

Supporting Information for “Stochastic representation of the microscale spatial variability in thaw depth in permafrost boreal forests”

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Introduction

Figure S1 and Table S1 provide the results of fitting six popular probability distributions to the merged data obtained in June 2017 on Spasskaya Pad.

Table S2 lists the statistics of the shape parameter k and rate parameter λ of the gamma distribution obtained by bootstrapping together with the normalized uncertainty range.

Figures S2–S5 show the contour plots of thaw depths measured on Spasskaya Pad and Elgeei, the comparison of thaw depths between the regular measurements (25 points) and merged data (45 points total) in June 2017 on Spasskaya Pad, and the comparison of the interannual node variability (INV) of active layer thickness on Spasskaya Pad and Elgeei.

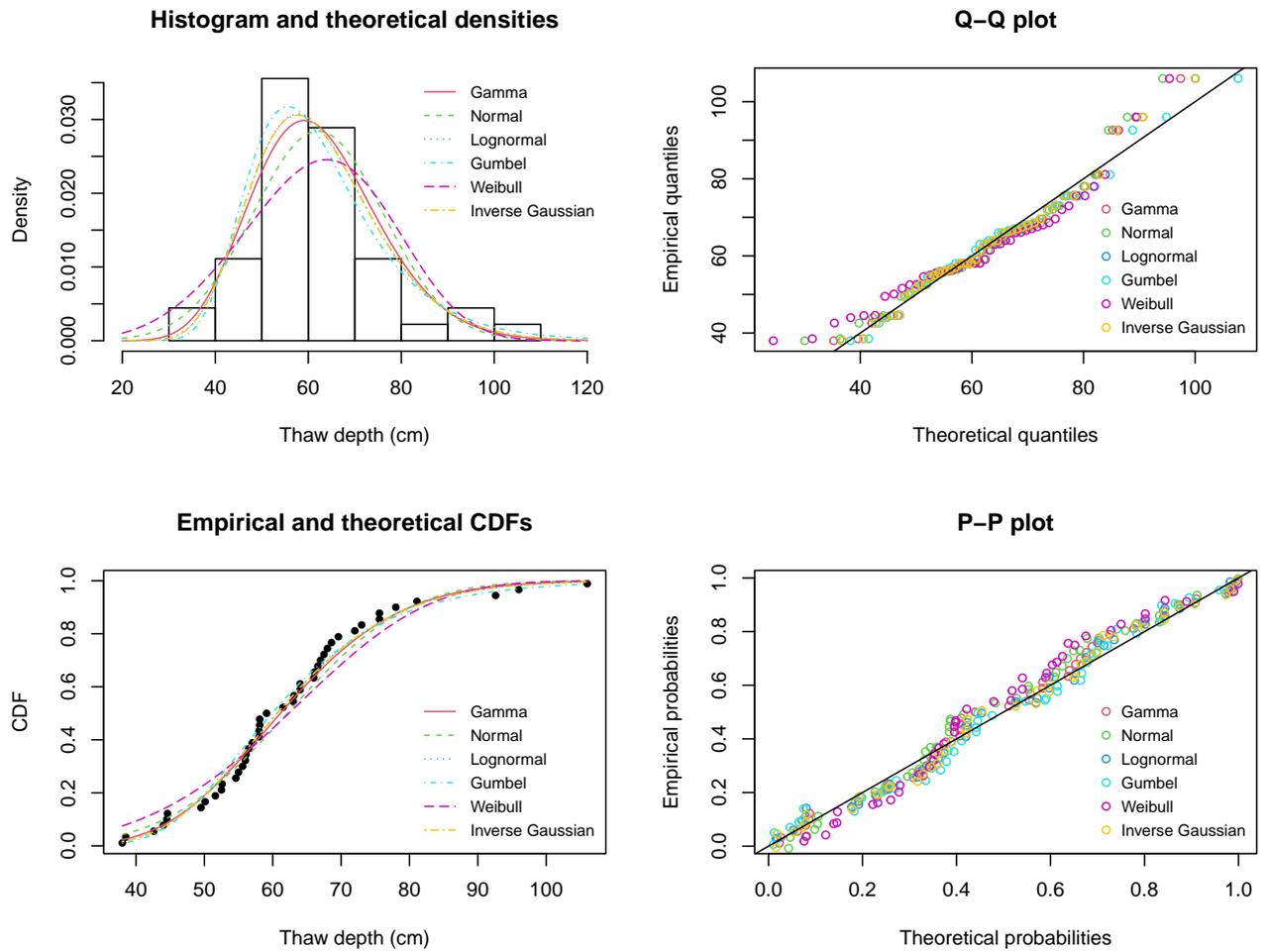


Figure S1. Results of fitting the gamma, normal, lognormal, Gumbel, Weibull, and inverse Gaussian distributions to the merged data from June 2017 obtained at Spasskaya Pad. The probability density function (PDF) plot, Q-Q (quantile-quantile) plot, cumulative density function (CDF) plot, and P-P (probability-probability) plot are shown.

Table S1. Comparison of the log-likelihood, the Akaike Information Criterion (AIC), and the Bayesian Information Criterion (BIC) for various probability distributions fitted to the merged data measured at Spasskaya Pad in June 2017, using maximum likelihood estimation.

Probability distributions	Log-likelihood	AIC	BIC
Gamma distribution	-180.6626	365.3253	368.9386
Normal distribution	-182.7123	369.4247	373.038
Lognormal distribution	-180.2196	364.4392	368.0525
Gumbel distribution	-180.3499	364.6997	368.313
Weibull distribution	-185.0891	374.1782	377.7916
Inverse Gaussian distribution	-180.2347	364.4694	368.0827

Table S2. Statistics of the shape parameter k and rate parameter λ of gamma distribution obtained by bootstrapping. k_{obs} and λ_{obs} are k and λ obtained from the observed data, $k_{2.5}$ and $k_{97.5}$ are the 2.5th and 97.5th percentiles of k , $\lambda_{2.5}$ and $\lambda_{97.5}$ are the 2.5th and 97.5th percentiles of λ , and NUR_k and NUR_λ are the normalized uncertainty range for k and λ , respectively.

Site	Date	Points	k_{obs}	$k_{2.5}$	$k_{97.5}$	λ_{obs}	$\lambda_{2.5}$	$\lambda_{97.5}$	NUR_k	NUR_λ
Spasskaya Pad	Jul 2016	17	77.68	45.18	188.88	0.890	0.524	2.180	1.850	1.860
Spasskaya Pad	Sep 2016	25	160.64	103.95	313.25	1.068	0.696	2.079	1.303	1.296
Spasskaya Pad	Jun 2017	45	20.78	14.43	35.87	0.334	0.229	0.582	1.032	1.055
Spasskaya Pad	Sep 2017	25	165.08	107.90	330.82	1.107	0.719	2.243	1.350	1.376
Spasskaya Pad	May 2019	25	11.27	7.33	22.83	0.408	0.265	0.811	1.375	1.337
Spasskaya Pad	Aug 2019	25	206.85	128.30	377.29	1.446	0.888	2.640	1.204	1.212
Spasskaya Pad	Sep 2019	18	218.26	128.95	512.61	1.462	0.862	3.422	1.758	1.751
Elgeei	Jul 2016	17	20.22	12.16	49.71	0.261	0.151	0.651	1.857	1.912
Elgeei	Sep 2016	25	46.63	29.84	91.05	0.331	0.211	0.658	1.313	1.350
Elgeei	Jun 2017	25	11.91	7.52	23.85	0.213	0.138	0.435	1.371	1.396
Elgeei	Sep 2017	25	44.96	29.65	89.74	0.306	0.202	0.608	1.336	1.328
Elgeei	Sep 2018	25	53.02	34.06	106.96	0.388	0.245	0.780	1.375	1.380
Elgeei	Sep 2019	25	36.75	23.51	71.97	0.253	0.162	0.499	1.318	1.335

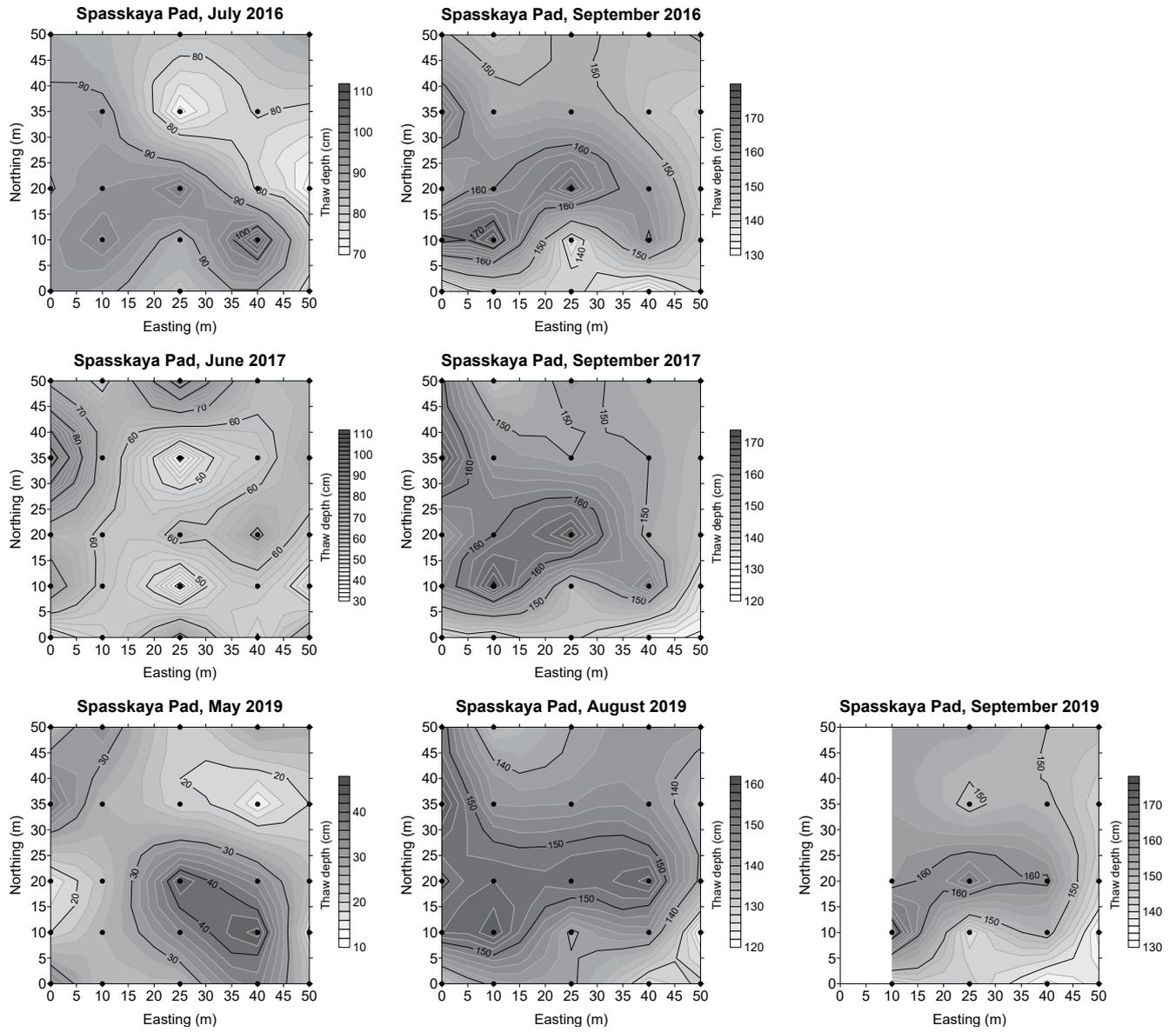


Figure S2. Contour plots of thaw depths within a 50 m × 50 m plot at Spasskaya Pad. Closed circles represent the measurement nodes on the grid.

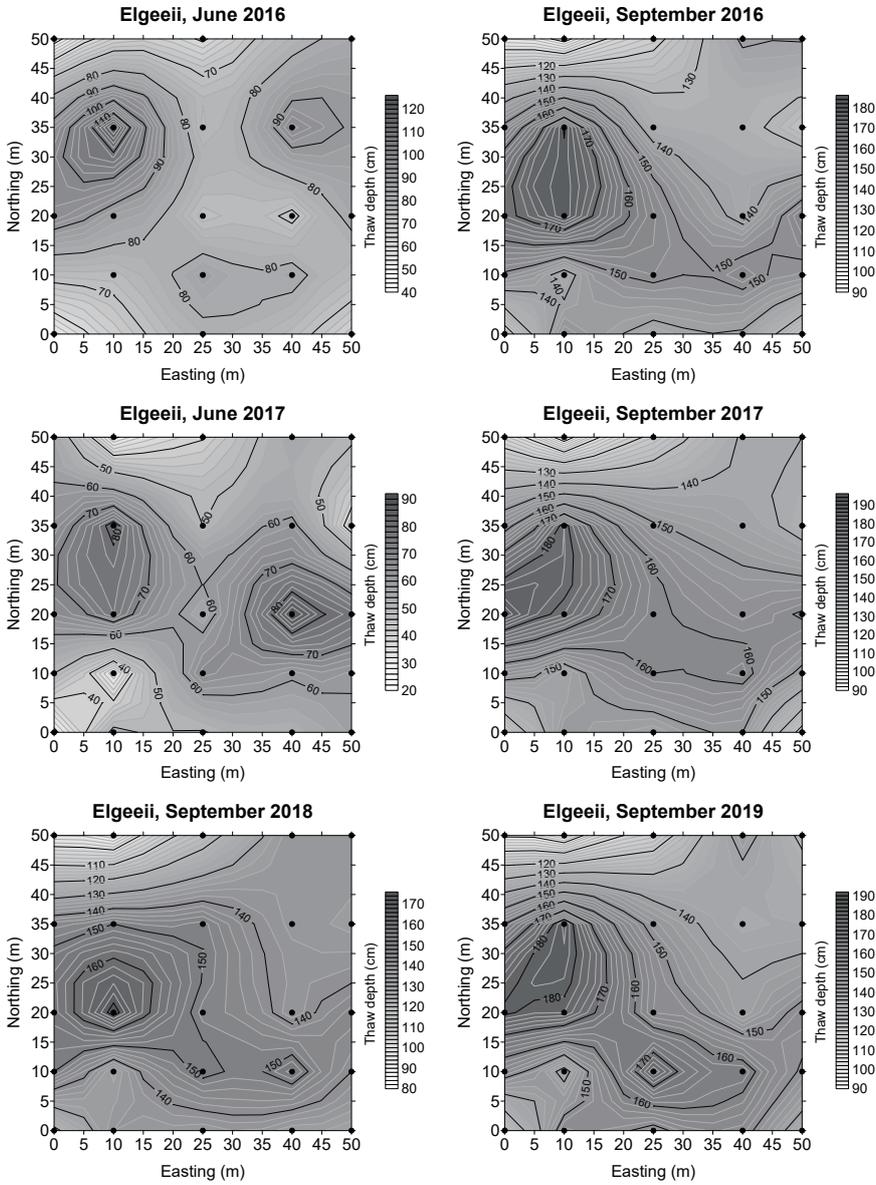


Figure S3. Contour plots of thaw depths within a 50 m × 50 m plot at Elgeei. Closed circles represent the measurement nodes on the grid.

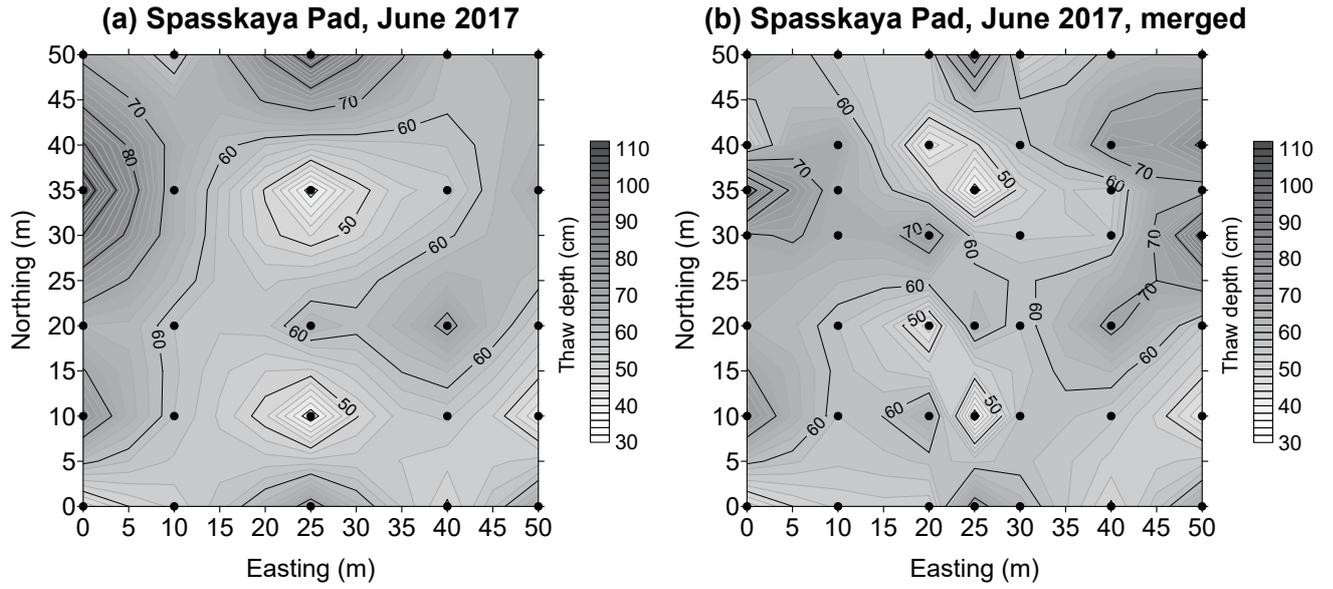


Figure S4. Contour plots of thaw depths of regular measurements (a, 25 points) and merged data (b, 45 points) in June 2017 at Spasskaya Pad. Closed circles represent the measurement nodes on the grid.

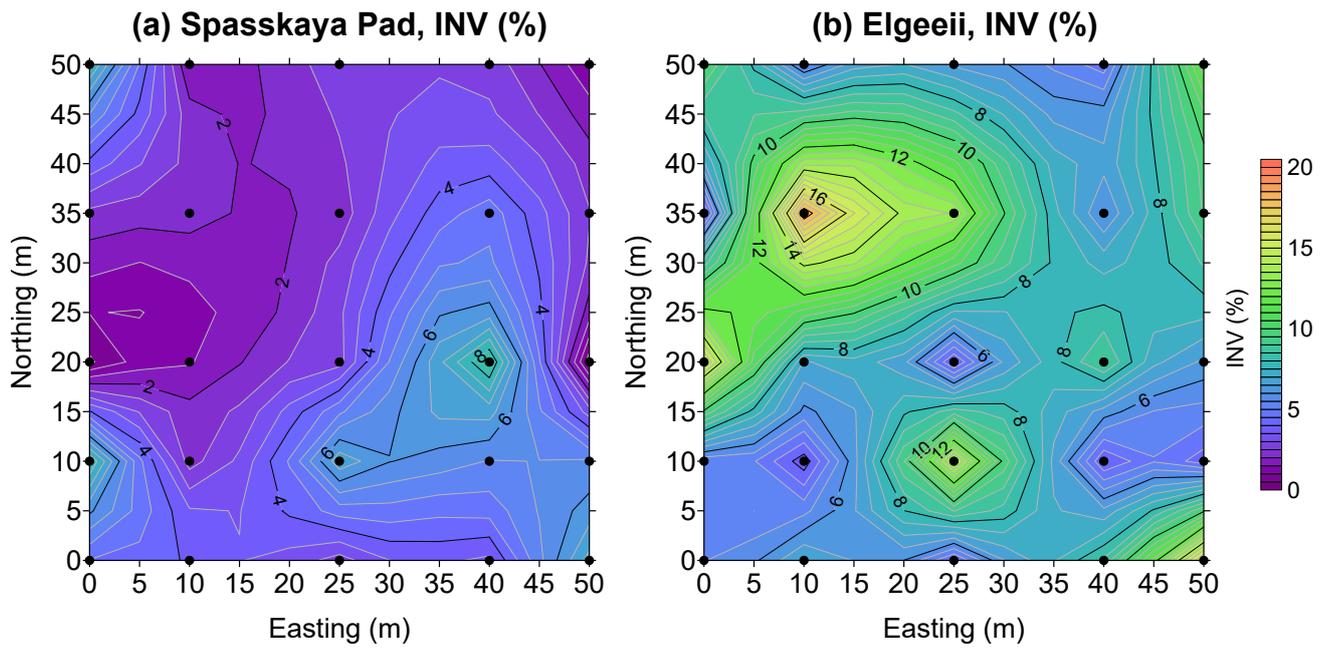


Figure S5. Contour plots of the interannual node variability (INV) of active layer thickness at Spasskaya Pad (a) and Elgeei (b). Closed circles represent the measurement nodes on the grid.