

Longline sink rate verification

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Background

- Line weighting and tori line approach is widely accepted longline mitigation
- Repeatable performance measures:
 - Sink rate (average metres per second to a given depth) or
 - Time (or distance) to given depth (e.g. 5 m or 10 m) or
 - Depth at end of tori line (assumes tori line is bullet proof)
- “Sink profiles”
- Mitigation standards
 - Input for pelagic longline (specifies line weighting)
 - Output of the input for demersal longlines (depth at end of tori)

Objective

To compare sink rate profiles of Zebra Tech Wet Tags and bottle tests against CEFAS and Star Oddi TDRs.



Recorder specifications

	CEFAS TDR	Star Oddi TDR	Wet Tag
Accuracy (m)	+/- 5	+/- 4.8	+/- 1.5
Resolution (m)	0.15	0.24	0.10
Sampling Frequency (s)	0.1	1	5
Temperature response to 63% (s)	47	20	-
Pressure response	-	"immediate"	-
Dimensions (mm)	36.5 x 12	46 x 15	108.5 x 39.5
Weight in water (g)	2	12	30

Recorder specifications



Methods

Four separate sets of data presented:

Pelagic longline

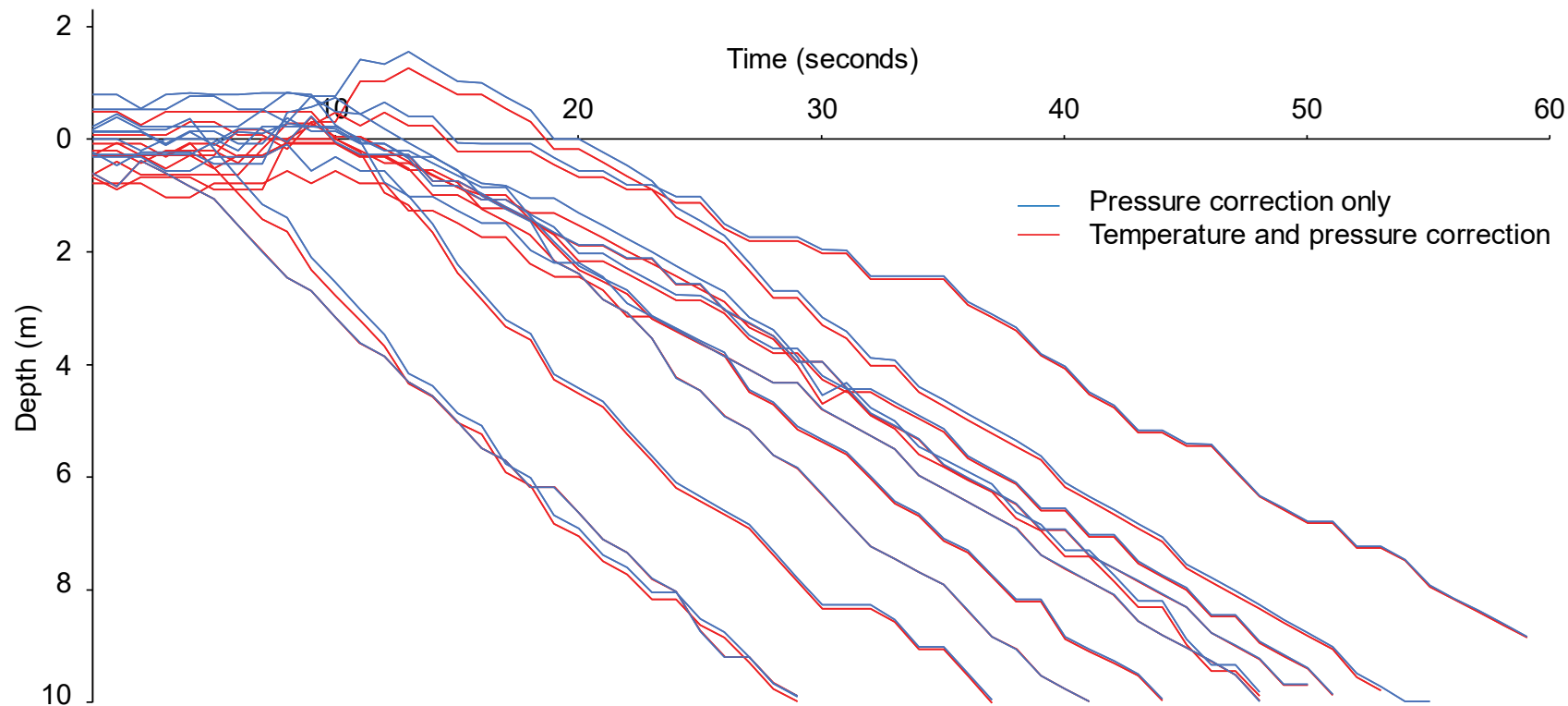
- Data collected opportunistically collected on a pelagic longline trip
- Free fall tests of pelagic longline snoods from a stationary vessel

Demersal longline

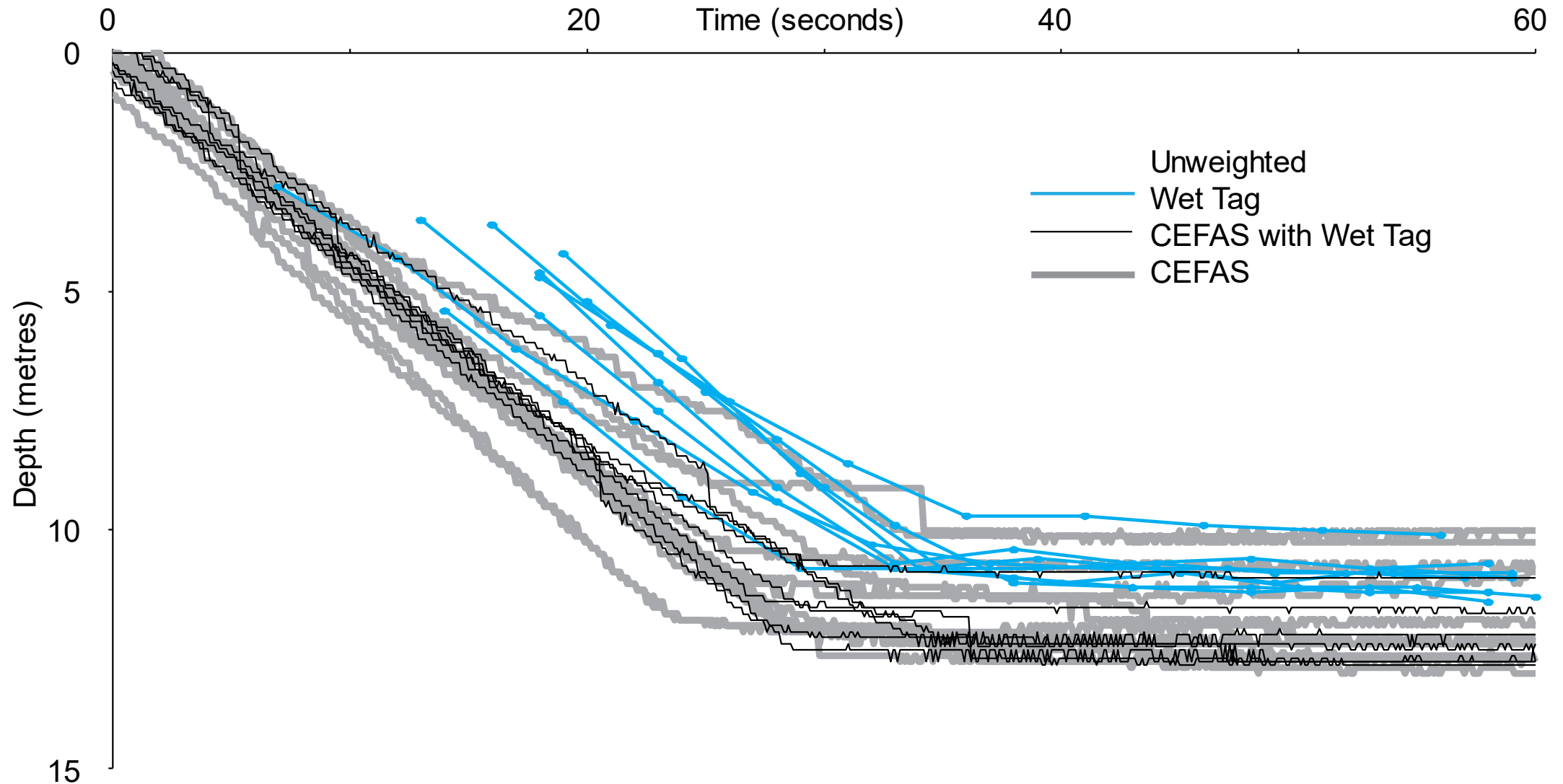
- Demersal longline comparing Wet Tags and TDRs (3 longline sets)
- Controlled drops of TDRs and Wet Tags from a wharf

Methods – Data analysis

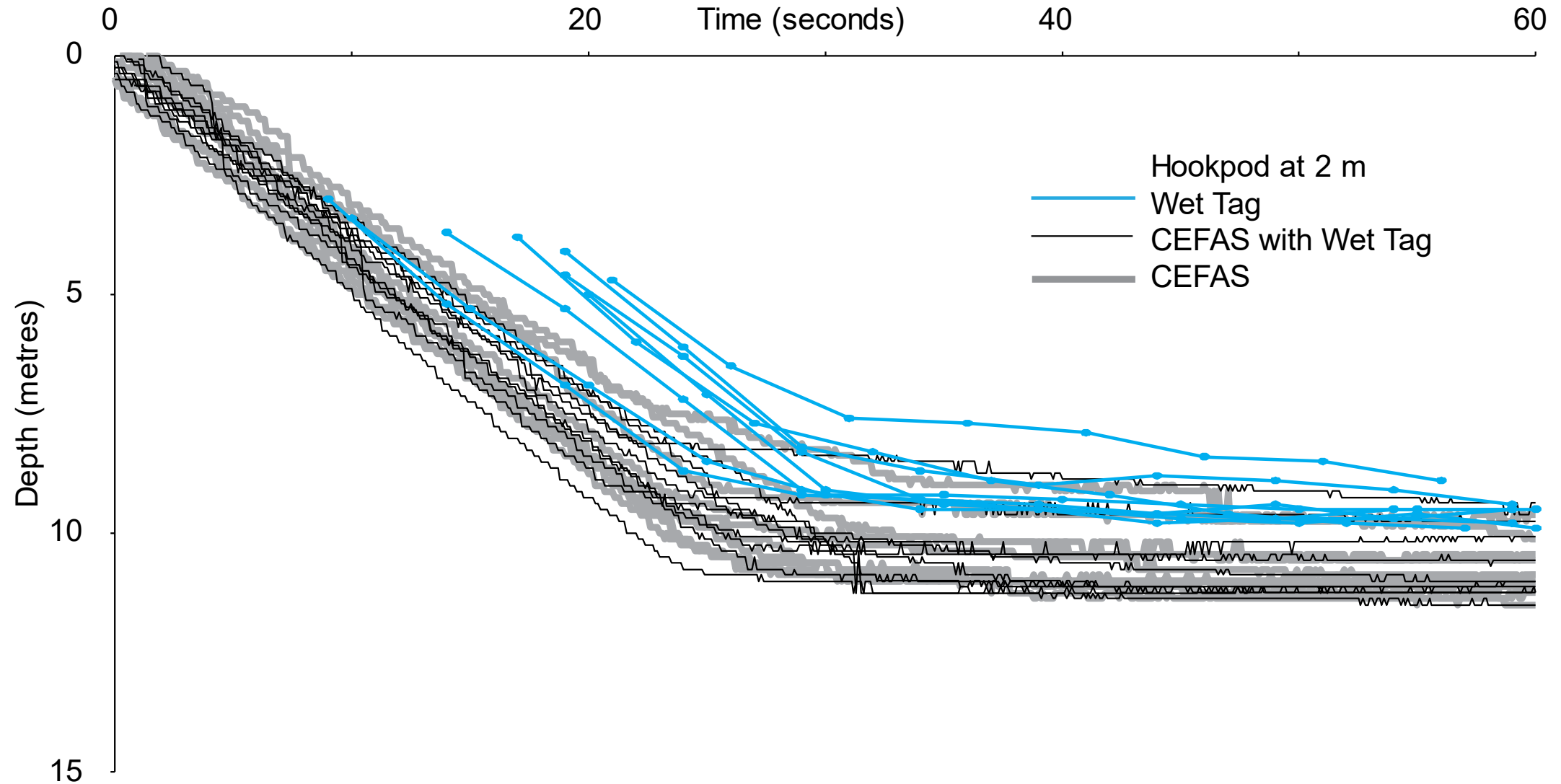
- Star Oddi and CEFAS TDRs had a pressure offset applied
- Star Oddi TDRs had a temperature correction applied
- Wet Tag data used straight from the tag



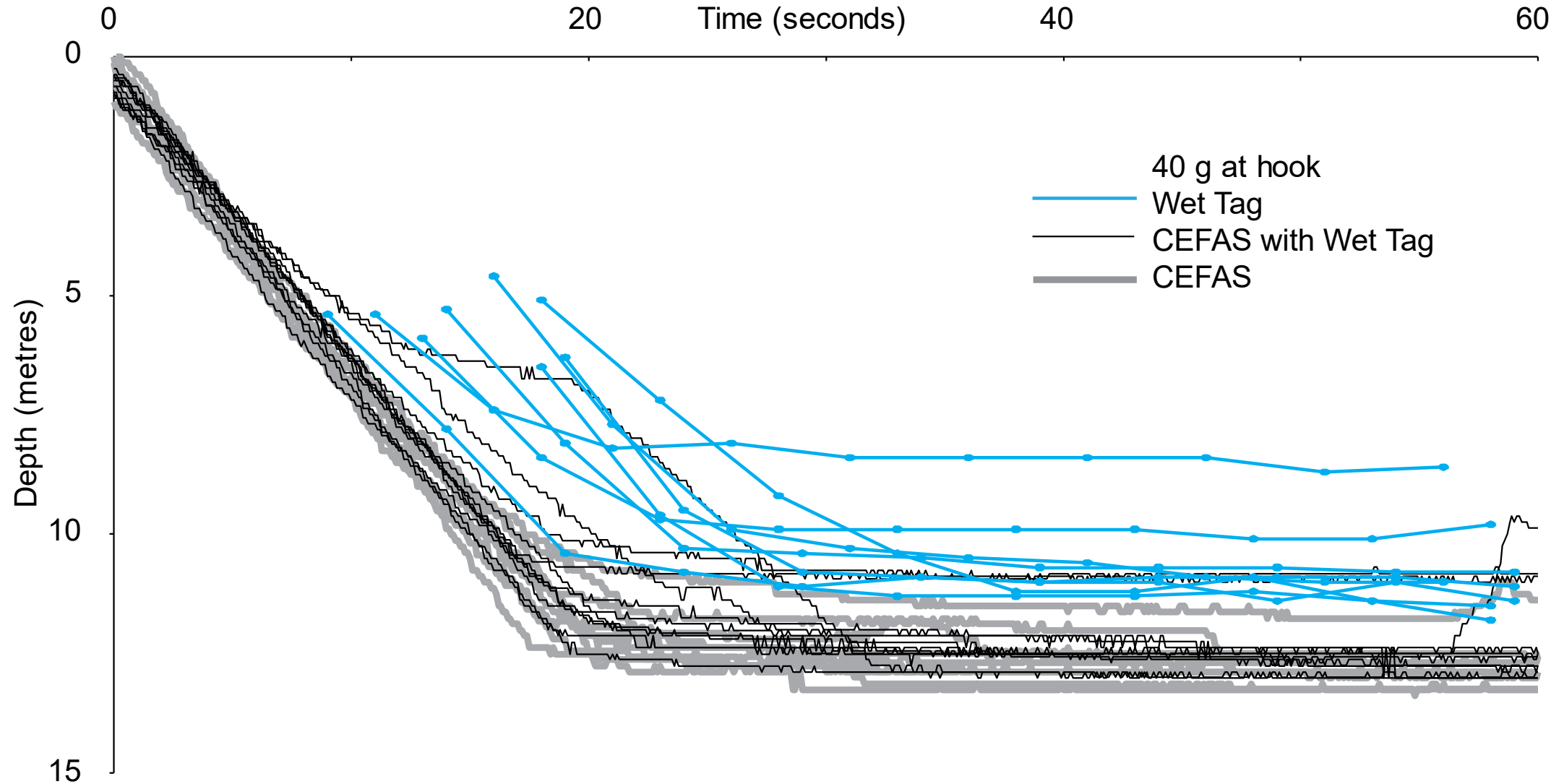
Results – Pelagic longline free fall – unweighted



Results – Pelagic longline free fall – Hookpod at 2 m



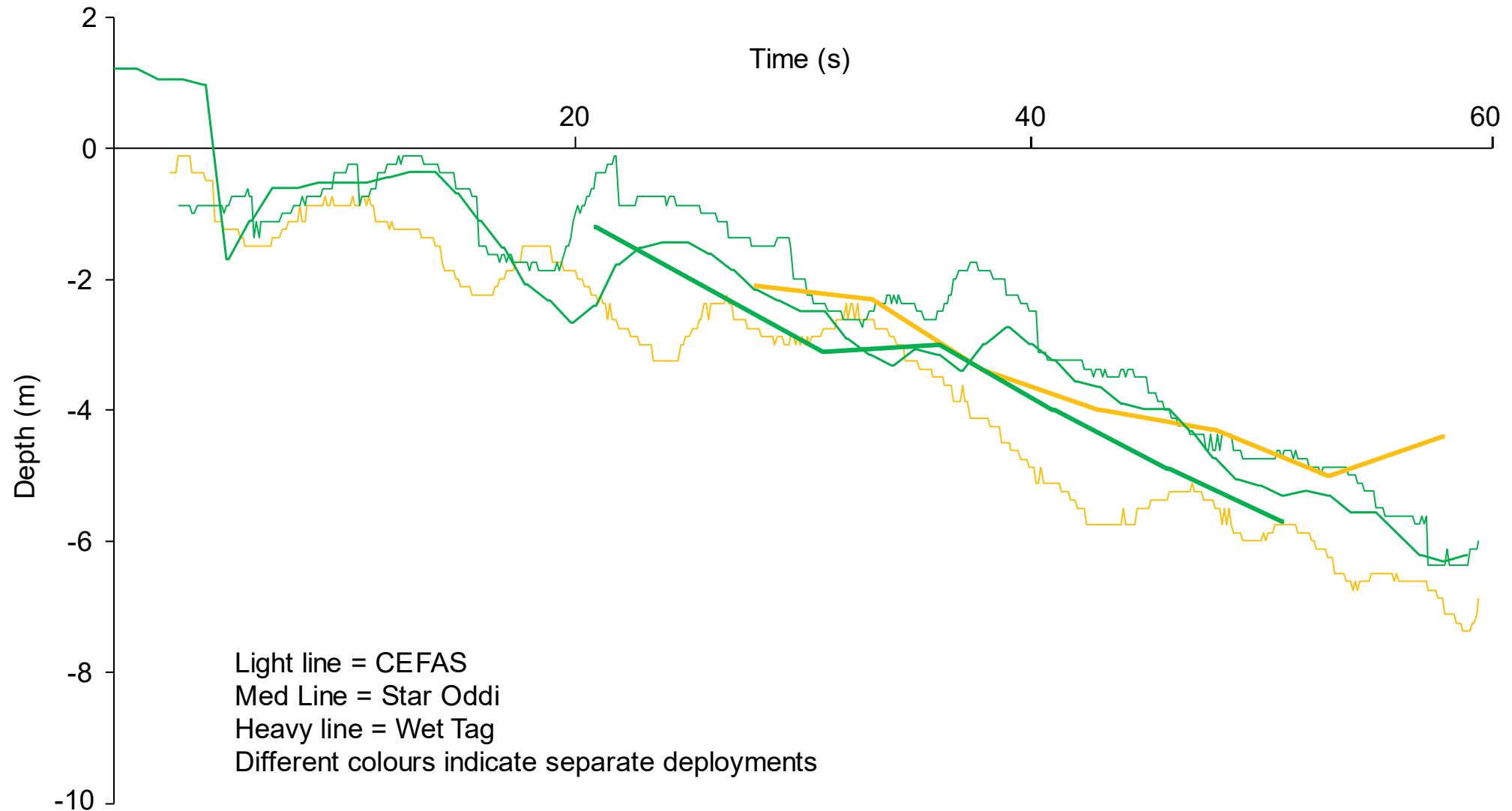
Results – Pelagic longline free fall – 40g at hook



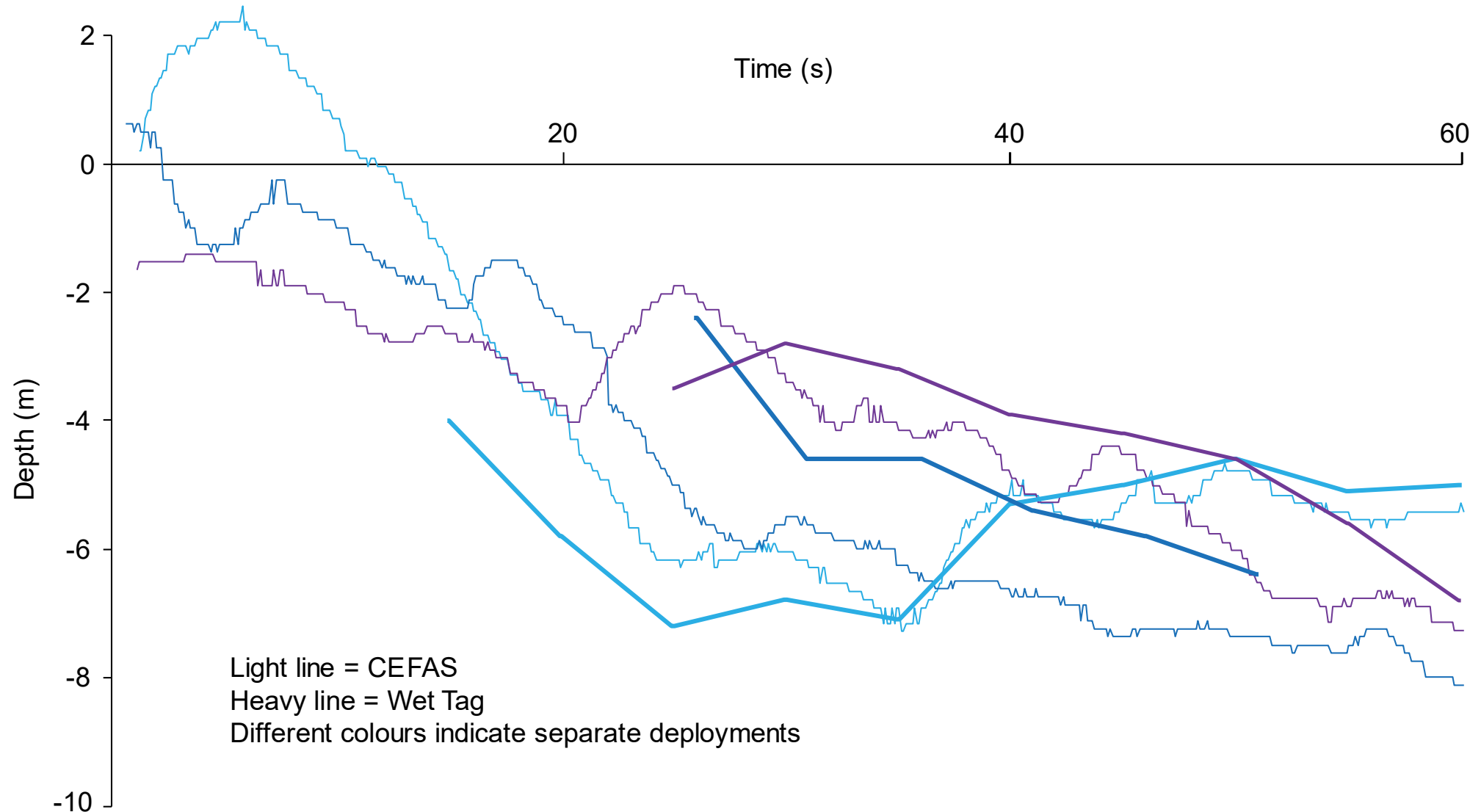
Shooting pelagic longlines



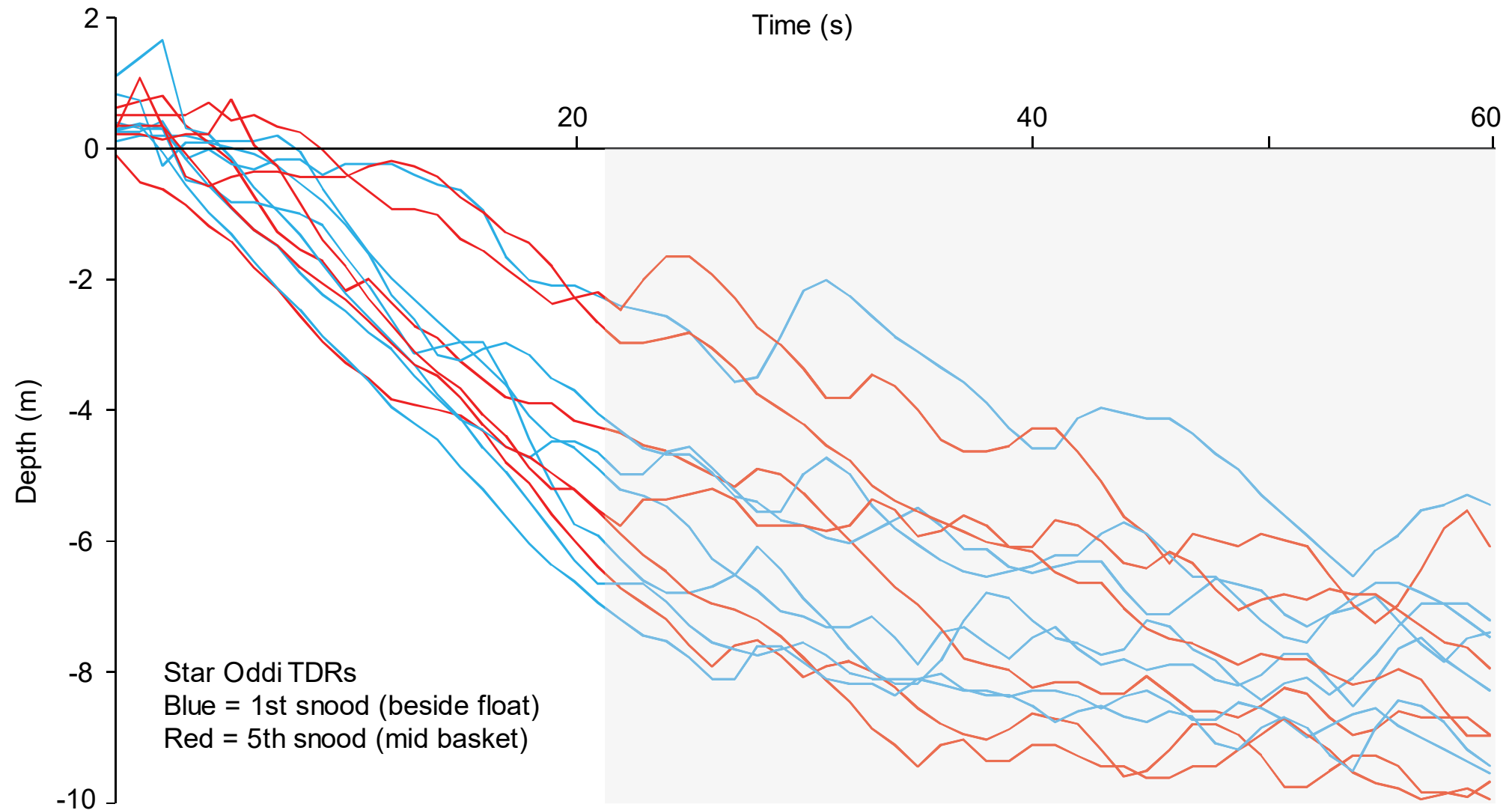
Results – Pelagic longline real world - Wet Tag



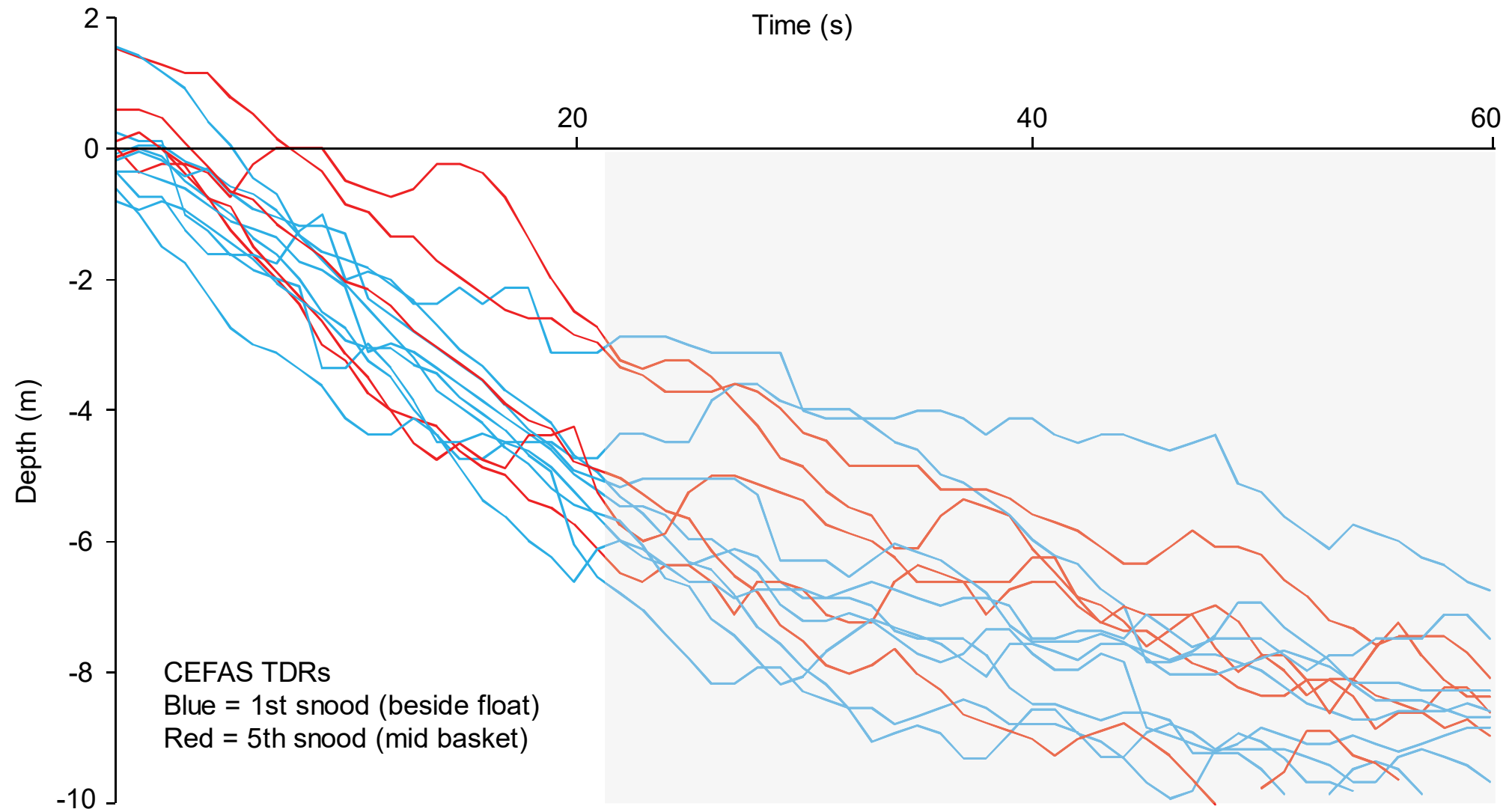
Results – Pelagic longline real world - Wet Tag



Results – Pelagic longline real world - Hookpod



Results – Pelagic longline real world - Hookpod



Conclusions – Pelagic longline

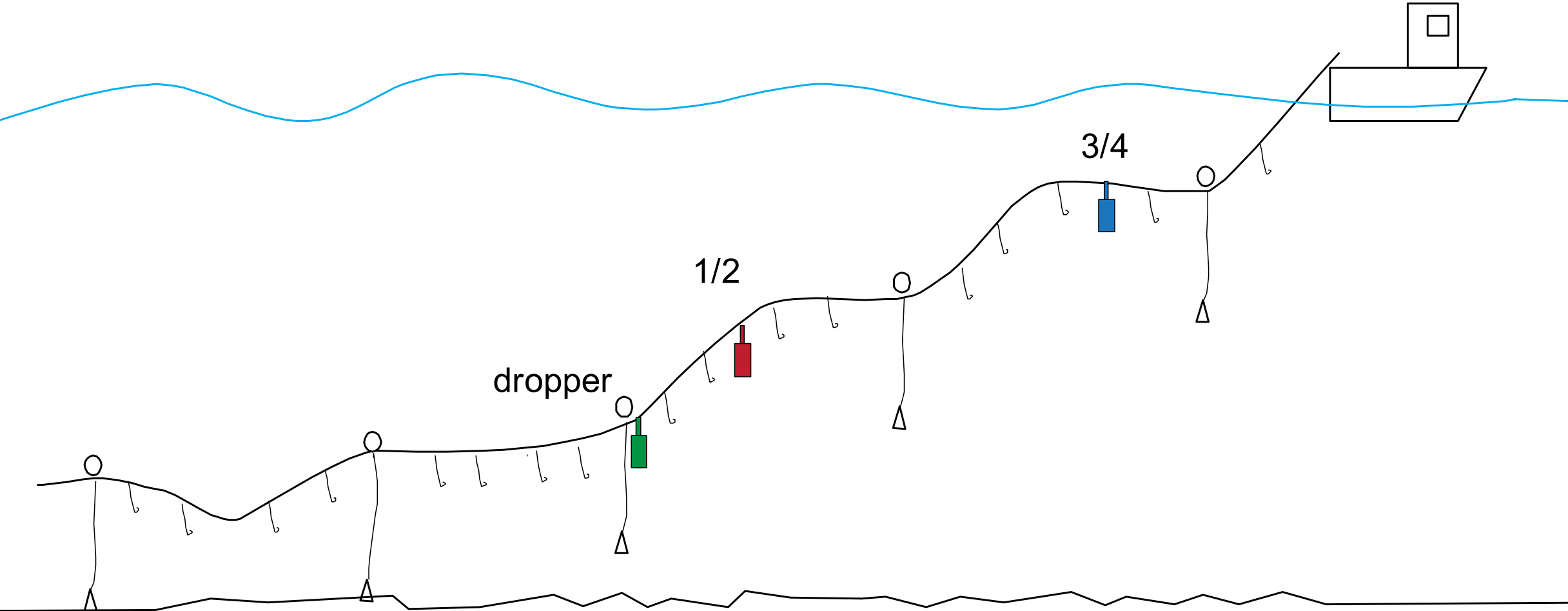
- Sink profile is initially linear, whilst snood is slack (irrespective of line position)
- Real world conditions introduce a lot of variation
- Wet Tags only take up to three measurements in this initial sink phase
- Lots of within set variation
- Established line weighting regimes in regulations and literature
- Little option to increase sink rate within a trip, but can slow down or make the tori line longer
- Longer snoods = will sink faster for longer

Questions – Pelagic longline

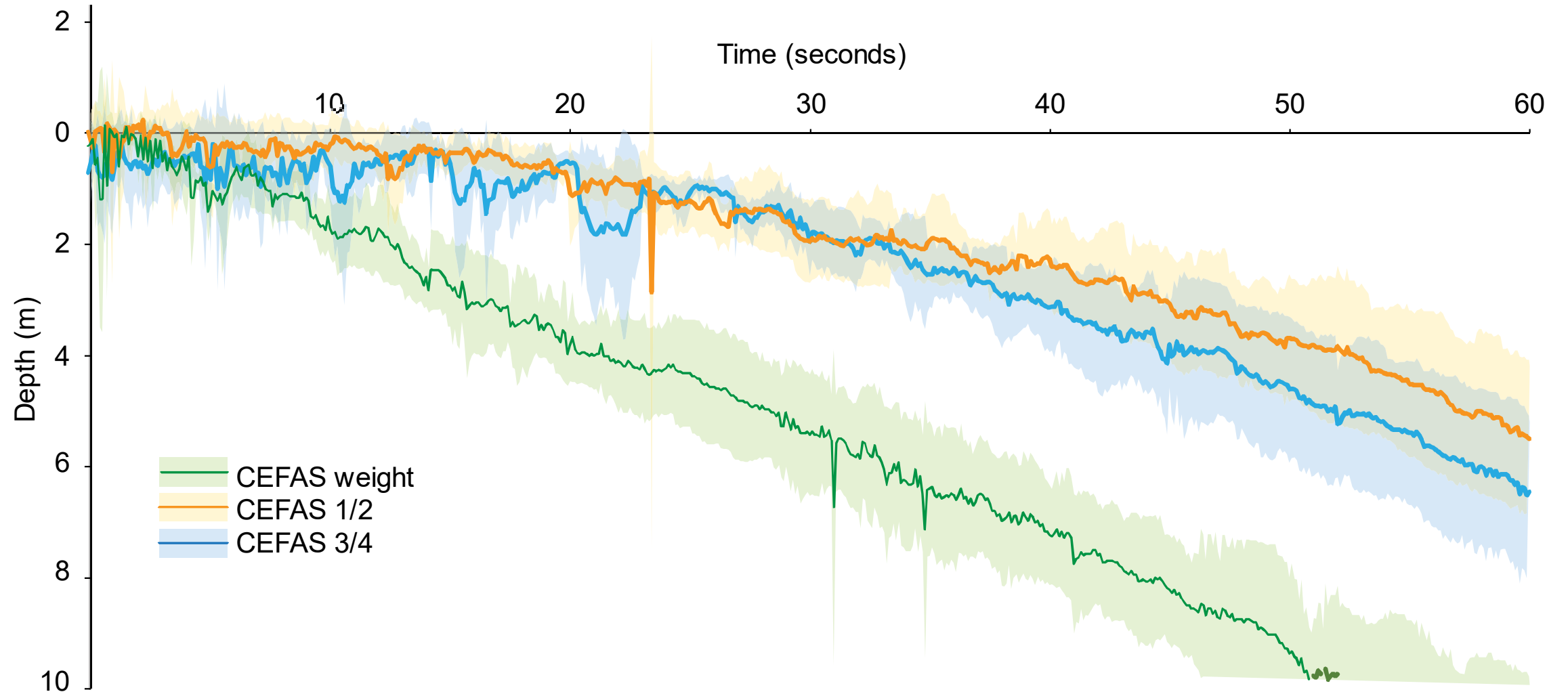
Shooting demersal longlines



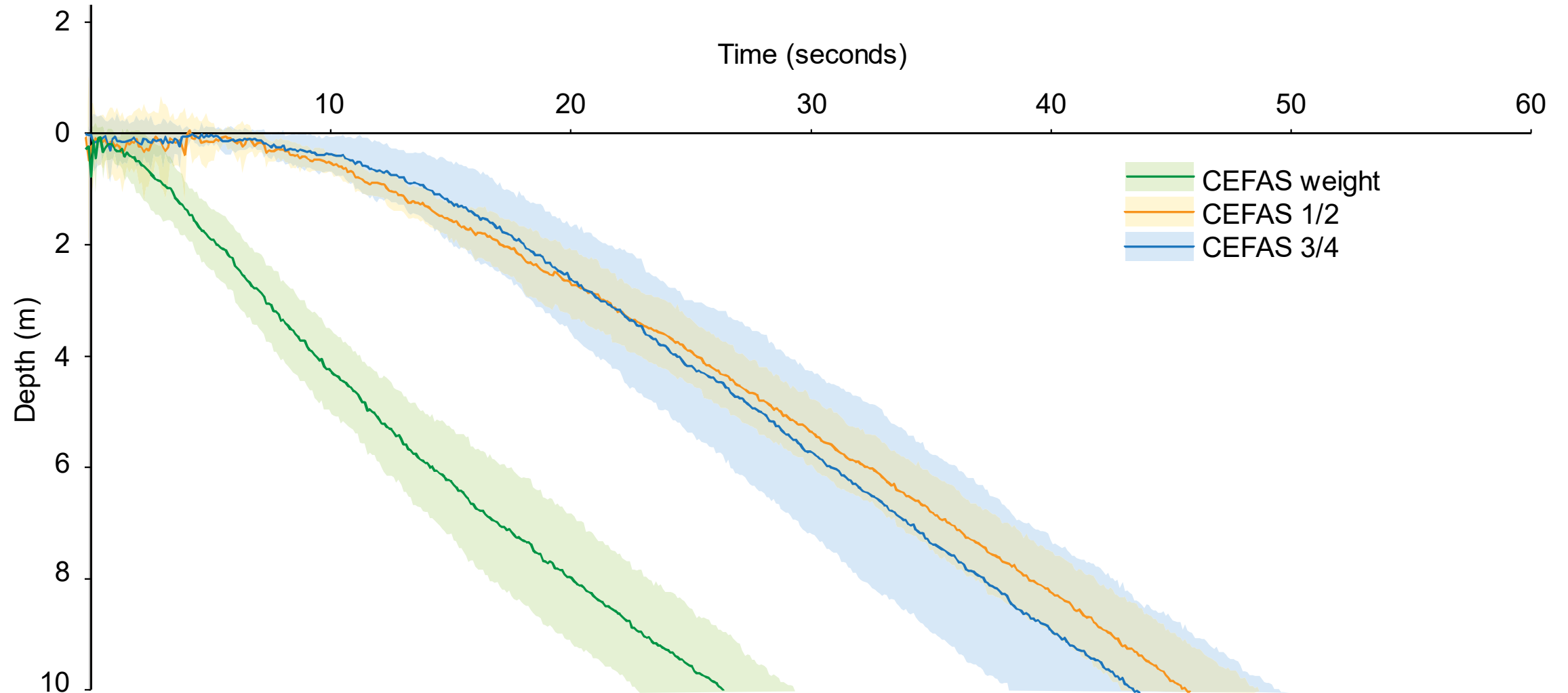
TDR placement



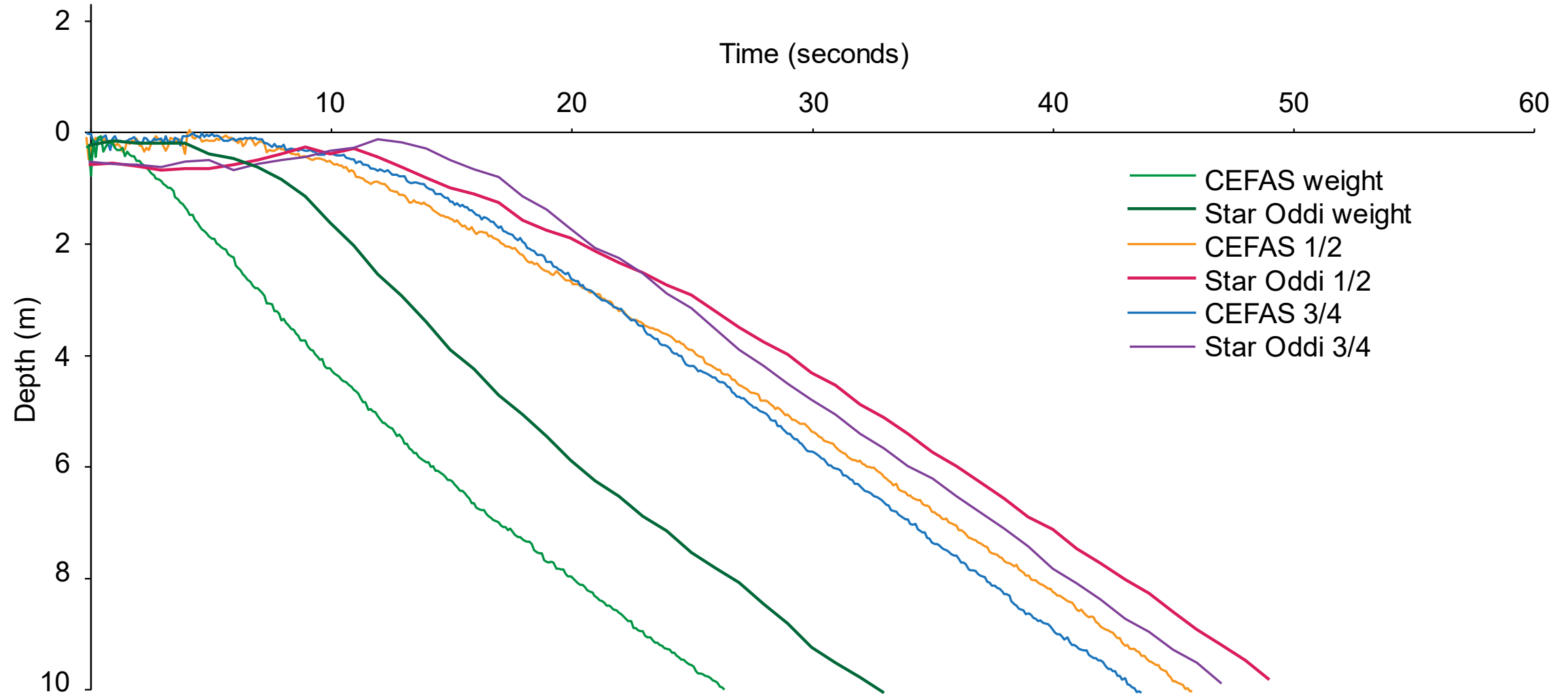
Results – Demersal longline weight spacing = 100 m



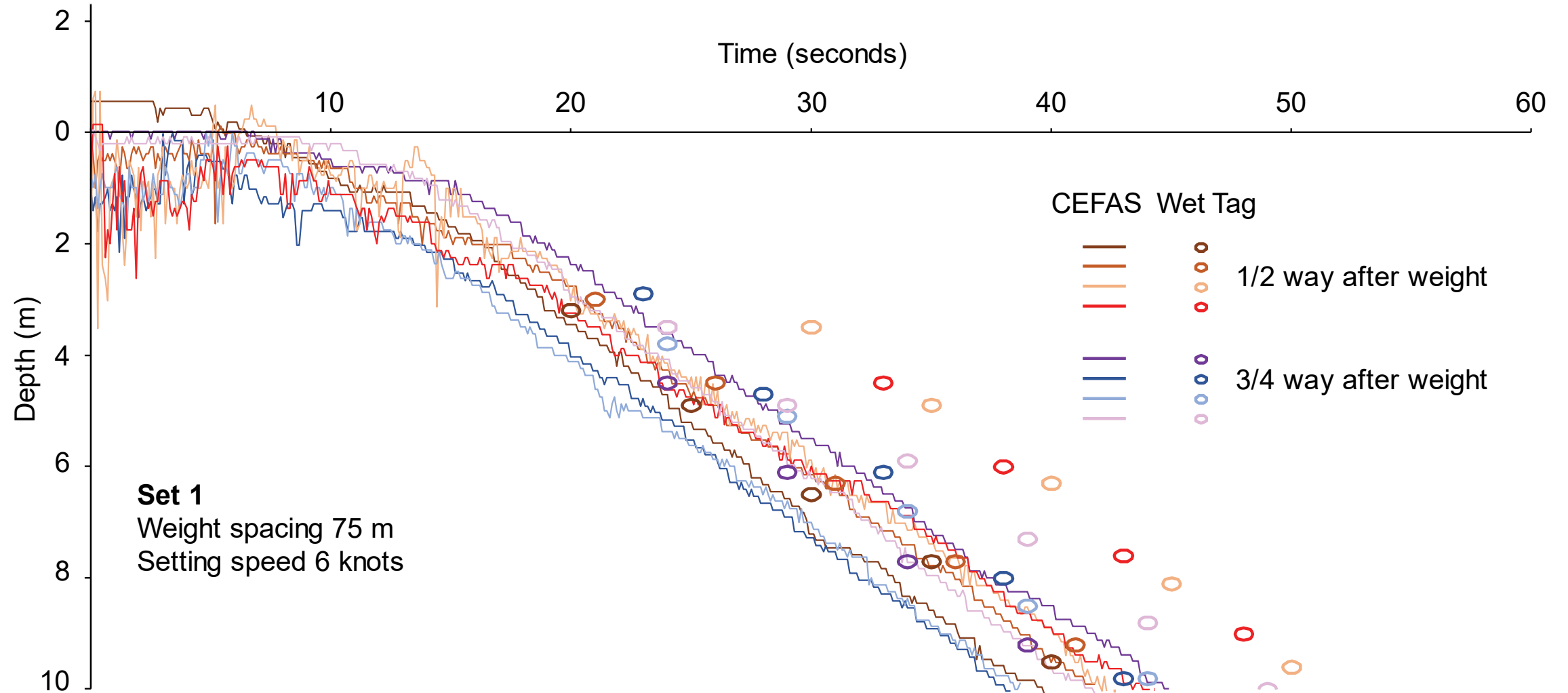
Results – Demersal longline weight spacing = 75 m



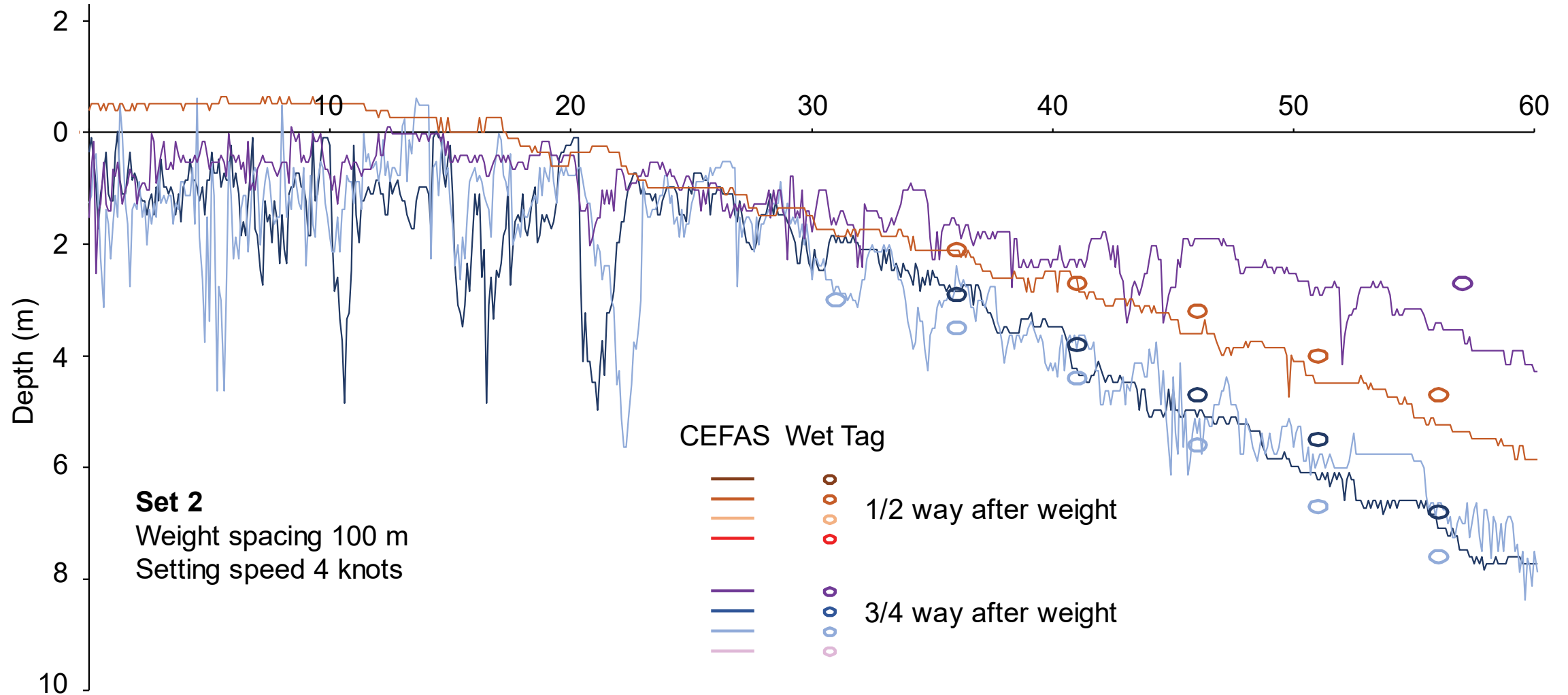
Results – Demersal longline CEFAS vs Star Oddi



Results – Demersal longline CEFAS vs Wet Tag



Results – Demersal longline CEFAS vs Wet Tag



Results – Demersal longline bottle tests

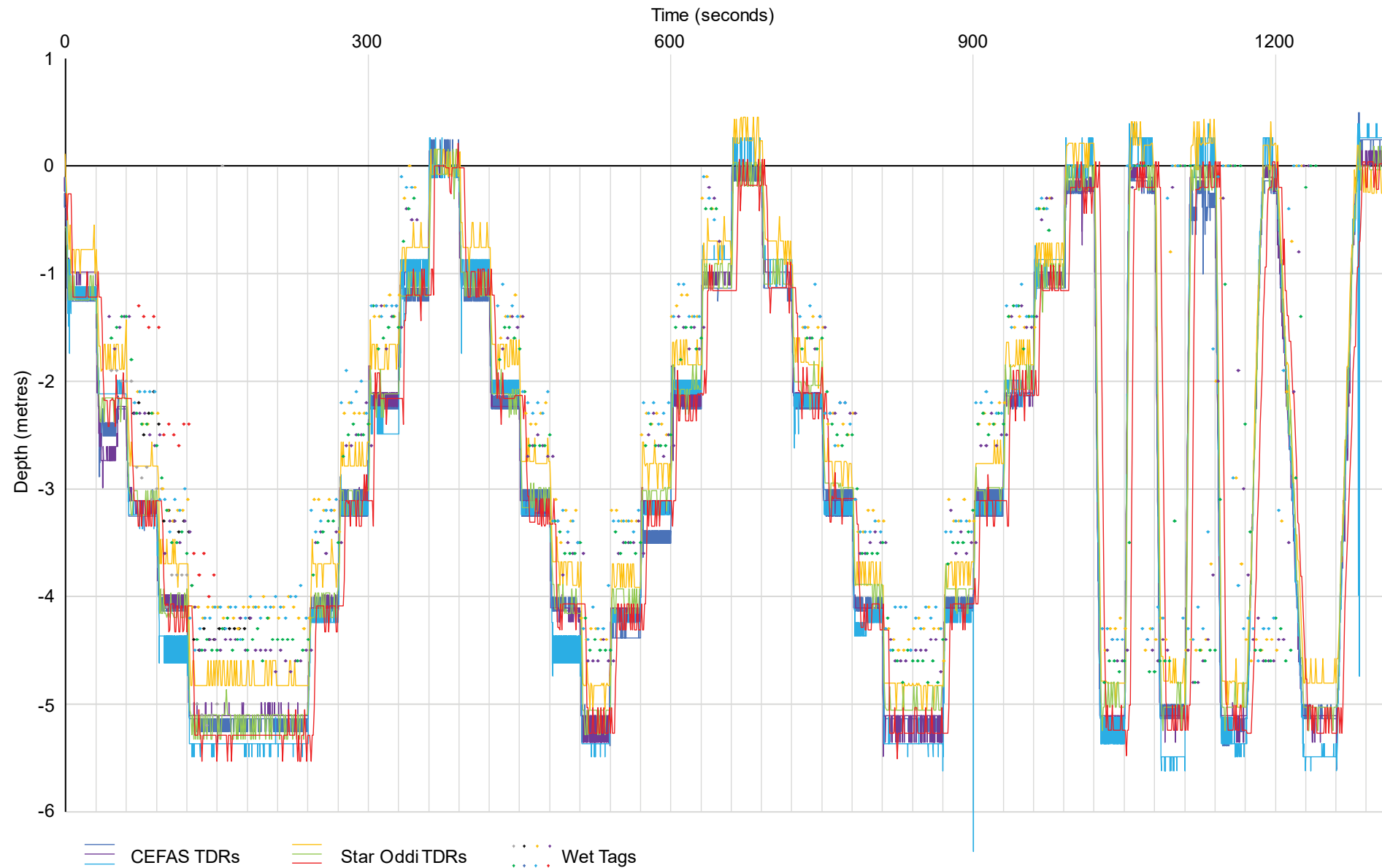
- Biased to underestimate time, especially in poor conditions
- Placed 1/2 way between weights

Line	1	1	1	1	3	3	3	3	mean	(+/- sd)
CEFAS TDR Time to 5m (s)	24	27	26	29	35	33	33	35	30	(26-35)
Bottle time to 5 m (s)	18	24	19	22	28	21	32	25	24	(19-28)

Conclusions – Demersal longline

- Sink profile is different for different positions on the line (lots of variability)
- Weights sink reasonably linearly, entering the water close to the boat
- Positions between weights sink initially slowly, then speed up and sink linearly once they have a weight either side (Wet Tags measure the linear portion).
- How long a position between weights sinks slowly for depends on several factors including speed, hook spacing, weight spacing, gear setup etc
- Directly measuring depth at distance astern requires an accurate speed, clip on time, and reasonably accurate (or an unbiased average) depth estimate
- Bottle tests are prone to underestimate time to depth, especially in poor conditions

Controlled drops from the wharf



Overall considerations

- What are the reasons for collecting sink rate data
(this will determine how best to do it)
- Are post-hoc per set sink rates useful?
(they'll likely be the same as last time that gear setup as used)
- Captures are the real measure of success after the event, and are what drive change in behaviour
- Tori lines (even paired) are not bulletproof
- At certain times and places line weighting and a tori isn't enough
(need a skipper prepared to stop (or not start) setting)

Acknowledgements

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