Issue number: 4			
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Version	**Date**	**Comments**	**Authors**
1	23-05-2025	Start of issue	Michaela Edwinson
2	23-06-2025	Adding missions	Michaela Edwinson
3	31-07-2025	Correction of data	Michaela Edwinson & Callum Rollo

1 Introduction

In February 2025, elevated dissolved oxygen (DO) concentrations recorded by the RINKO_FT were observed across all starting missions. This issue is associated with activation of RINKO_FT raw data recording in the updated SeaExplorer payload firmware (seapld) version 2.24.2-r, 2.25.1-cr, 2.25.1-r and 2.25.3-cr which appears to introduce a source of error in calculating the DO values. From January until June 2025, these seaplds versions were installed across various missions. In addition to the discrepancies of DO measurements, further complications were identified, including inaccessible MicroRider-1000G data during the ongoing mission. Installed seapld 2.24.1-r or lower are not affected.
On the affected missions, O_2 concentrations have been recalculated from the raw values using the function "recalc_oxygen" in votoutils/glider/fix_oxygen_alseamar_bug.py [1]. These recalculated values replace the incorrect values in the variables oxygen_concentration. The incorrect values have been moved to a new variable named oxygen_concentration_uncorrected. Table 1 lists all missions with the relevant issues since January 2025. The "flag" column corresponds to the quality of the data: suspect (3), failure (4) and good (1).

Table 1: Details of missions affected by issues with SeaExplorer payload firmware since January 2025. The different basins mentioned in the 'Location' column, follow the division made by HELCOM which is shown in A.1

Glider	Mission	Location	Mission Start Date	Version seapld	Issue description	Flag
SEA044	106	Bornholm Basin	2025-06-10	2.25.3-cr	**A**	1
SEA055	89	Bornholm Basin	2025-04-13	2.25.1-cr	**C**	3
SEA056	80	Bornholm Basin	2025-03-12	2.24.2-r	**A**	1
	82	Bornholm Basin	2025-04-13	2.25.1 -r	**A**	1
	83	Bornholm Basin	2025-05-20	2.25.1 -r	**A**	1
SEA063	88	Bornholm Basin	2025-06-10	2.24.2-r	**A**	1
SEA067	68	Bornholm Basin	2025-02-19	2.24.2-r	**A**	1
	70	Bornholm Basin	2025-03-26	2.25.1-cr	**A**	1
	72	Bornholm Basin	2025-04-28	2.25.1 -cr	**A**	1
	73	Bornholm Basin	2025-06-10	2.25.1-r	**A**	1
SEA068	40	Skagerrak	2025-03-24	2.24.2-r	**A**	1
	41	Skagerrak	2025-05-08	2.25.1-cr	**A**	1
SEA069	44	Skagerrak	2025-02-28	2.25.0-cr	**A**	1
	46	Skagerrak	2025-04-15	2.25.1-r	**A**	1
	48	Skagerrak	2025-06-04	2.25.1-r	**A**	1
SEA076	34	Eastern Gotland	2025-02-26	2.24.2-r	**A**	1
	36	Åland	2025-04-07	2.25.1-r	**A**	1
	37	Eastern Gotland	2025-05-17	2.25.1 -r	**A**	1
SEA077	41	Åland	2025-02-28	2.24.2-r	**A**	1
SEA078	33	Skagerrak	2025-02-07	2.24.2 -r	**A**	1
	35	Eastern Gotland	2025-04-02	2.25.1-cr	**A**	1
	36	Åland	2025-05-08	2.25.1 -cr	**A**	1

Legend		Flag
A	Data is corrected	1
C	O_2 concentrations are potentially calculated incorrectly, but can't be corrected as raw values are unavailable. No MicroRider-1000G data were viewable during mission, but available upon recovery. Under investigation.	3

2 Examples

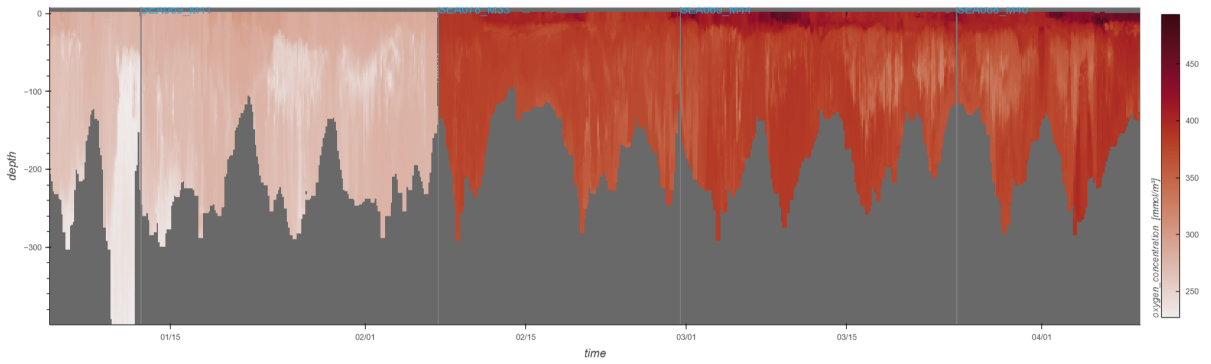

Figure 1: Overview of dissolved oxygen (DO) anomalies recorded by the RINKO-FT sensor across missions in Skagerrak, with a pronounced increase beginning with the mission on 2025-02-07 (SEA078 M34).

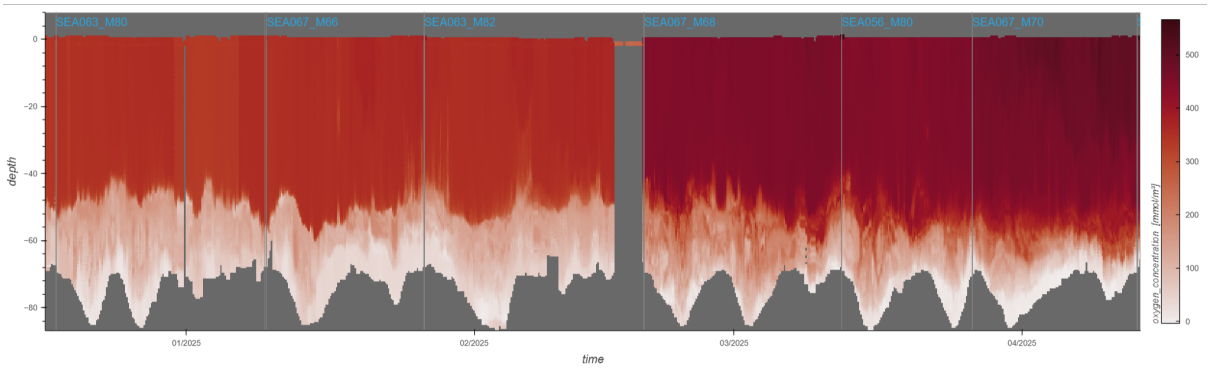

Figure 2: Overview of dissolved oxygen (DO) anomalies recorded by the RINKO-FT sensor across missions in Bornholm Basin, with a pronounced increase beginning with the mission on 2025-02-19 (SEA067 M68). Additionally, the end of mission SEA063 M82 exhibits data gaps due to the CTD ceasing to log, further highlighting the impact of firmware-related issues.

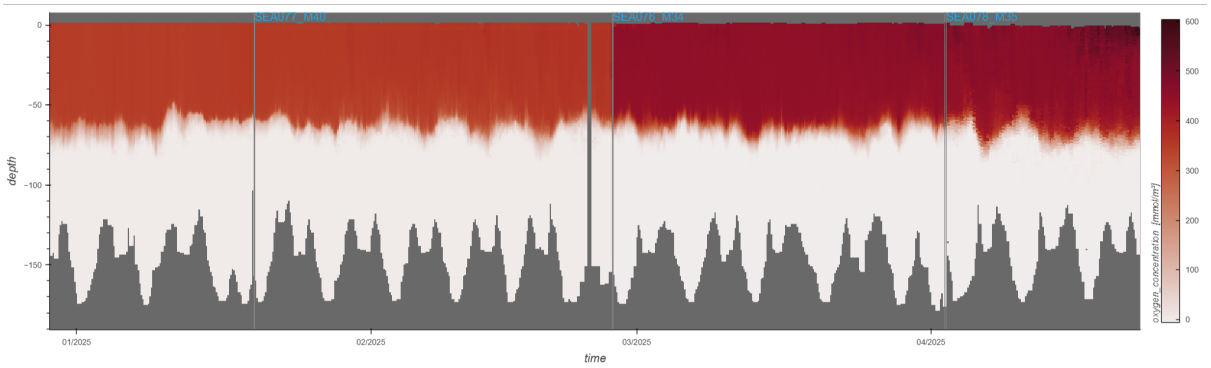

Figure 3: Overview of dissolved oxygen (DO) anomalies recorded by the RINKO-FT sensor across missions in Eastern Gotland, with a pronounced increase beginning with the mission on 2025-02-26 (SEA076 M34).

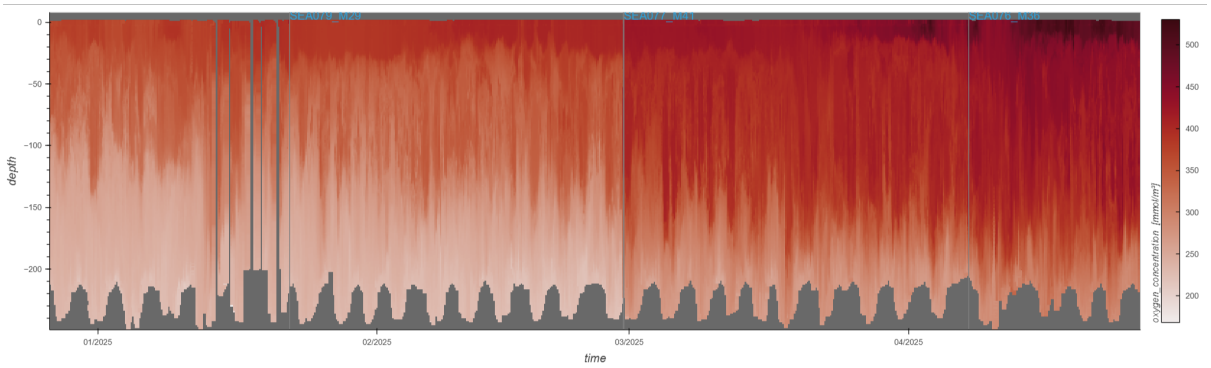

Figure 4: Overview of dissolved oxygen (DO) anomalies recorded by the RINKO-FT sensor across missions in Åland Sea, with a pronounced increase beginning with the mission on 2025-02-28 (SEA077 M41).

References

[1] Rollo, C. and Edwinson, M. [2025]. recalc_oxygen in votoutils/glider/fix_oxygen_alseamar_bug.py, Available at `https://github.com/voto-ocean-knowledge/votoutils/blob/main/votoutils/glider/fix_oxygen_alseamar_bug.py`.

A Appendix

Figure A.1: Map of the Baltic Sea showing the 17 sub-basins (Map taken from http://stateofthebalticsea.helcom.fi/in-brief/our-baltic-sea/)