Does deployment depth of C-PODs affect the detectability of harbour porpoises (*Phocoena phocoena*)?

by

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1

C-PODs, which are widely used for monitoring - and EIA studies, are stationary acoustic monitoring devices used to record cetacean echo-location clicks. Concern has been raised about different deployment methods used and how this may impact on detection probability.

2

For more than 100 days two C-PODs were deployed at the same position at different depths (ca. 5 and 17 m above sea ground) at one location within the North Sea and at three locations in the Baltic Sea. The parameters 'porpoise positive 10-minutes (PP10M)', 'porpoise positive minutes (PPM)', 'harbour porpoise clicks (Hp_Clx)' and 'raw data clicks (background noise, All_Clx)' were analysed on a daily basis.

The data were processed with CPOD.exe v.1.020 and only probability classes 'Hi' and 'mod' were used for further analysis.

A regression analysis was calculated to test data from PODs of different water depths.

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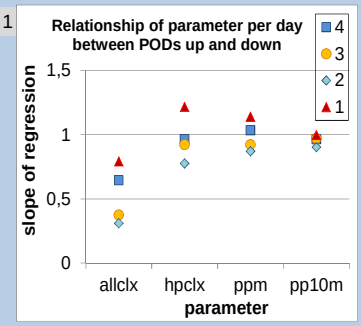
Tab. 1: Regression results (R^2 and y) for three positions within the Baltic (1-3) and one position in the North Sea (4).

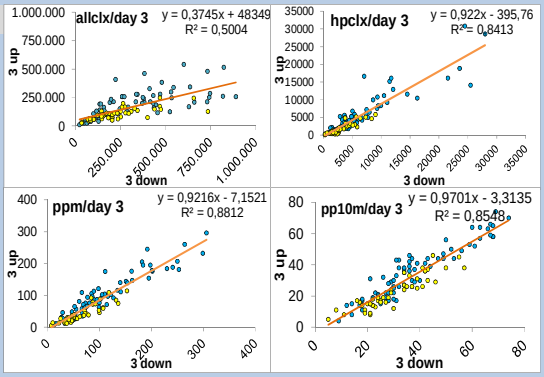
Position	[m] above sea ground up	down	All_Clx/day	Hp_Clx/day	PPM/day	PP10M/day
1	25	4	R^2 = 0.74	R^2 = 0.83	R^2 = 0.88	R^2 = 0.83
			0.64x-3187	0.83x+28	0.82+0.86	0.8x
2	17	4	R^2 = 0.26	R^2 = 0.71	R^2 = 0.74	R^2 = 0.78
			0.79x + 27958	1.22x-229	1.14x-0.37	0.99x+1.68
3	12	4	R^2 = 0.5	R^2 = 0.84	R^2 = 0.88	R^2 = 0.86
			0.31x+89519	0.78x+432	0.87x+3.8	0.9x+0.61
4	15	5	R^2 =0.87	R^2 = 0.8	R^2 = 0.81	R^2 = 0.77
			0.37x+48349	0.92x-395.76	0.92x-7.15	0.97x-3.31

1



(1) The slope of regression shows the relationship between the two datasets up/down for all 4 parameters at the four positions.

2



(2) The regression analysis between up and down is depicted for raw data, Hp_Clx, PPM and PP10M per day exemplary for Position 3. There was one POD exchange during the deployment period. The two deployment phases are displayed with turquiose and yellow points.

4

The analyses show:

In all examples the POD deployed below recorded more raw data - probably due to sediment movement. Thus, the correlation of raw data pairs „up/down" shows a higher dispersion of residuals and a constant difference between the PODs.

The analyses of the differenet parameter – from the finest unit Hp_Clx to the coarsest unit PP10M - reveal in comparison with the raw data set a better correlation of the two data-pairs .
Similarity is increasing with coarseness of the parameter (from hp-clisks to pp10m). The parameter pp10m/day shows no difference for all four tested examples (Figure 1).

After POD-exchanges, differences between the two POD-pairs were visible. The changes at the same position sometimes led to a change in the slope of regression (see coloured points in Figure 2), indicating possible differences in POD specific sensitivities.

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The closer the C-POD is deployed to the sea floor, the more noise it records.

Detection probability of harbour porpoise clicks stays nearly the same independently from deployment height. Observed differences in the data-pairs decrease the coarser the analysed parameter.

C-PODs seem to have different sensitivites.