Photography encouraged

Absolute Velocity Estimates from a Glider Mounted ADCP

Callum Rollo[1] (c.rollo@uea.ac.uk) Karen J Heywood[1] Rob Hall[1] Alex Phillips[2]
[1]University of East Anglia, Norwich, UK [2]Marine Autonomous Robotics Systems group, Southampton UK

University of East Anglia

COAS Centre for Ocean and Atmospheric Sciences

National Oceanography Centre
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NEXUSS

Introduction | Trials results | Deployment plan | Data qc | Tech specs

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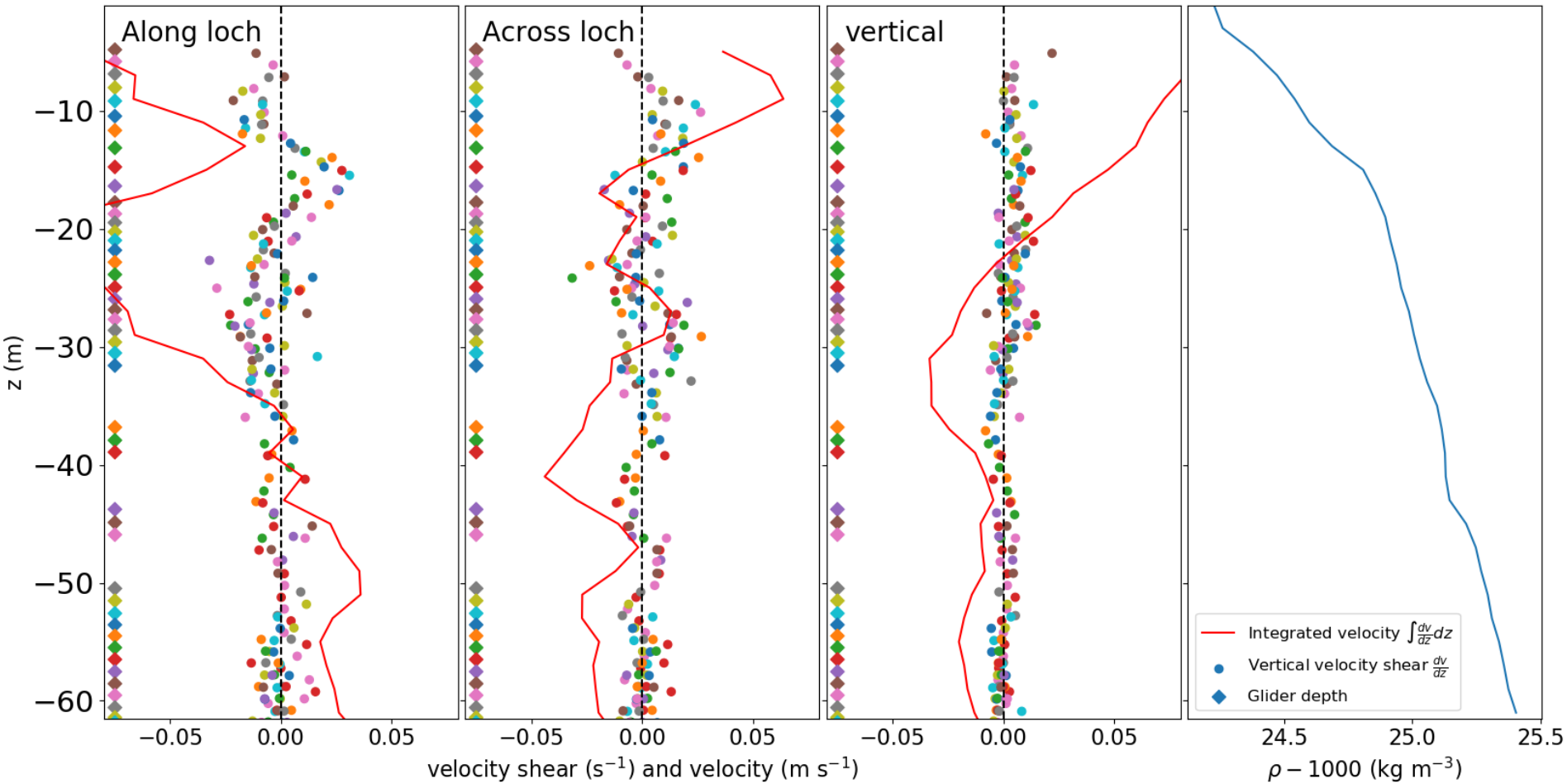

- Vertical shear of horizontal velocity coherent between ensembles
- Strong along loch shear across pycnocline

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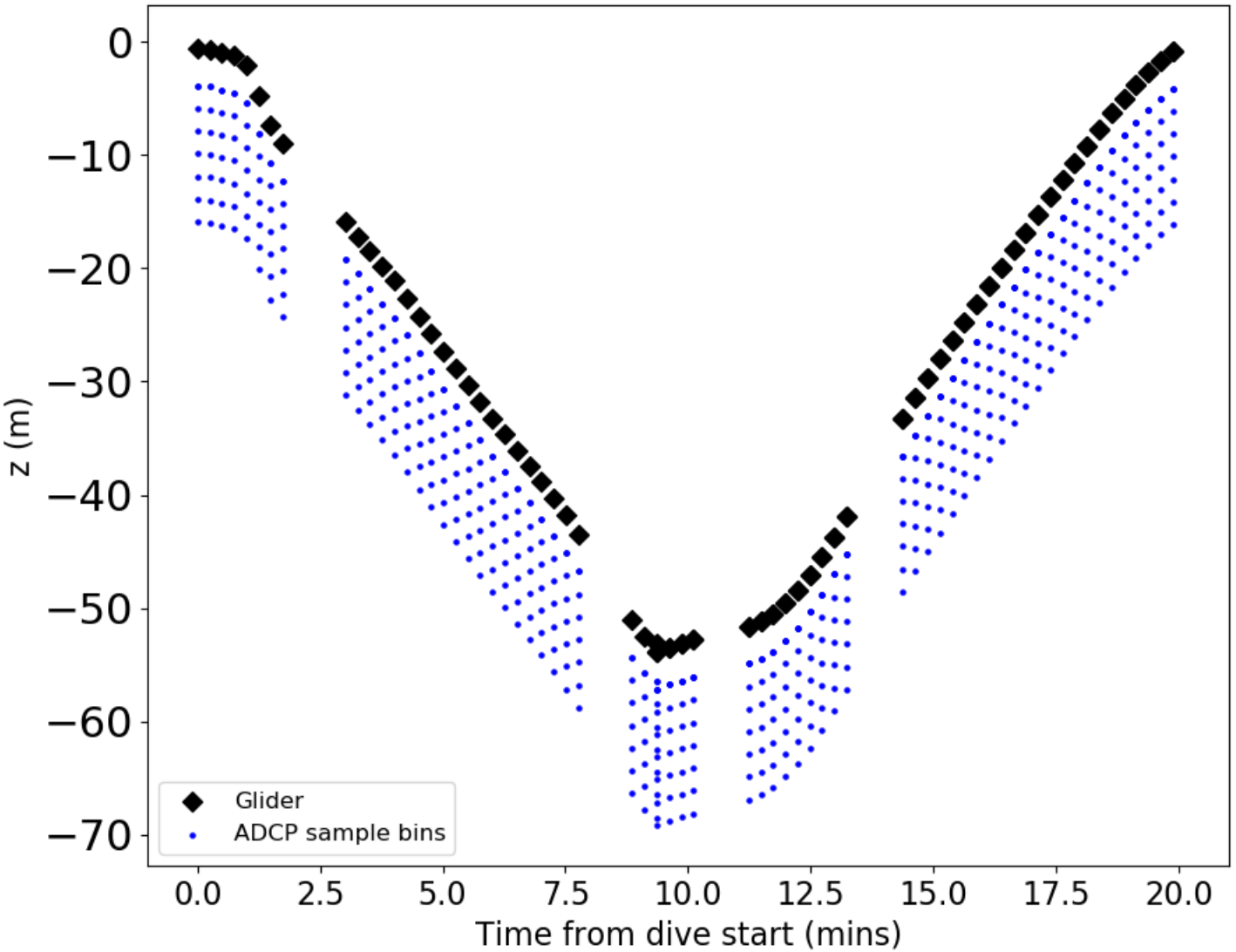

Dive profile from trials with glider depth and bins out to 15 m plotted

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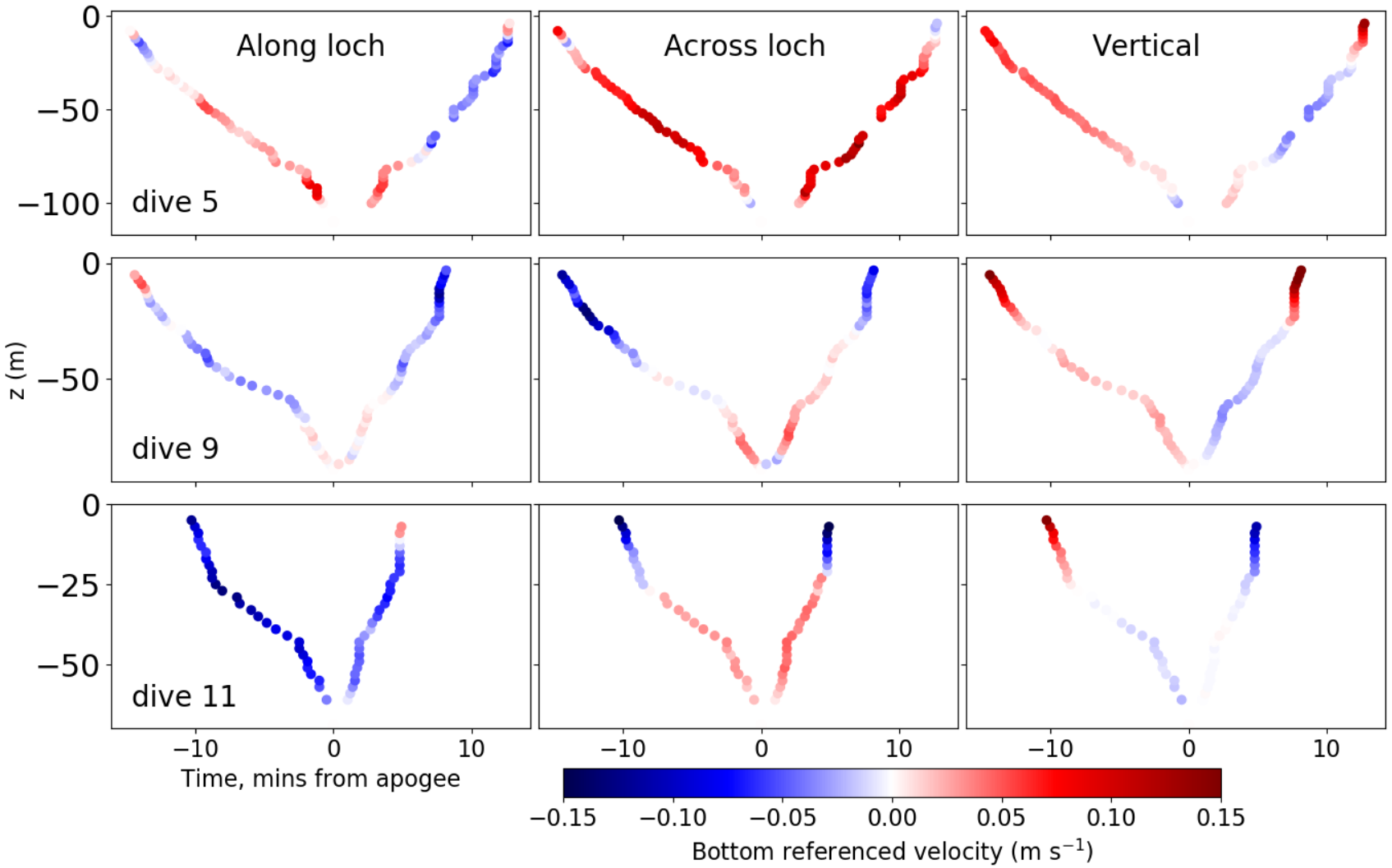

Good agreement for horizontal velocities between descents and ascents

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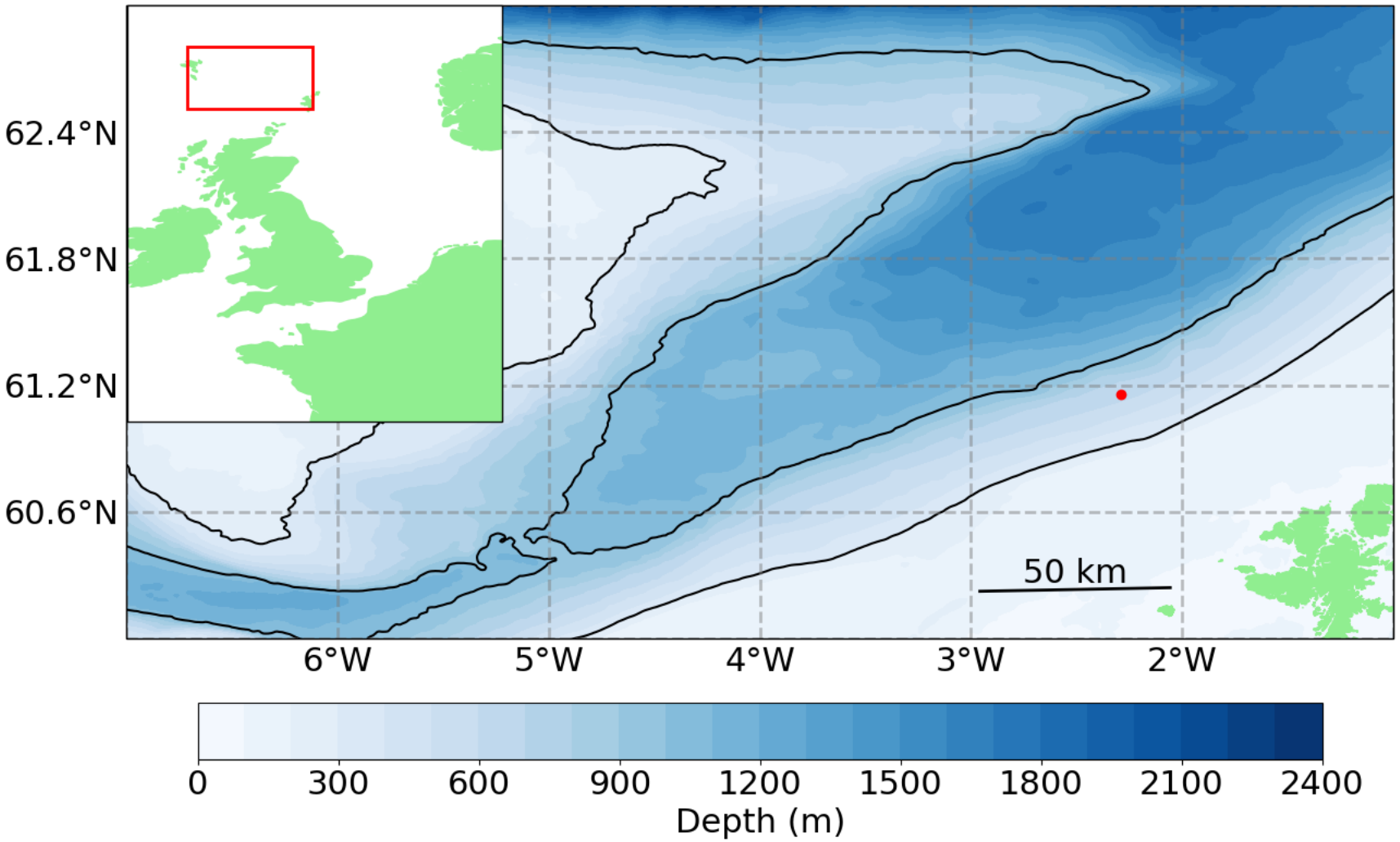

Deployment to the Faroe Shetland Channel April 2019 in conjunction with ADCP mooring and PIES see expected conditions

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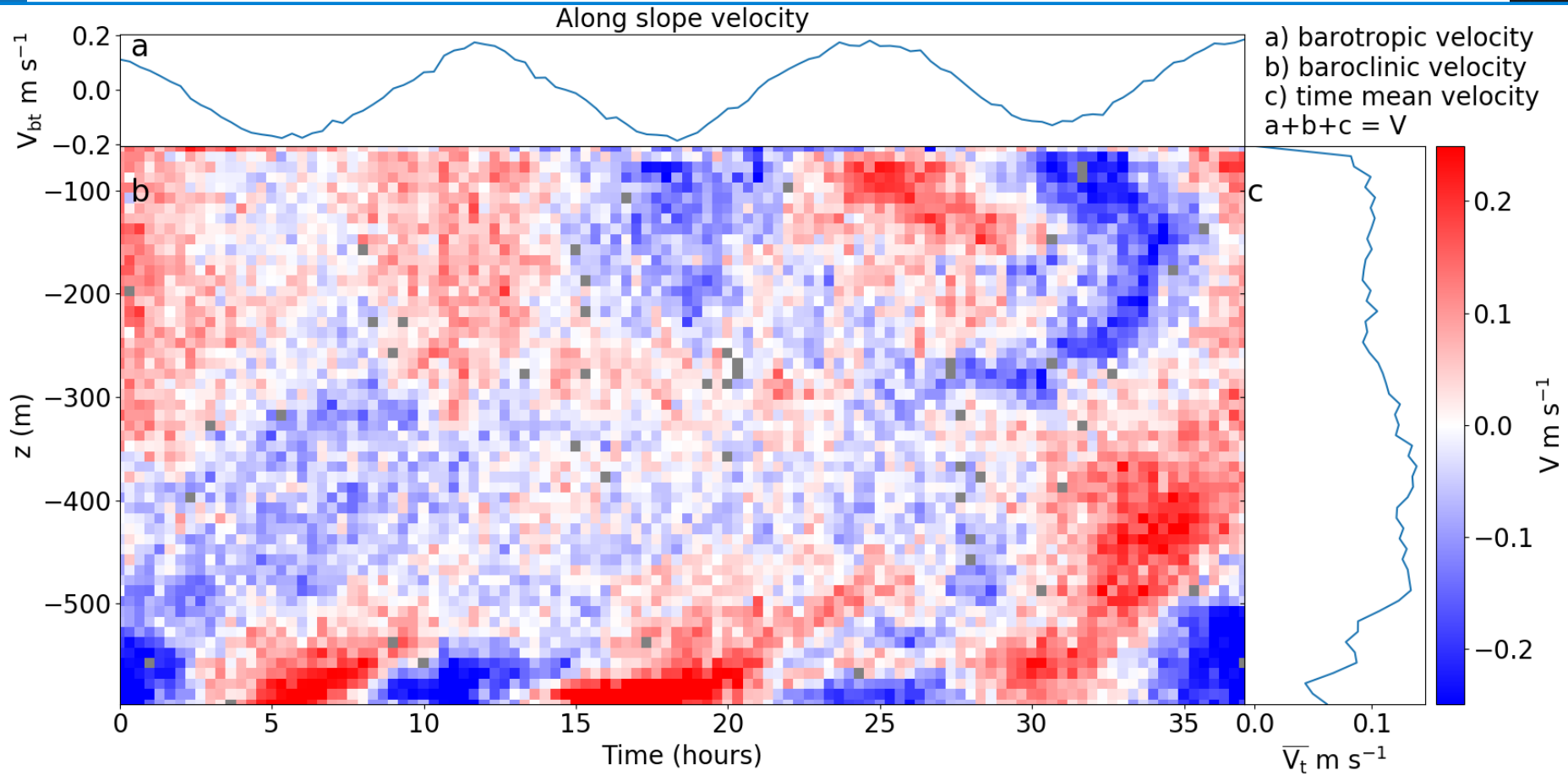

Tidal currents of 0.2 $\mathrm{m\ s^{-1}}$ and a mean flow of 0.1 $\mathrm{m\ s^{-1}}$ bottom intensified baroclinic tidal flows will be a good test of the ADCP glider. ADCP data courtesy of Bee Berx, Marine Scotland Science

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Quality control and calculation steps

- Discard cells where glider attitude causes beam miss of > 1 m see plot
- Discard cells where the ping correlation is less than 50% see plot
- Rotate from beam coordinates to East-North-Up using data from attitude sensors and compass on the ADCP
- Calculate shear between each remaining adjacent cell
- Average shear data in 2 m vertical bins
- Integrate shear to get relative velocity profiles
- Reference relative velocity profiles using dive average current from the glider for "absolute" velocity profiles
- What if we don't use quality control? see plot

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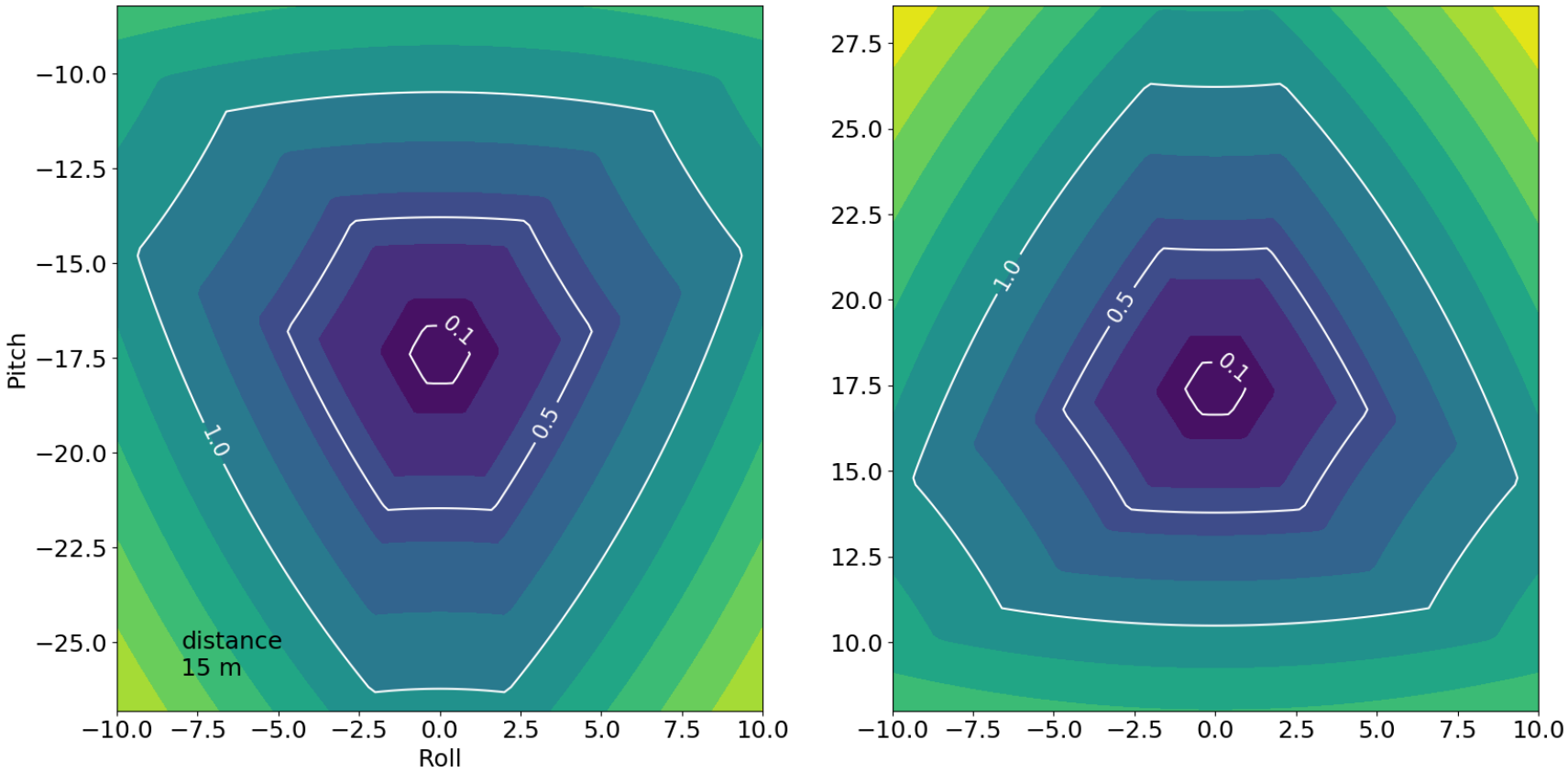

Flight angles affect the vertical location of the three beams. Plot shows the vertical distance between beams sampling a cell 15 m from the glider over a range of pitch and roll angles. Perfect sampling (0 m beam miss) is achieved at $\pm 17.3^\circ$ pitch 0° roll

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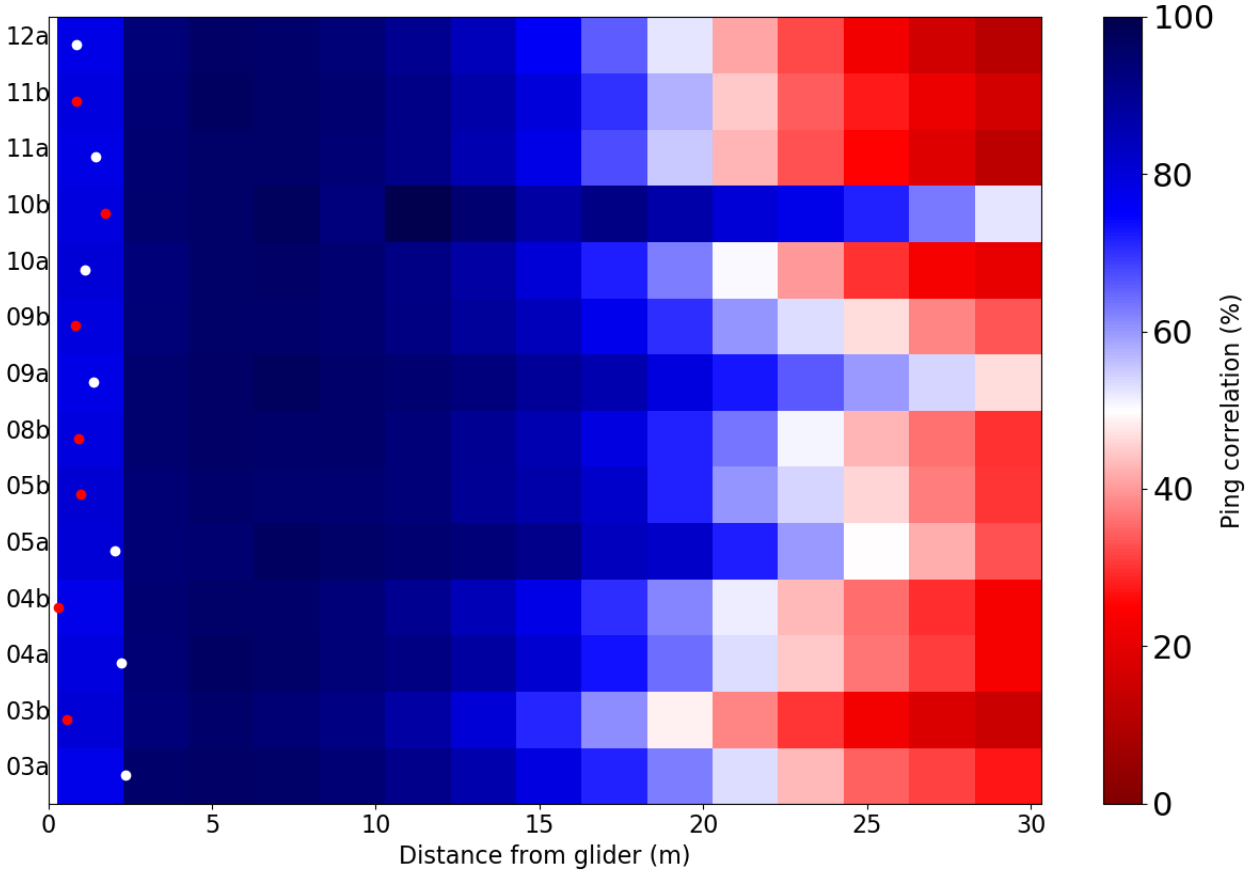

Dots are vertical missmatch of beams at 15 m from glider. white for descent, red for ascent. Closer to 0 = better flight

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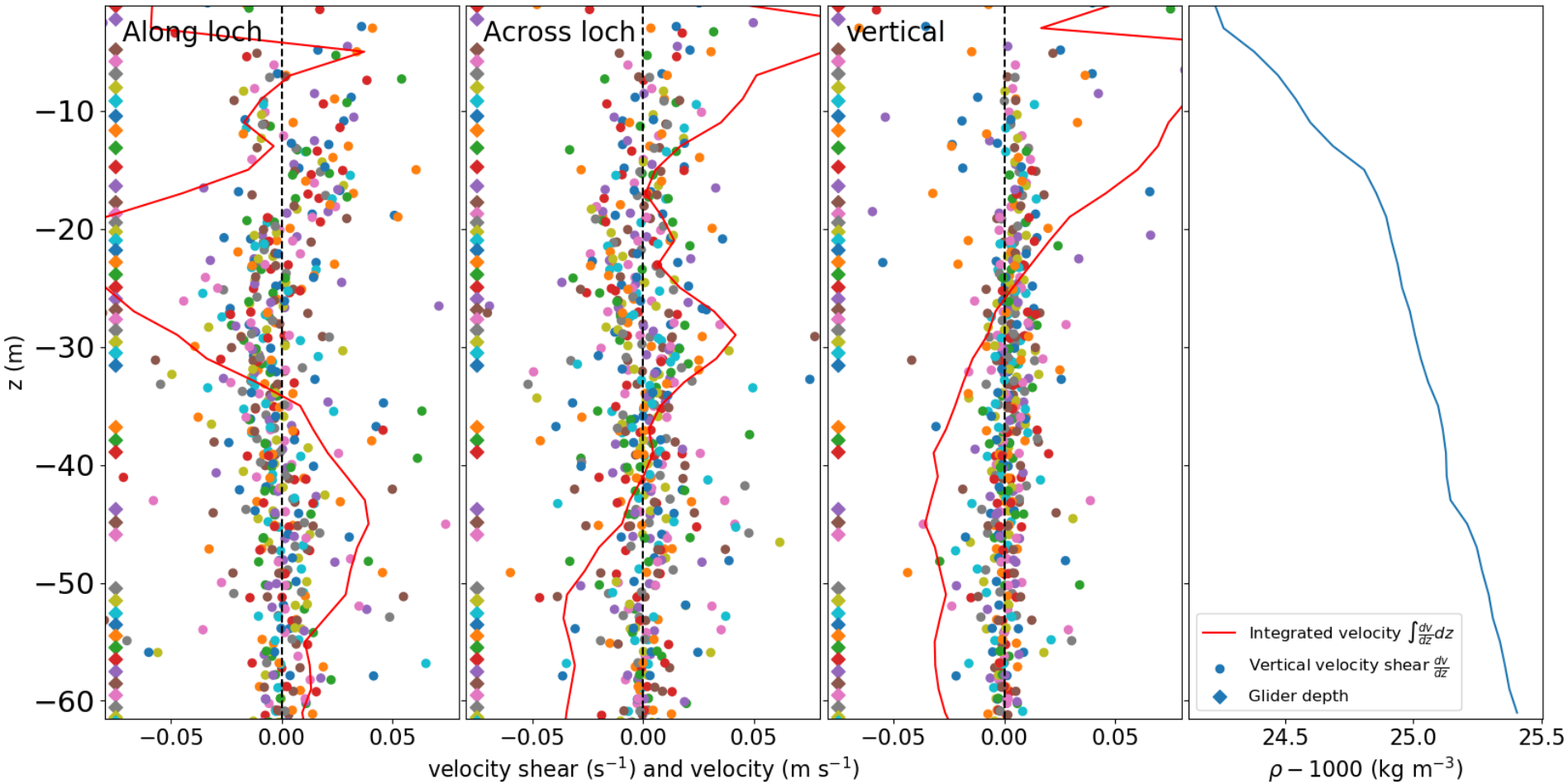

The same data as the introduction, without quality control steps

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Seaglider max depth 1000m , vertical velocity 0.1 m/s
ADCP spec:

- Sampling frequency 1 MHz
- Range 30 m (max) 10-15 m (typical)
- 3 downward looking beams at 30 degrees from vertical
- Cell size 2 m
- 2 second ensemble of 8 pings every 30 seconds
- Expected endurance 6 weeks

PICO adapted from the template by Anselm Köhler found here:
`https://github.com/snowtechblog/pico-latex-presentation`

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