First results from a new interdisciplinary robotic vehicle for under-ice research
What is an under-ice ROV (good for)?

(ROV = Remotely Operated Vehicle)

investigate spatial variability

3x more

2015
1980

1m
2m
3m
Current ROV setup (Codename: BEAST)

Base Model:
V8 M500
INTERVENTION
Ocean Modules
ROV Systems
Sweden

More information: sensor.awi.de
1st mission: PS101 (Sep-Oct 2016)
6 successful ROV ice stations in conjunction with other ice work

All systems acquired data successfully

Very complex system

Ongoing data processing, archiving and evaluation
Upward looking camera
Light transmittance during freeze-up

- yellow = open water over the floe edge (and access hole)
- green = thin ice with higher transmittance
- blue = second year ice with low transmittance (snow covered)
Light transmittance during freeze-up

- Light transmittance decreases during freeze-up mostly due to snowfall
- Late autumn: still light transmission through young ice and leads
Highlight: under-ice autumn bloom

- Decreasing chlorophyll signal in the mixed layer
- Stunning zooplankton abundances under the ice (not shown)
- Unusually low sea ice concentration in the area

Rare observation in the central Arctic pack ice zone!
Sea ice draft maps from single beam sonar

PS101-142/1/20160926 - Ice Draft map
Sea ice draft distribution from single beam sonar

- Some thick ice (ridges)
- A lot of FYI (mode at 0.8 m)
- Significant contribution of young, thin ice < 0.3 m
- Not biased, unlike traditional, ground-based EM-methods
Multibeam sonar

- 3D mapping
- Ice topography

Comparison to upward looking images
Floe scale maps of ice draft
Multibeam vs. Single beam sonar

PS101-142/1/20160926 - Ice Draft map
Progress & future work

- Data will be made publicly available on PANGAEA
- New AWI data portal (in development)
- Enable full vehicle functionality: Improve positioning system!
- Further payload to be included for next mission:
  - Water sampling bottle, ADCP (watertrack and under-ice turbulence)
  - Zooplankton camera (ROV-LOKI), Under-ice net (ROV-SUIT)

First full-scale science mission during Polarstern cruise with two week drift camp this spring (PS 106, May-June)