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Supporting Information for

Where and Why do submarine canyons remain connected to the shore during sea level rise? – Insights from global topographic analysis and Bayesian regression

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Captions for Data Set S1 and S2.

Introduction

This Supporting Information includes a map that shows the global distribution of individual shore-connected canyon heads during the Last Glacial Maximum (LGM) and the present day (Fig. S1) and various scatter plots of each predictor to the individual canyon head (Fig. S2a, Data Set S1). In the main text, we bin this data into hexagonal polygons of a size of 50,000 km^2 to upscale the data set for Bayesian penalized regression modeling (Fig. S2b, Data Set 2).

Moreover, we include the details of the sensitivity analysis that guided the choice of the shrinkage prior (Figs. S3 to S6). The model parameters for all five shrinkage priors are included in Tables S1 to S5.

Global distribution of shore-connected canyon heads

In the main text of the manuscript, we show the present-day shore-connected canyon (SCC) heads as the fraction SCCs binned in 50,000 km^2 hexagons. For a more complete picture, we show the global distribution of individual SCCs during the present-day and the Last Glacial Maximum (Fig. S1) and the number of present-day SCC heads plotted against every predictor.

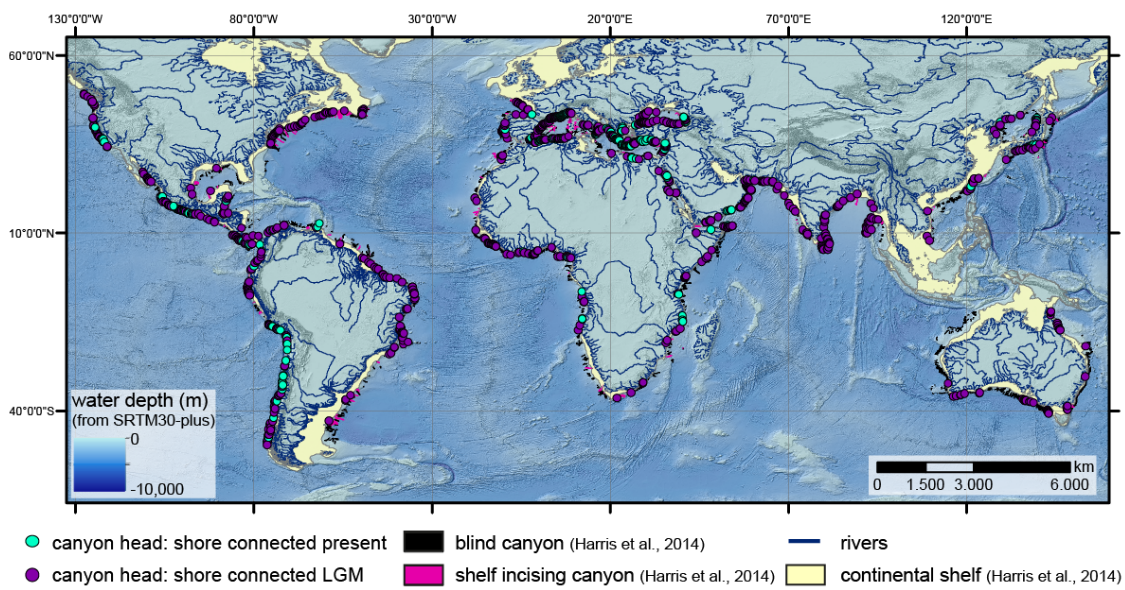
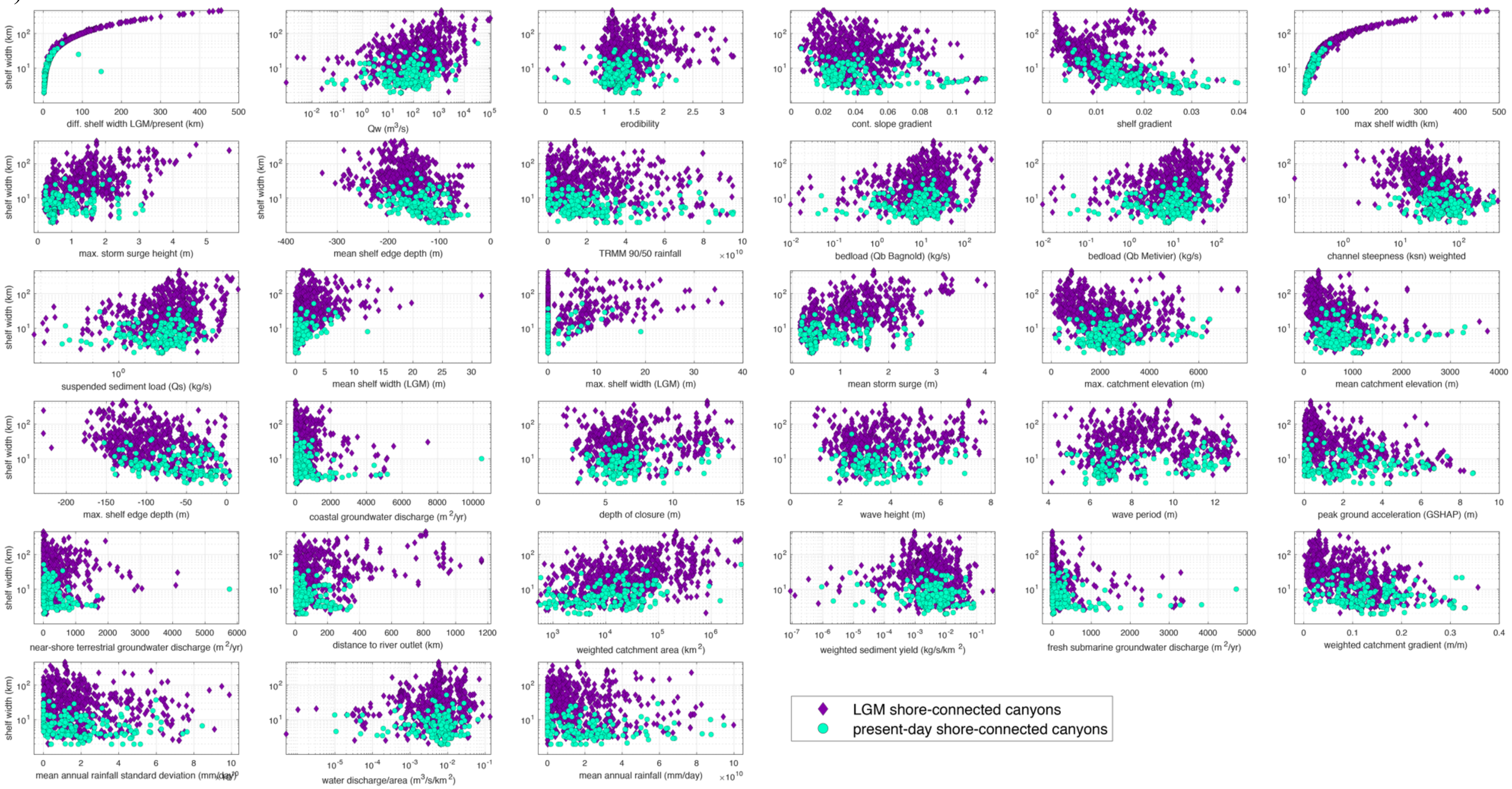


Fig. S1. Global distribution of shore-connected canyon (SCC) heads during the present day and the Last Glacial Maximum.

a)


shelf width (km)
diff. shelf width LGM/present (km)
Qw (m^3/s)
erodibility
cont. slope gradient
shelf gradient
max shelf width (km)
max. storm surge height (m)
mean shelf edge depth (m)
TRMM 90/50 rainfall
bedload (Qb Bagnold) (kg/s)
bedload (Qb Metivier) (kg/s)
channel steepness (ksn) weighted
suspended sediment load (Qs) (kg/s)
mean shelf width (LGM) (m)
max. shelf width (LGM) (m)
mean storm surge (m)
max. catchment elevation (m)
mean catchment elevation (m)
max. shelf edge depth (m)
coastal groundwater discharge (m^2/yr)
depth of closure (m)
wave height (m)
wave period (m)
peak ground acceleration (GSHAP) (m)
near-shore terrestrial groundwater discharge (m^2/yr)
distance to river outlet (km)
weighted catchment area (km^2)
weighted sediment yield (kg/s/km^2)
fresh submarine groundwater discharge (m^2/yr)
weighted catchment gradient (m/m)
mean annual rainfall standard deviation (mm/day)
water discharge/area (m^3/s/km^2)
mean annual rainfall (mm/day)
LGM shore-connected canyons
present-day shore-connected canyons

b)

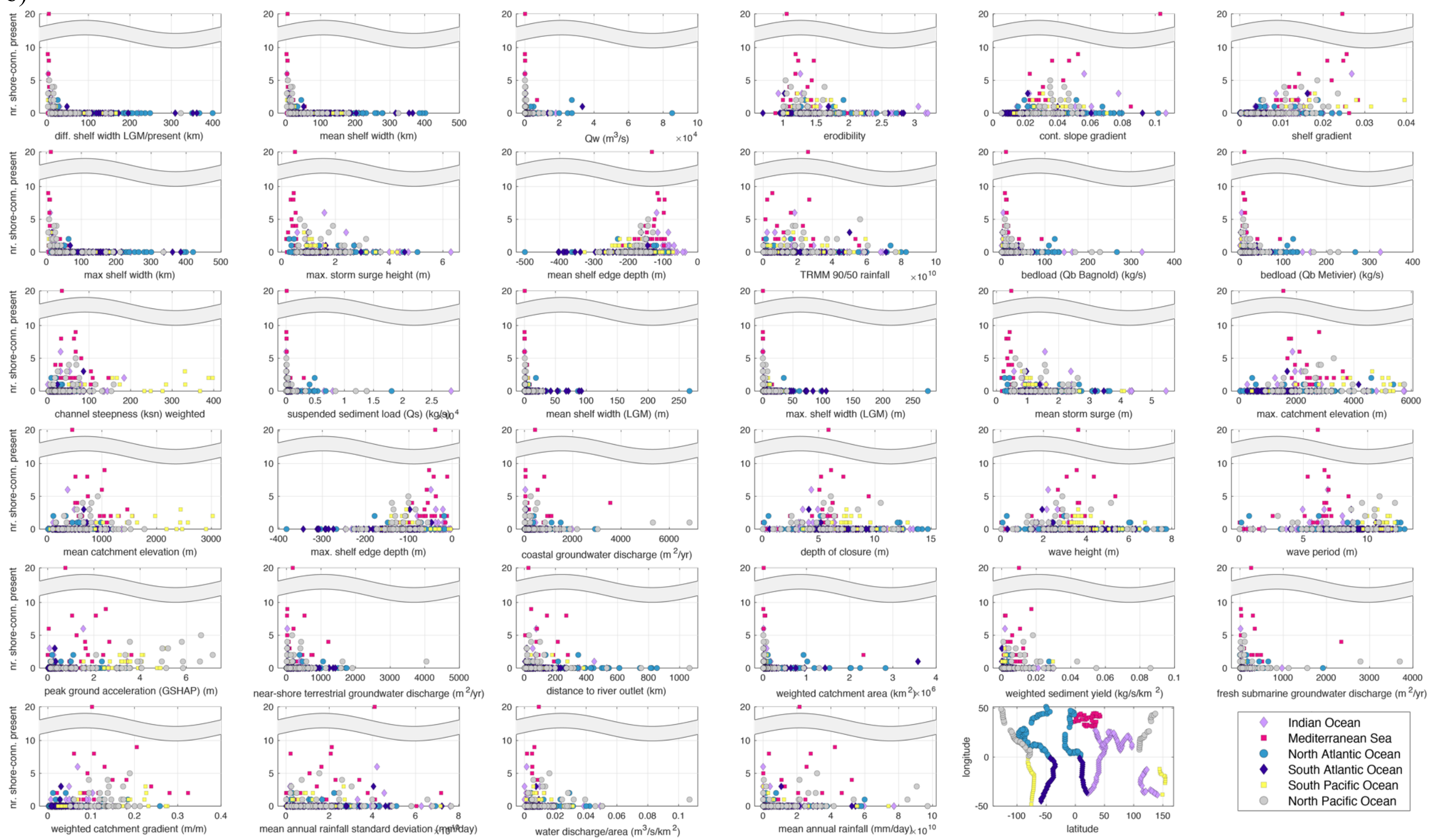


Fig. S2. a) Cross-plots of 33 predictors against mean, present-day shelf width for present-day and LGM shore-connected canyons (SCCs). Note the log-scale of the y-axis and some x-axes. b) Predictors plotted against the total numbers of present-day and LGM shore-connected canyons (SCCs) in each hexagon.

Sensitivity Analyses of shrinkage priors

To identify the most important predictors on the number of present-day shore-connected canyon (SCC) heads and to predict these numbers on a global scale, we employ Bayesian penalized regression. Bayesian statistics applies probabilities to statistical problems offering a statistical way to learn from new data to update prior beliefs (e.g., Efron, 2013) while accounting for uncertainties and Bayesian regression is an emergent state-of-the-art tool in geomorphology (Korup, 2020). In the frequentist approach to penalized regression a penalty term is introduced with the aim to shrink small regression coefficients towards zero and therefore reducing or eliminating the predictor variable from the model, while large coefficients remain large (e.g., Tibshirani, 2011). In Bayesian penalized regression, penalization is incorporated through the prior distribution (e.g., van Erp et al., 2019). Therefore, the shrinkage prior allows us to determine important predictors and to discard these predictors that are unimportant to predict the number of SCC canyon heads. We used used *bayesreg*, a Matlab toolbox for fitting Bayesian penalized regression models with continuous shrinkage prior densities for penalized regression models (Makalic and Schmidt, 2016, version 1.9, 2017-2020). As we are predicting counts of present-day SCC canyons per hexagon, we specified a Poisson distribution for the response variable *in bayesreg*. To choose the shrinkage prior, we followed the suggested procedure of van Erp (2020): We applied all five shrinkage priors available for the Poission problem in *bayesreg* with their default hyperparameters (Figs. S3-S6, Table S1-S5). All priors result in similar prediction root mean square errors (RMSE=0.93-0.95; Table S1-S5, Fig. S6), Watanabe–Akaike information criteria (WAIC=220-231), pseudo R^2 of ~0.5, and posterior distributions of the regression coefficients (Figs. S4). ***Based on the lowest RMSE*** (Table S1) ***and the efficient and stable sampling performance*** (Table S1-5, Fig. S3)***, we show the results of the lasso shrinkage prior in the main text of the manuscript.*** To determine the importance of each predictor, we use the Bayesian feature ranking algorithm of Makalic and Schmidt (2011). The rank corresponds to the strength of the association between the predictors and the response (present-day SCC counts per hexagon) where lower ranks denote more important predictors (Table S1-S5). Because the ranking process is repeated for each posterior sample, the final rank of the predictor is determined from the complete set of rankings based on the 75th percentile.

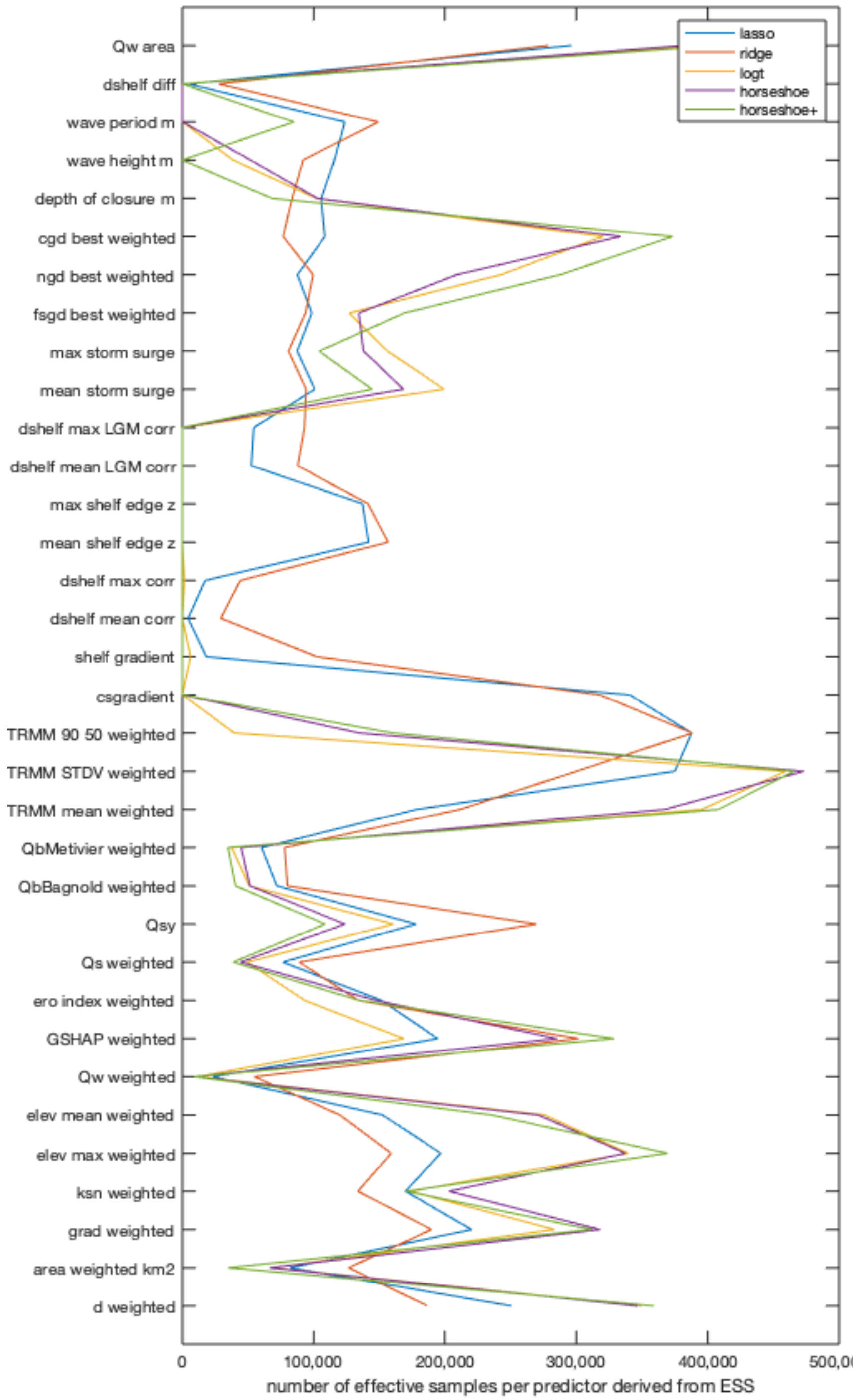


Figure S3. The number of samples used to compute the posterior distribution of all predictors for each shrinkage prior. This number was computed by applying the effective sample size (ESS, Table S1-S5) to the total MCMC sample size of n= 500 000. The logt, the horseshoe and the horseshoe+ shrinkage priors ineffectively sample some predictors and the efficient sample size is zero for e.g., the shelf width. Effective sampling is most stable when using the lasso and the ridge prior with the minimum number of samples used is 4,385 and 27,921 respectively.

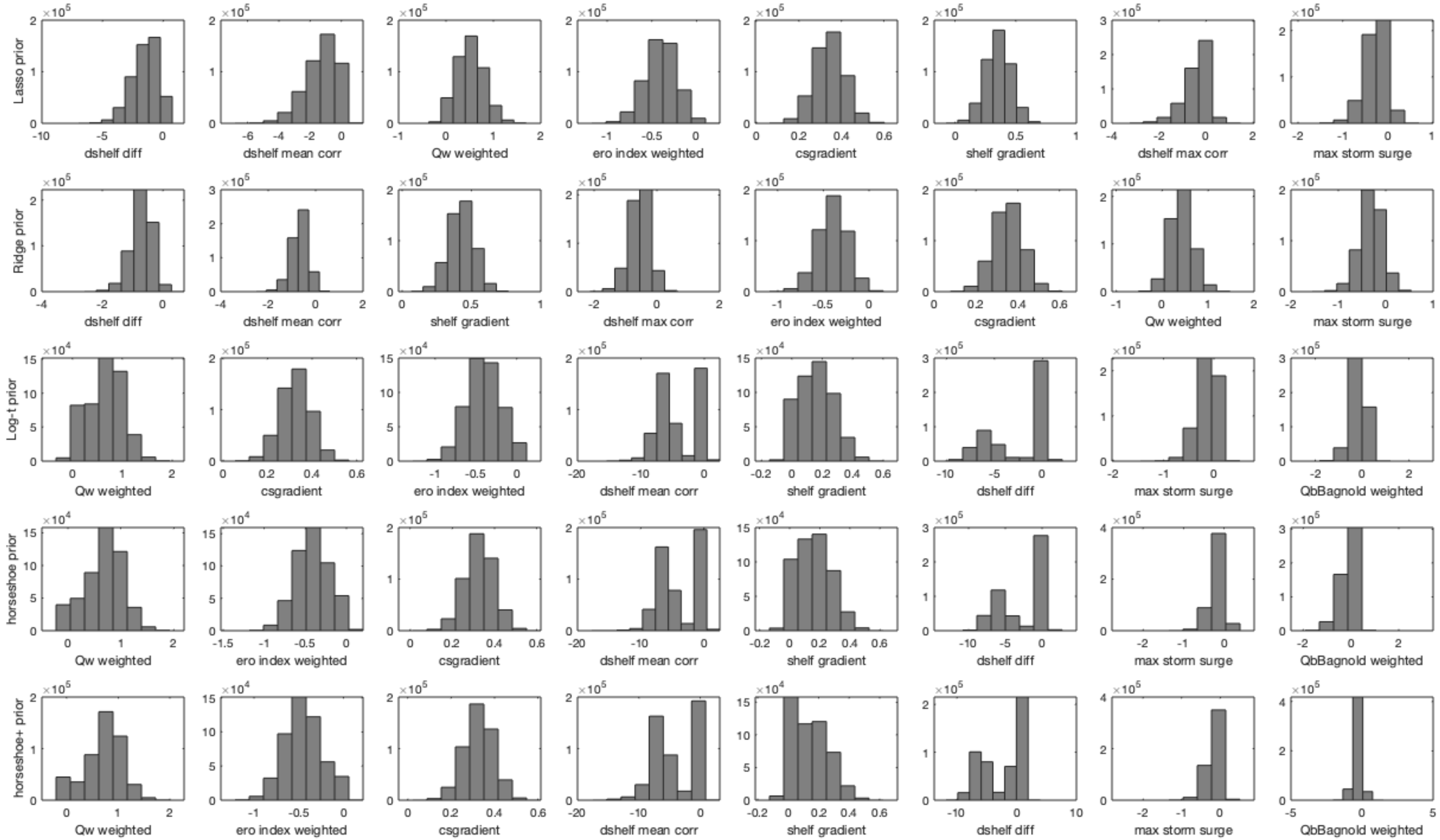


Fig. S4. Posterior distributions of the 8 most highly ranked predictor coefficients for each shrinkage prior ordered by rank. For abbreviations of predictors see Table 1 in the main manuscript. The predictors on the left have the highest ranking (see also Table S1-S5).

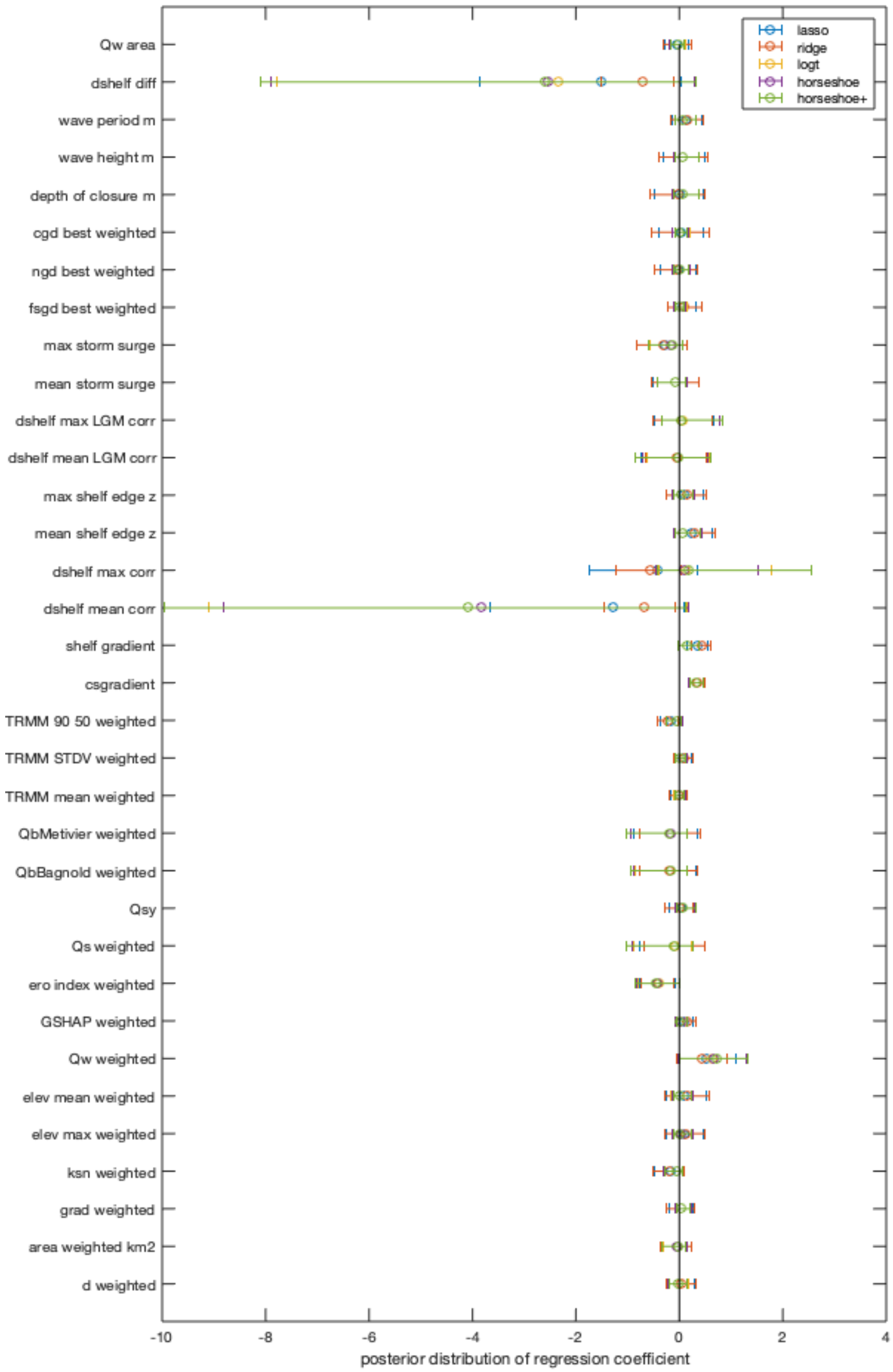


Fig. S5. Comparison of posterior mean estimates and 95% credibility intervals obtained employing the five shrinkage priors. All five shrinkage priors return comparable posterior distributions for all predictors.

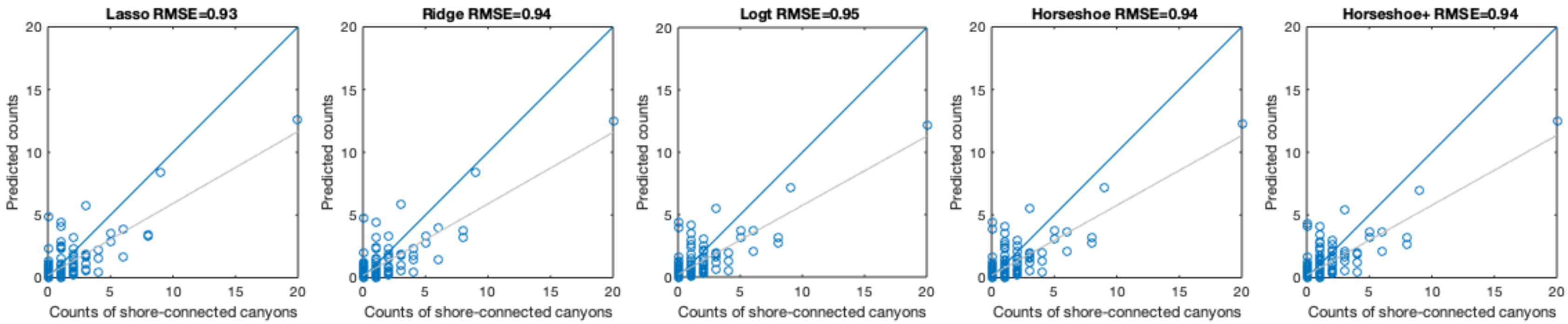


Fig. S6. Comparison of the actual counts of presently shore-connected canyons and the predicted counts from Bayesian regression for all five priors. Blue lines show 1:1 reference lines and grey lines are least-square lines.

Bayesian Poisson lasso regression

MCMC Samples = 500000		Number of obs	=	347
MCMC Burnin = 10000		Number of vars	=	34
MCMC Thinning = 100		Overdispersion	=	0.8113
		Pseudo R2	=	0.5433
		WAIC	=	225.2

Parameter	mean(Coef)	std(Coef)	[95% Cred.	Interval]	tStat	Rank	ESS
dshelf_diff	-1.56206	1.08041	-3.92990	0.03486	-1.446	1 *	0.9
dshelf_mean_corr	-1.27846	1.03177	-3.65104	0.10040	-1.239	2 *	1.0
Qw_weighted	0.51996	0.28837	-0.00313	1.10846	1.803	3 *	4.7
ero_index_weighted	-0.40133	0.17550	-0.76035	-0.07394	-2.287	4 **	30.6
csgradient	0.34328	0.07050	0.20376	0.48017	4.869	4 **	64.6
shelf_gradient	0.35196	0.10420	0.14393	0.55243	3.378	6 **	3.5
dshelf_max_corr	-0.40650	0.52613	-1.70896	0.35483	-0.773	7 *	3.4
max_storm_surge	-0.27517	0.24821	-0.82367	0.13795	-1.109	7 *	17.6
mean_shelf_edge_z	0.23568	0.19393	-0.10125	0.64301	1.215	9 *	29.0
TRMM_90_50_weighted	-0.16829	0.10326	-0.37948	0.02046	-1.630	10 *	77.4
QbBagnold_weighted	-0.19589	0.29873	-0.87897	0.31708	-0.656	11 *	13.1
QbMetivier_weighted	-0.18814	0.30983	-0.89673	0.34718	-0.607	11	12.6
ksn_weighted	-0.16178	0.14417	-0.47983	0.08125	-1.122	13 *	32.5
Qs_weighted	-0.07812	0.29859	-0.75618	0.48980	-0.262	13	15.1
dshelf_mean_LGM_corr	-0.04603	0.29824	-0.72504	0.52654	-0.154	15	10.6
dshelf_max_LGM_corr	0.04874	0.27654	-0.49854	0.66027	0.176	15	11.3
mean_storm_surge	-0.08212	0.21863	-0.51612	0.37389	-0.376	15	20.1
elev_max_weighted	0.08788	0.17218	-0.23608	0.45679	0.510	18	37.1
elev_mean_weighted	0.08991	0.19010	-0.25397	0.51385	0.473	18	31.1
max_shelf_edge_z	0.08559	0.17409	-0.25132	0.45013	0.492	18	28.3
cgd_best_weighted	0.02929	0.21100	-0.40450	0.47055	0.139	18	22.7
depth_of_closure_m	0.00675	0.22203	-0.47156	0.45017	0.030	18	20.6
wave_height_m	0.06235	0.19763	-0.31599	0.49351	0.316	18	22.8
wave_period_m	0.12036	0.15004	-0.14830	0.44328	0.802	18 *	23.1
GSHAP_weighted	0.09205	0.08636	-0.07039	0.26624	1.066	25 *	37.3
ngd_best_weighted	-0.01770	0.17018	-0.37254	0.32690	-0.104	25	19.2
d_weighted	0.02468	0.13168	-0.23803	0.29497	0.187	27	46.5
area_weighted_km2	-0.04490	0.14728	-0.36530	0.22925	-0.305	27	16.7
Qsy	0.04341	0.11821	-0.18968	0.28499	0.367	27	34.0
fsgd_best_weighted	0.05517	0.13495	-0.21795	0.33239	0.409	27	17.7
grad_weighted	0.03136	0.11737	-0.20493	0.26851	0.267	31	38.6
TRMM_STDV_weighted	0.05218	0.08909	-0.11779	0.23506	0.586	31	60.2
Qw_area	-0.04156	0.11699	-0.28938	0.18159	-0.355	31	58.8
TRMM_mean_weighted	-0.00986	0.07347	-0.16134	0.13176	-0.134	34	35.1

Table S1. Summary statistics of the Bayesian regression model for a Poisson-distributed target variable using the Lasso shrinkage prior.

Bayesian Poisson ridge regression

MCMC Samples	= 500000	Number of obs	= 347
MCMC Burnin	= 10000	Number of vars	= 34
MCMC Thinning	= 100	Overdispersion	= 0.8922
		Pseudo R2	= 0.5309
		WAIC	= 231.79

Parameter	mean(Coef)	std(Coef)	[95% Cred.	Interval]	tStat	Rank	ESS
dshelf_diff	-0.71734	0.35353	-1.50067	-0.10654	-2.029	1 **	5.6
dshelf_mean_corr	-0.68055	0.35157	-1.45794	-0.06795	-1.936	2 **	5.9
shelf_gradient	0.42786	0.09128	0.24564	0.60389	4.688	3 **	20.5
dshelf_max_corr	-0.55698	0.31900	-1.23248	0.03092	-1.746	3 *	8.8
ero_index_weighted	-0.40168	0.15943	-0.72758	-0.10295	-2.520	5 **	26.8
csgradient	0.35233	0.07020	0.21336	0.48851	5.019	5 **	63.6
Qw_weighted	0.42153	0.24502	-0.04049	0.92372	1.720	7 *	11.0
max_storm_surge	-0.31487	0.24278	-0.82230	0.13738	-1.297	8 *	16.2
mean_shelf_edge_z	0.29119	0.19334	-0.08119	0.68069	1.506	9 *	31.3
TRMM_90_50_weighted	-0.21302	0.10348	-0.42017	-0.01452	-2.059	10 **	77.7
ksn_weighted	-0.20467	0.15339	-0.51828	0.08438	-1.334	11 *	26.8
QbBagnold_weighted	-0.19017	0.28576	-0.77199	0.36311	-0.665	11 *	16.0
QbMetivier_weighted	-0.17609	0.29358	-0.77343	0.39486	-0.600	11	15.6
Qs_weighted	-0.06947	0.29506	-0.66857	0.50145	-0.235	14	17.8
dshelf_mean_LGM_corr	-0.05237	0.29857	-0.66333	0.51763	-0.175	14	17.6
elev_mean_weighted	0.13777	0.21622	-0.27814	0.57403	0.637	16	24.0
GSHAP_weighted	0.14339	0.09217	-0.03942	0.32227	1.556	16 *	60.3
dshelf_max_LGM_corr	0.04239	0.29029	-0.51780	0.63160	0.146	16	18.6
cgd_best_weighted	0.01573	0.27458	-0.52818	0.56499	0.057	16	15.3
depth_of_closure_m	-0.03676	0.26611	-0.57623	0.48109	-0.138	16	16.7
elev_max_weighted	0.10844	0.19486	-0.27518	0.49268	0.557	21	31.8
max_shelf_edge_z	0.13913	0.19118	-0.24553	0.50718	0.728	21 *	28.3
mean_storm_surge	-0.08957	0.22930	-0.52873	0.37963	-0.391	21	18.8
wave_height_m	0.06646	0.23411	-0.38871	0.53991	0.284	21	18.4
wave_period_m	0.13856	0.16499	-0.17921	0.46978	0.840	21 *	29.8
fsgd_best_weighted	0.10524	0.16622	-0.23135	0.42790	0.633	26	18.7
ngd_best_weighted	-0.06317	0.20914	-0.47284	0.35509	-0.302	26	19.9
d_weighted	0.03501	0.14541	-0.25398	0.31615	0.241	28	37.3
area_weighted_km2	-0.04064	0.15304	-0.35532	0.24680	-0.266	28	25.3
grad_weighted	0.02332	0.13713	-0.25066	0.28725	0.170	28	37.9
Qsy	0.00373	0.13461	-0.26626	0.26154	0.028	28	54.0
TRMM_STDV_weighted	0.07897	0.09924	-0.11608	0.27284	0.796	28 *	60.0
Qw_area	-0.03192	0.13236	-0.29602	0.22342	-0.241	28	55.8
TRMM_mean_weighted	-0.01776	0.08227	-0.18363	0.13937	-0.216	34	42.2

Table S2. Summary statistics of the Bayesian regression model for a Poisson-distributed target variable using the Ridge shrinkage prior.

Bayesian Poisson log-t regression

MCMC Samples	= 500000	Number of obs	= 347
MCMC Burnin	= 10000	Number of vars	= 34
MCMC Thinning	= 100	Overdispersion	= 0.84204
		Pseudo R2	= 0.5478
		WAIC	= 221.04

Parameter	mean(Coef)	std(Coef)	[95% Cred.	Interval]	tStat	Rank	ESS
Qw_weighted	0.64485	0.36312	−0.01116	1.29222	1.776	1 *	2.3
csgradient	0.32521	0.06772	0.18980	0.45577	4.802	2 **	0.0
ero_index_weighted	−0.40354	0.20696	−0.80743	−0.00637	−1.950	3 **	18.6
dshelf_mean_corr	−4.08243	3.29695	−9.09343	0.16254	−1.238	4 *	0.0
shelf_gradient	0.15768	0.11171	−0.01403	0.38290	1.412	5 *	1.3
dshelf_diff	−2.32835	2.97636	−7.77587	0.30061	−0.782	6	0.0
max_storm_surge	−0.15122	0.18088	−0.57593	0.07726	−0.836	7 *	31.2
QbBagnold_weighted	−0.16587	0.27288	−0.86671	0.14828	−0.608	8	10.2
QbMetivier_weighted	−0.17423	0.29312	−0.93889	0.15384	−0.594	8	7.5
mean_storm_surge	−0.07968	0.14491	−0.42390	0.14808	−0.550	10	39.9
Qs_weighted	−0.09063	0.26637	−0.86971	0.24803	−0.340	11	9.9
TRMM_90_50_weighted	−0.06391	0.08319	−0.26498	0.05043	−0.768	11 *	7.9
dshelf_max_corr	0.11055	0.57141	−0.40173	1.76716	0.193	11	0.3
mean_shelf_edge_z	0.07038	0.13077	−0.11098	0.41517	0.538	11	0.0
dshelf_mean_LGM_corr	−0.01343	0.27514	−0.61810	0.56898	−0.049	11	0.0
dshelf_max_LGM_corr	0.04910	0.24847	−0.32567	0.77222	0.198	11	0.0
depth_of_closure_m	0.06005	0.12958	−0.14715	0.37344	0.463	11	20.4
wave_height_m	0.06766	0.12344	−0.12012	0.36625	0.548	11	7.7
wave_period_m	0.06628	0.10550	−0.08435	0.33066	0.628	11	0.0
area_weighted_km2	−0.03463	0.10761	−0.31534	0.14813	−0.322	20	13.6
ksn_weighted	−0.06209	0.09432	−0.30500	0.05942	−0.658	20	34.7
Qsy	0.05823	0.09415	−0.08211	0.29151	0.618	20	32.1
max_shelf_edge_z	0.03241	0.10199	−0.14783	0.29198	0.318	20	0.0
d_weighted	−0.01303	0.08781	−0.22224	0.16561	−0.148	24	70.0
grad_weighted	0.04101	0.07846	−0.08762	0.23334	0.523	24	56.7
elev_max_weighted	0.02593	0.09453	−0.14374	0.26655	0.274	24	67.9
elev_mean_weighted	0.01866	0.09588	−0.15203	0.26438	0.195	24	55.2
ngd_best_weighted	0.01664	0.08124	−0.14189	0.20935	0.205	24	48.5
cgd_best_weighted	0.01457	0.08085	−0.14296	0.19910	0.180	24	64.1
Qw_area	−0.02126	0.07333	−0.20600	0.10880	−0.290	24	78.3
GSHAP_weighted	0.02617	0.05629	−0.07060	0.16229	0.465	31	33.7
TRMM_mean_weighted	0.00702	0.04829	−0.09520	0.11477	0.145	31	79.1
TRMM_STDV_weighted	0.01524	0.05640	−0.09216	0.15063	0.270	31	91.8
fsgd_best_weighted	0.00678	0.06030	−0.12228	0.13647	0.112	31	25.5

Table S3. Summary statistics of the Bayesian regression model for a Poisson-distributed target variable using the Log-t shrinkage prior.

Bayesian Poisson horseshoe regression

MCMC Samples = 500000
MCMC Burnin = 10000
MCMC Thinning = 100

Number of obs = 347
Number of vars = 34
Overdispersion = 0.84202
Pseudo R2 = 0.5483
WAIC = 220.43

Parameter	mean(Coef)	std(Coef)	[95% Cred.	Interval]	tStat	Rank	ESS
Qw_weighted	0.66939	0.35528	-0.00834	1.29974	1.884	1 *	1.8
ero_index_weighted	-0.41196	0.20657	-0.81206	-0.00714	-1.994	2 **	29.5
csgradient	0.32641	0.06782	0.19084	0.45685	4.813	2 **	0.0
dshelf_mean_corr	-3.83752	3.29468	-8.81877	0.16504	-1.165	4 *	0.0
shelf_gradient	0.15917	0.11236	-0.01504	0.38657	1.417	5 *	0.0
dshelf_diff	-2.55542	3.03296	-7.89894	0.29174	-0.843	6	0.0
max_storm_surge	-0.15361	0.18559	-0.58608	0.07646	-0.828	7 *	27.6
QbBagnold_weighted	-0.17126	0.27912	-0.88873	0.14860	-0.614	8	10.3
QbMetivier_weighted	-0.17885	0.29640	-0.94937	0.15372	-0.603	8	9.0
mean_storm_surge	-0.07844	0.14765	-0.42946	0.15080	-0.531	10	33.7
Qs_weighted	-0.09408	0.27747	-0.90488	0.26075	-0.339	11	8.9
TRMM_90_50_weighted	-0.06163	0.08172	-0.26123	0.05071	-0.754	11 *	27.0
dshelf_max_corr	0.09902	0.55813	-0.43958	1.51143	0.177	11	0.0
mean_shelf_edge_z	0.07343	0.13379	-0.10694	0.42744	0.549	11	0.0
dshelf_mean_LGM_corr	-0.02548	0.29437	-0.71227	0.55022	-0.087	11	0.0
dshelf_max_LGM_corr	0.04669	0.25256	-0.34908	0.78539	0.185	11	0.0
depth_of_closure_m	0.06118	0.12833	-0.13570	0.37671	0.477	11	20.5
wave_height_m	0.06741	0.12253	-0.11142	0.36718	0.550	11	10.4
wave_period_m	0.06435	0.10454	-0.08374	0.32869	0.616	11	0.0
area_weighted_km2	-0.03769	0.10741	-0.32408	0.13661	-0.351	20	13.3
ksn_weighted	-0.05951	0.09314	-0.30264	0.05923	-0.639	20	40.6
Qsy	0.05951	0.09405	-0.07476	0.29497	0.633	20	24.8
max_shelf_edge_z	0.03170	0.10119	-0.14362	0.29355	0.313	20	0.0
d_weighted	-0.01236	0.08662	-0.22075	0.16358	-0.143	24	69.3
grad_weighted	0.03969	0.07666	-0.08253	0.23084	0.518	24	63.6
elev_max_weighted	0.02540	0.09233	-0.13659	0.26272	0.275	24	67.5
elev_mean_weighted	0.01822	0.09419	-0.14537	0.26263	0.193	24	54.3
ngd_best_weighted	0.01690	0.07775	-0.13082	0.20209	0.217	24	41.8
cgd_best_weighted	0.01511	0.07540	-0.12747	0.18471	0.200	24	66.7
Qw_area	-0.02054	0.07145	-0.20243	0.10465	-0.287	24	76.6
GSHAP_weighted	0.02466	0.05464	-0.06901	0.15747	0.451	31	57.1
TRMM_mean_weighted	0.00714	0.04645	-0.08985	0.11162	0.154	31	73.4
TRMM_STDV_weighted	0.01287	0.05402	-0.09173	0.14163	0.238	31	94.6
fsgd_best_weighted	0.00735	0.05666	-0.11122	0.12846	0.130	31	26.9

Table S4. Summary statistics of the Bayesian regression model for a Poisson-distributed target variable using the Horseshoe shrinkage prior.

Bayesian Poisson horseshoe+ regression

MCMC Samples = 500000
MCMC Burnin = 10000
MCMC Thinning = 100

Number of obs = 347
Number of vars = 34
Overdispersion = 0.86572
Pseudo R2 = 0.5477
WAIC = 219.92

Parameter	mean(Coef)	std(Coef)	[95% Cred.	Interval]	tStat	Rank	ESS
Qw_weighted	0.71418	0.35507	-0.00380	1.33041	2.011	1 *	1.8
ero_index_weighted	-0.44661	0.20932	-0.83984	-0.00246	-2.134	2 **	27.0
csgradient	0.32659	0.06687	0.19294	0.45509	4.884	3 **	0.0
dshelf_mean_corr	-4.09754	3.52100	-9.95034	0.13110	-1.164	4 *	0.0
shelf_gradient	0.14127	0.11732	-0.01683	0.37995	1.204	5 *	0.0
dshelf_diff	-2.60921	3.11463	-8.09472	0.31647	-0.838	6	0.0
max_storm_surge	-0.14638	0.19037	-0.58850	0.06083	-0.769	7 *	20.8
QbBagnold_weighted	-0.17864	0.30172	-0.93833	0.13830	-0.592	8	8.1
QbMetivier_weighted	-0.19242	0.32647	-1.01850	0.14108	-0.589	8	7.0
mean_storm_surge	-0.07452	0.14969	-0.43670	0.13178	-0.498	10	28.9
Qs_weighted	-0.10571	0.31087	-1.03834	0.25547	-0.340	11	7.8
Qsy	0.05859	0.09549	-0.05405	0.30958	0.614	11	21.7
dshelf_max_corr	0.16848	0.73127	-0.43150	2.54914	0.230	11	0.0
dshelf_mean_LGM_corr	-0.03261	0.32482	-0.86076	0.59956	-0.100	11	0.0
dshelf_max_LGM_corr	0.04886	0.26281	-0.35061	0.85043	0.186	11	0.0
depth_of_closure_m	0.06361	0.12902	-0.10212	0.39195	0.493	11	13.7
wave_height_m	0.06804	0.12392	-0.08430	0.38085	0.549	11	0.0
wave_period_m	0.05438	0.10045	-0.06950	0.32512	0.541	11	17.0
area_weighted_km2	-0.03499	0.10172	-0.32764	0.10918	-0.344	19	7.0
ksn_weighted	-0.04179	0.08429	-0.27784	0.04996	-0.496	19	34.1
TRMM_90_50_weighted	-0.04470	0.07449	-0.24314	0.04426	-0.600	19	32.0
mean_shelf_edge_z	0.05855	0.12390	-0.09126	0.40812	0.473	19	0.0
d_weighted	-0.00997	0.07659	-0.20842	0.14273	-0.130	23	71.8
grad_weighted	0.03254	0.06904	-0.06258	0.22052	0.471	23	62.4
elev_max_weighted	0.01789	0.07644	-0.11030	0.22582	0.234	23	73.9
elev_mean_weighted	0.01340	0.08094	-0.11708	0.22922	0.166	23	47.1
GSHAP_weighted	0.01732	0.04607	-0.05618	0.14114	0.376	23	65.7
max_shelf_edge_z	0.02437	0.08925	-0.12068	0.27462	0.273	23	0.0
ngd_best_weighted	0.01310	0.06076	-0.09495	0.16625	0.216	23	57.6
cgd_best_weighted	0.01123	0.05625	-0.08799	0.14401	0.200	23	74.7
Qw_area	-0.01202	0.05806	-0.16801	0.09020	-0.207	23	81.6
TRMM_mean_weighted	0.00621	0.03793	-0.07062	0.10031	0.164	32	81.6
TRMM_STDV_weighted	0.00763	0.04376	-0.07834	0.11974	0.174	32	93.1
fsgd_best_weighted	0.00642	0.04319	-0.07884	0.10614	0.149	32	33.8

Table S5. Summary statistics of the Bayesian regression model for a Poisson-distributed target variable using the Horsehoe+ shrinkage prior.

Data Set S1. Information and predictor variable values for each individual canyon head.

Data Set S2. Information and predictor variable values for numbers of submarine canyon heads in each 50 000 km^2 hexagon.