Article

Beyond Human Interventions on Complex Bays: Effects on Water and Wave Dynamics (Study case Cádiz Bay, Spain) - Supporting Information

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1   **Supplementary Materials:** Supplementary information includes table S1 with the Delft3D calibrated model
2   parameters, tables S2 and S3 with the calibration and testing correlation coefficients, respectively, and Figures
3   S1, S2, S3 and S4 with the results for the calibration and testing of the model for the hydrodynamics and water
4   quality variables, respectively.

5   1. Tables S1, S2 and S3
6   2. Figures S1, S2, S3 and S4

Parameter	Specification
Domain	6.8°W to 6.0°W 36.66°N to 36.38°W
Oceanic boundary forcing	Water level with harmonic constituents
Transport conditions	Salinity and water temperature
Bottom roughness	Constant Chézy's roughness coefficient (U(80), V(60))
Horizontal eddy viscosity	$1\ m^2s^{-1}$
Horizontal eddy diffusivity	$20\ m^2s^{-1}$
Wind drag coefficient	0.005
Heat flux model	Ocean
Secchi depth	2 m
Dalton number	0.0013
Stanton number	0.0013
Included variables	Solar radiation, relative humidity, air temperature, cloud coverage, evaporation and precipitation
Depth-induced breaking	α=1, β=0.73
Non-linear triad interactions	α=0.1, β=9
Bottom friction	Collins coefficient 0.02
Diffraction	Smoothing coefficient 0.9, smoothing steps 900
Time step	0.1 min

Table S1. Parameters of the Delft3D numerical simulations.

Instr.	η			V_e			V_n		
	RMSE (m)	R^2	S	RMSE (m/s)	R^2	S	RMSE (m/s)	R^2	S
Calibration (January 4th to 22th, 2012)									
I1	0.10	0.99	0.99	0.09	0.92	0.88	0.27	0.94	0.71
I3	0.11	0.99	0.99	0.14	0.95	0.78	0.38	0.95	0.64
Testing (May 24th to June, 10th 2013)									
I3	0.16	0.99	0.99	0.15	0.88	0.81	0.36	0.88	0.71
I3a	0.23	0.98	0.98	0.13	0.93	0.91	0.46	0.84	0.59
I3b	0.23	0.99	0.98	0.12	0.67	0.79	0.26	0.76	0.65

Table S2. Results for the hydrodynamic calibration and testing. RMSE refers to root mean squared error, R^2 is correlation and S is skill.

Instr.	Temperature			Salinity		
	RMSE (°C)	R^2	S	RMSE (psu)	R^2	S
Calibration (January 4th to 22th, 2012)						
I1	0.45 / 0.17	0.81 / 0.91	0.67 / 0.82	0.08 / 0.06	0.79 / 0.84	0.78 / 0.67
I2	0.25 / 0.17	0.60 / 0.77	0.58 / 0.69	0.09 / 0.05	0.53 / 0.72	0.52 / 0.66
I3	0.25 / 0.18	0.84 / 0.76	0.79 / 0.69	0.07 / 0.06	0.71 / 0.82	0.56 / 0.58
Testing (May 24th to June, 10th 2013))						
I3	0.13 / 0.07	0.92 / 0.93	0.93 / 0.94	0.05 / 0.02	0.82 / 0.89	0.86 / 0.92
I3a	0.14 / 0.10	0.87 / 0.88	0.82 / 0.83	0.02 / 0.01	0.82 / 0.85	0.77 / 0.79
I3b	0.13 / 0.08	0.79 / 0.79	0.82 / 0.83	0.03 / 0.02	0.76 / 0.79	0.77 / 0.81

Table S3. Results for the temperature and salinity calibration and testing. On each cell, the first and second values represent the instantaneous and daily-scale results, respectively. RMSE refers to root mean squared error, R^2 is correlation and S is skill.
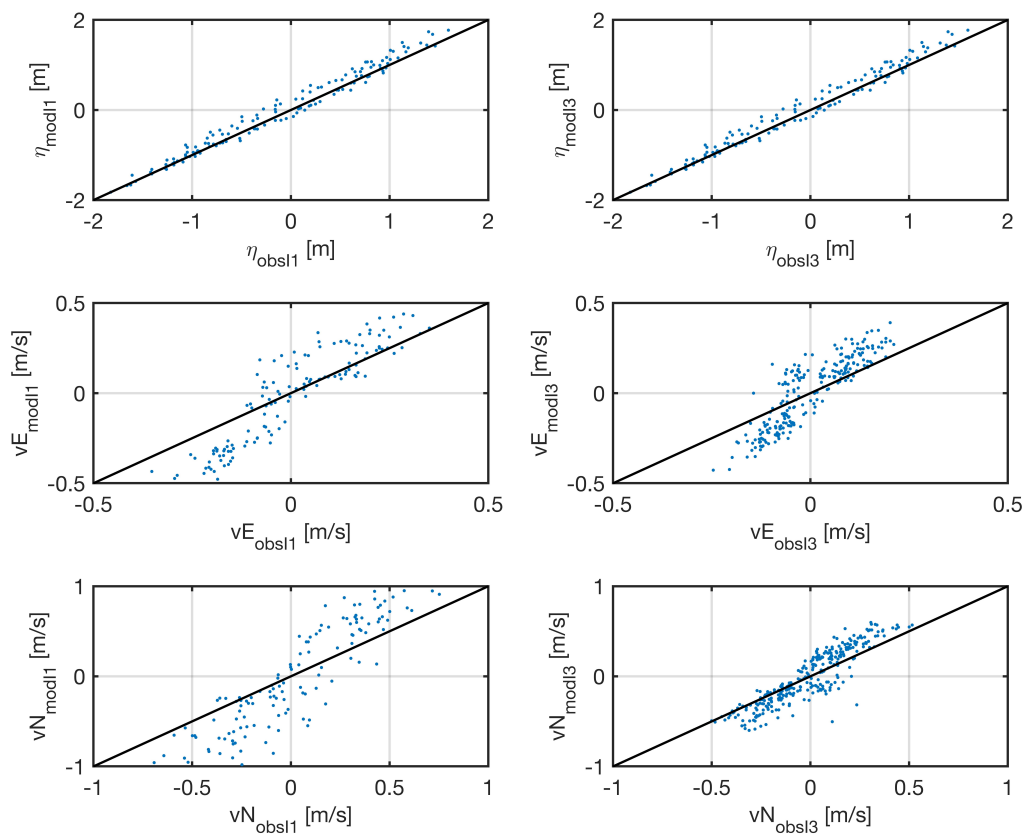

Figure S1. Results for the water level and velocity calibration. Upper, mid and lower panels correspond to water level and east and north velocity, respectively. Left (right) panels correspond to results for the instruments I1 (I3).
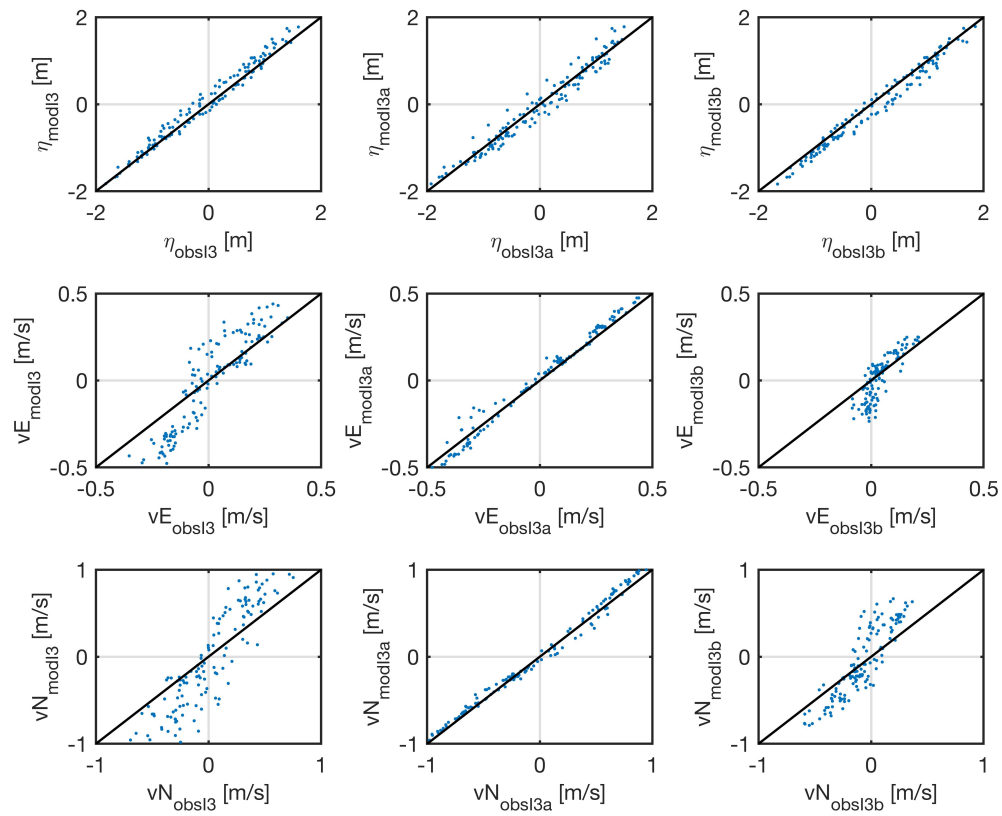
Figure S2. Results for the water level and velocity testing. Upper, mid and lower panels correspond to water level and east and north velocity, respectively. Left to right panel correspond to results for the instruments I3, I3a and I3b, respectively.
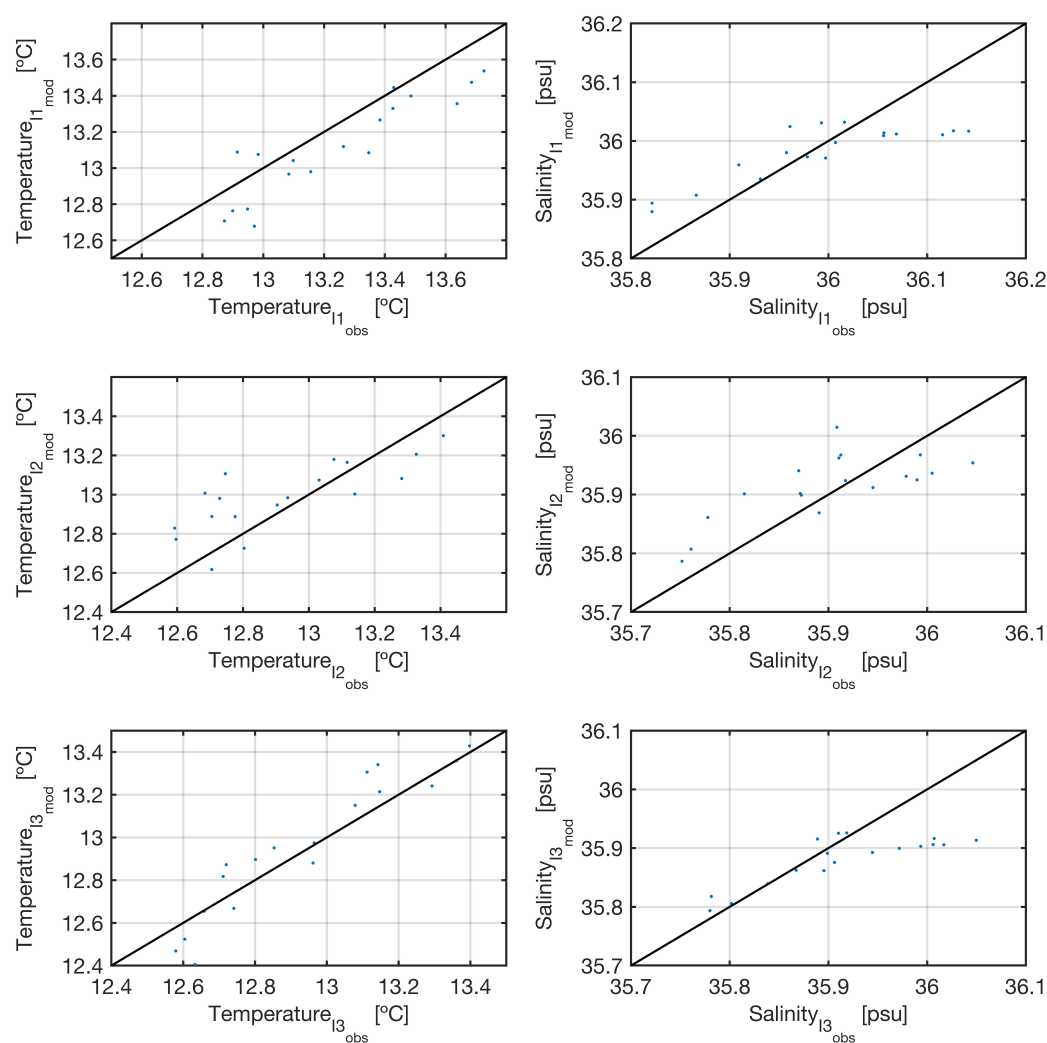
Figure S3. Results for the salinity and temperature calibration. Left and right panel correspond to temperature and salinity, respectively. Upper, mid and lower panel correspond to results for instruments I1, I2 and I3, respectively.
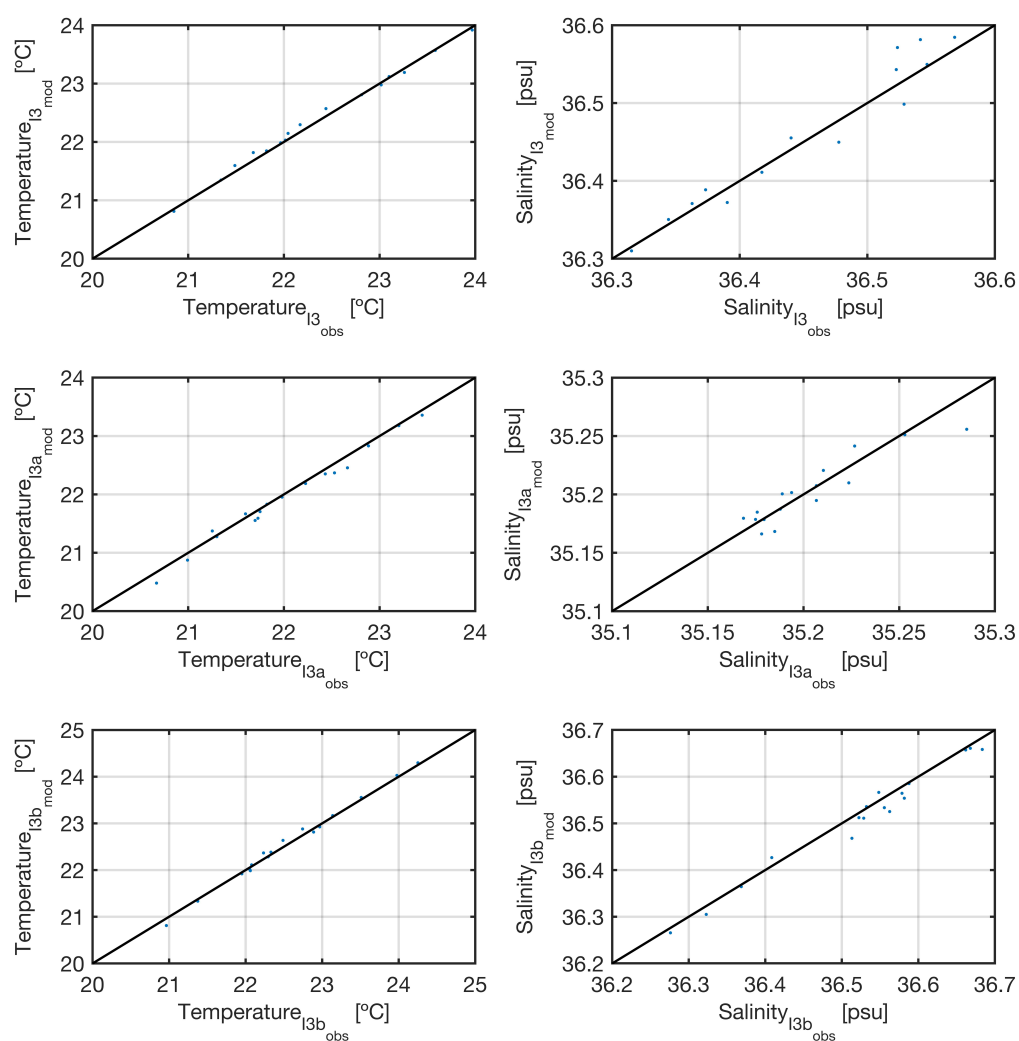
Figure S4. Results for the salinity and temperature testing. Left and right panel correspond to temperature and salinity, respectively. Upper, mid and lower panels correspond to results for instruments I3, I3a and I3b, respectively.