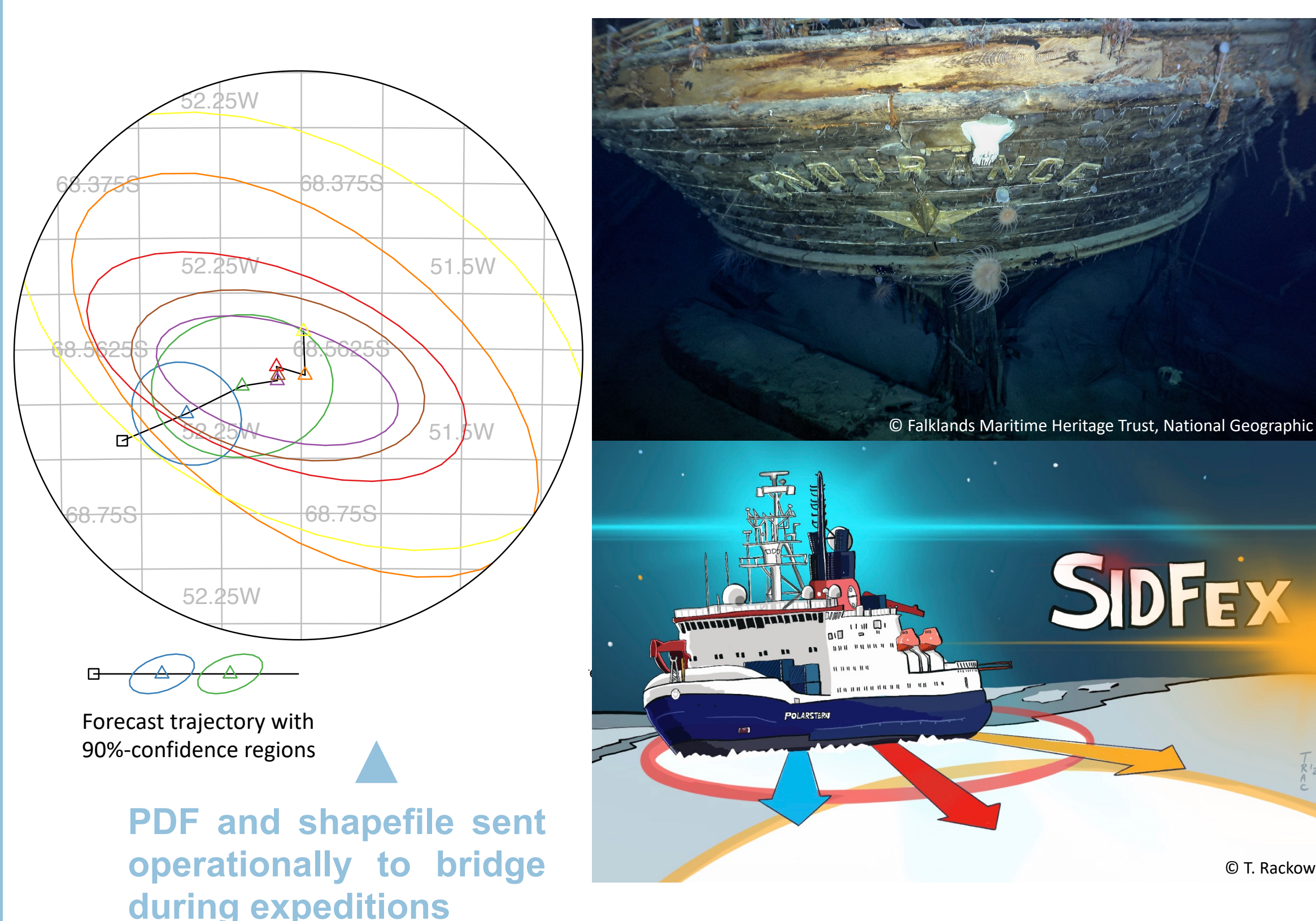
3) Consensus forecast

We developed a method to combine several short-term forecasts with a seasonal forecast. It makes best use of all short-term forecasts for up to 10 days lead time and guarantees a seamless transition to a seasonal forecasts for longer lead times.

Legend left:
- February
- March
- April
- May
- June

Legend right:
- ecmwf001_SEAS5
- awi001_ClimRunVers2019May
- nrl001_navyesc–subseasonal
- uw001_IceOceanModel

with short-term forecasts   *without* short-term forecasts

Seasonal sea-ice drift forecasts without and with information from short-term forecasts
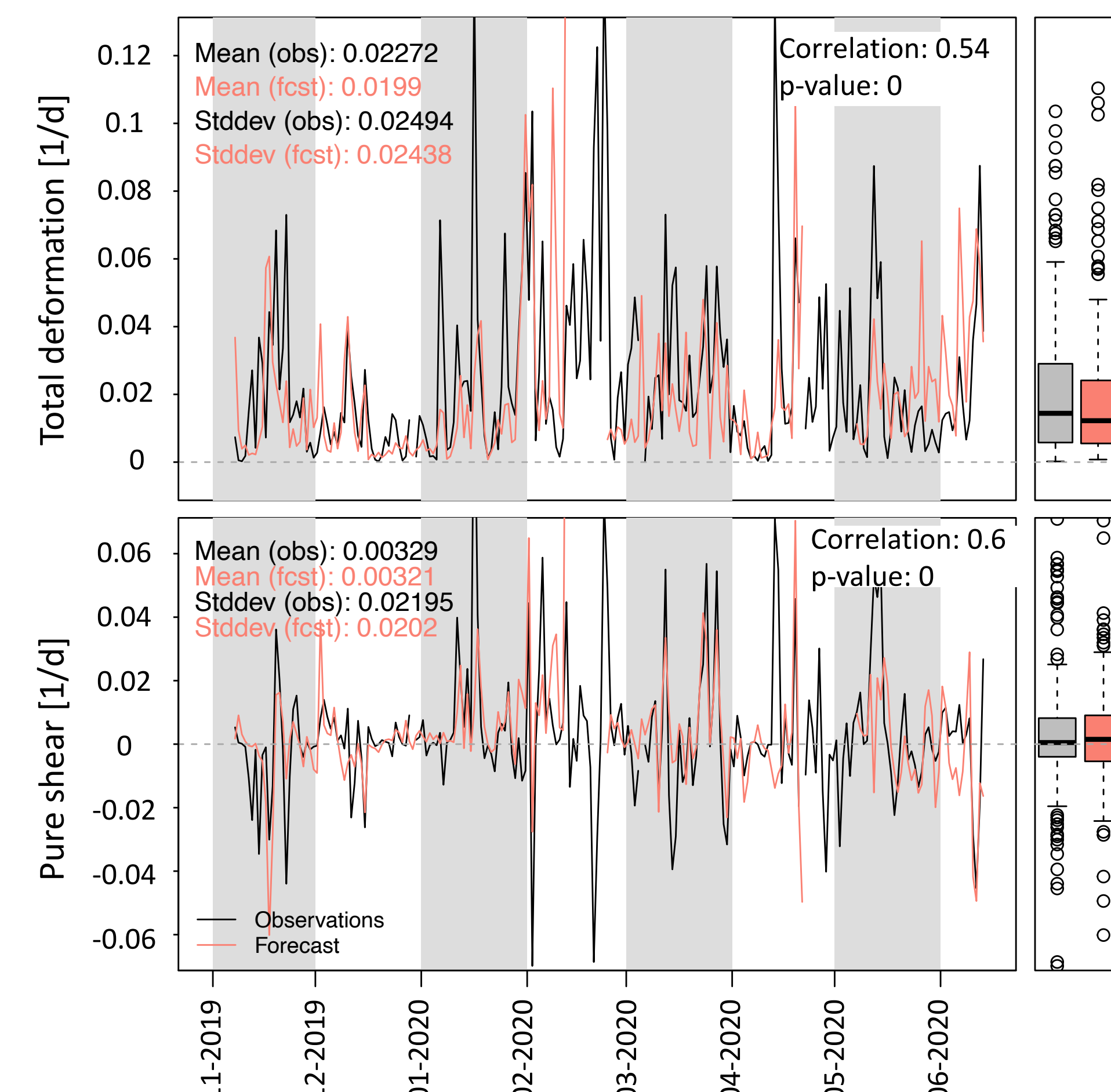
4) MOSAiC & Endurance22

To support research cruises, we provide them near-real-time forecasts for the sea-ice drift in their vicinity. This helps them to plan their track and order SAR images. In doing this, we contributed to the success of MOSAiC and the finding of the Endurance.

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Forecast trajectory with 90%-confidence regions

PDF and shapefile sent operationally to bridge during expeditions
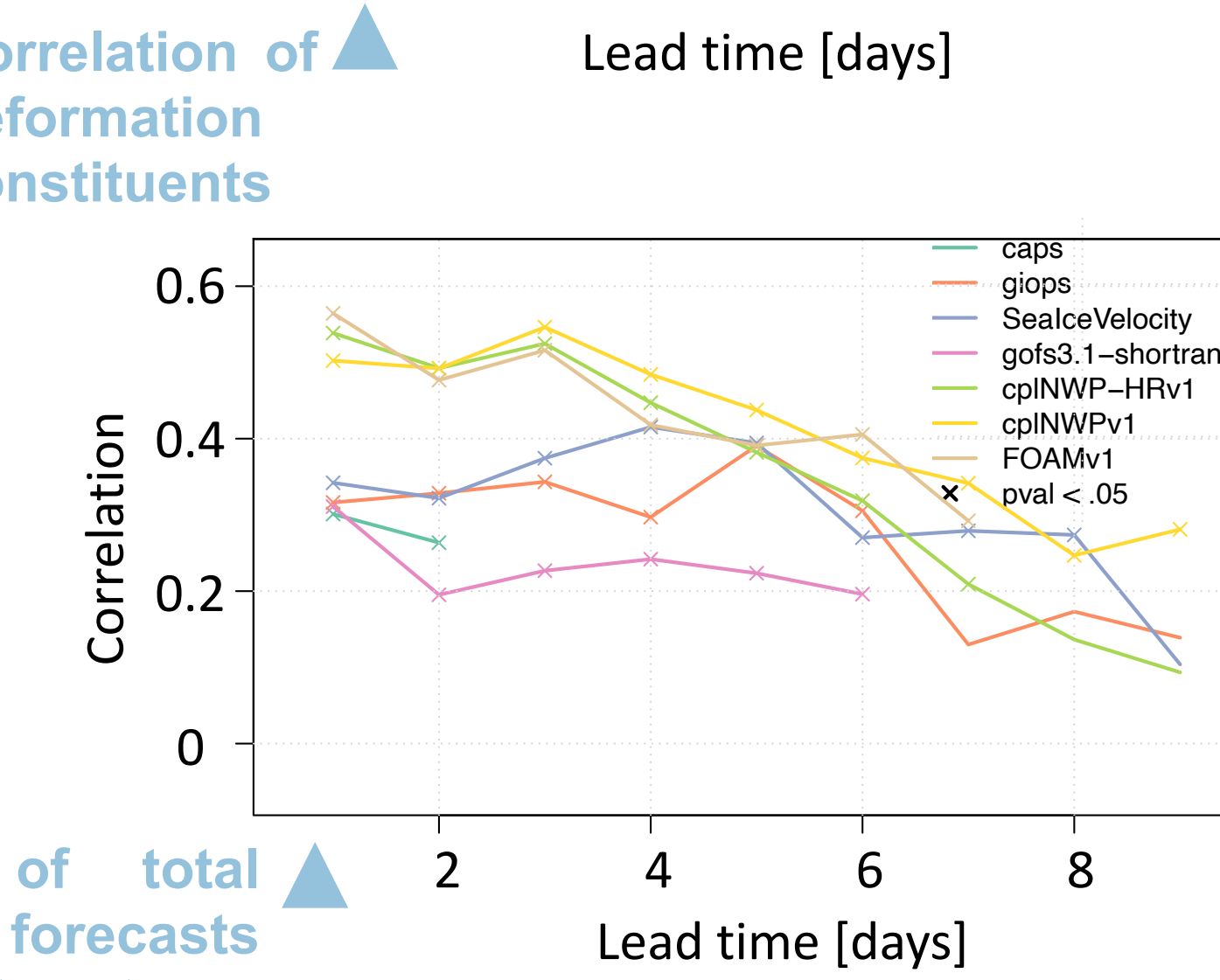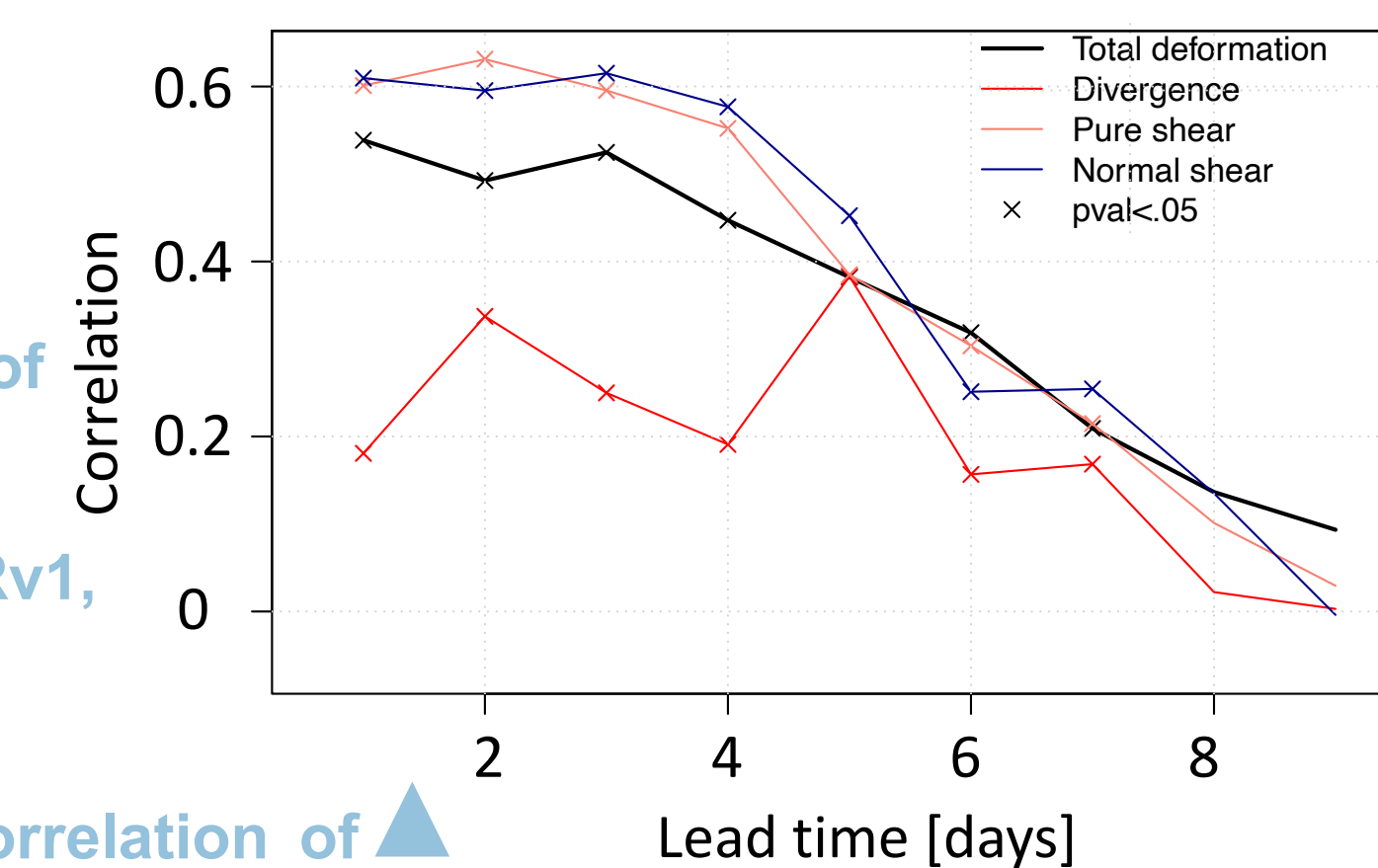
5) Deformation forecasts

We are investigating the skill of our forecasts to predict sea-ice deformation. This works reasonably on the scale of the Distributed Network, an array of buoys deployed during MOSAiC. It works even better on pan-Arctic scales (not shown).

Total deformation [1/d]:
Mean (obs): 0.02272
Mean (fcst): 0.0199
Stddev (obs): 0.02494
Stddev (fcst): 0.02438
Correlation: 0.54
p-value: 0

Pure shear [1/d]:
Mean (obs): 0.00329
Mean (fcst): 0.00321
Stddev (obs): 0.02195
Stddev (fcst): 0.0202
Correlation: 0.6
p-value: 0

Legend:
- Observations
- Forecast

Timeseries of one system (cplNWP-HRv1, see 2)

Correlation plot legend:
- Total deformation
- Divergence
- Pure shear
- Normal shear
- × pval<.05

Correlation of deformation constituents

Correlation plot legend:
- caps
- giops
- SealceVelocity
- gofs3.1–shortrange
- cplNWP–HRv1
- cplNWPv1
- FOAMv1
- × pval < .05

Correlation of total deformation forecasts from different systems

6) The SIDFEx CV

The original purpose of SIDFEx in 2017 was to find the best MOSAiC starting position and support the expedition. Over time, more buoys were added, yielding a forecast database which covers most of the Western and Central Arctic and even some Antarctic forecasts.

2017   2018   2019
2020   2021   2022

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