Supplement to Assessing volumetric change distributions and scaling relations of thaw slumps across the Arctic

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1 Propbility density function of area and volumetric change rates

To compute the rollover, cutoff, exponetial decay coefficients we fitted a a three-parameter inverse Gamma function defined by:

$$pdf(X_{RTS}|\rho,a,s) = \frac{1}{a\Gamma(\rho)}\left(\frac{1}{X_{RTS}-s}\right)^{\rho+1}\exp\left(-\frac{a}{X_{RTS}-s}\right) \quad (1)$$

where X_{RTS} is either the yearly area or volume change and $\Gamma(\rho)$ is the gamma function of ρ. The determined values of the fitting parameters as well as the rollover, cutoff and exponential decay coefficients can be seen in Table 1 and 2.

Table S 1. Rollover Cutoff and Exponential decay for yearly area change rate.

Area	Rollover $[10^3 \mathrm{m}^2 \mathrm{yr}^{-1}]$	Cutoff $[10^3 \mathrm{m}^2 \mathrm{yr}^{-1}]$	Exp.decay	ρ	a $[10^3]$	s $[10^3]$
Peel	2.53 ± 0.22	4.67 ± 2.87	2.1 ± 0.2	1.35	6.90	-0.46
Banks	6.51 ± 0.42	17.45 ± 6.84	2.8 ± 0.4	1.87	22.86	-1.50
Ellesmere	6.66 ± 0.69	14.41 ± 7.68	2.3 ± 0.3	1.47	17.17	-0.57
Tuktuyaktuk	1.47 ± 0.18	3.43 ± 2.15	2.7 ± 0.5	2.39	6.97	-0.61
Noatak	2.17 ± 0.81	3.99 ± 1.81	2.1 ± 0.4	7.47	69.39	-5.52
Chukotka	2.33 ± 0.77	4.30 ± 1.49	2.6 ± 0.5	2.39	13.01	-1.32
Taymyr	2.38 ± 0.34	5.42 ± 2.17	2.8 ± 0.6	1.03	3.09	0.75
Yamal/Gydan	2.19 ± 0.39	4.78 ± 2.33	3.0 ± 1.3	2.32	10.29	-0.86

Table S 2. Rollover Cutoff and Exponential decay for yearly volumetric change rate.

Area	Rollover $[10^3 \mathrm{m}^2 \mathrm{yr}^{-1}]$	Cutoff $[10^3 \mathrm{m}^2 \mathrm{yr}^{-1}]$	Exp.decay	ρ	a $[10^3]$	s $[10^3]$
Peel	7.68 ± 0.93	14.83 ± 6.47	1.8 ± 0.1	0.92	17.99	-1.64
Banks	9.70 ± 0.78	25.58 ± 11.54	2.0 ± 0.2	1.04	22.91	-1.54
Ellesmere	16.12 ± 3.00	15.71 ± 10.44	1.8 ± 0.3	1.03	30.49	0.805
Tuktuyaktuk	4.02 ± 0.44	5.07 ± 2.17	2.0 ± 0.2	1.63	11.14	-0.36
Noatak	3.82 ± 1.52	5.48 ± 3.70	1.8 ± 0.3	0.41	1.14	2.04
Chukotka	4.99 ± 2.10	8.19 ± 6.10	2.1 ± 0.5	2.07	29.34	-3.66
Taymyr	6.22 ± 1.14	7.69 ± 6.91	2.0 ± 0.4	1.26	12.13	0.61
Yamal/Gydan	4.33 ± 1.64	13.92 ± 7.11	2.8 ± 1.0	3.16	44.22	-5.77

2 Additional Figures

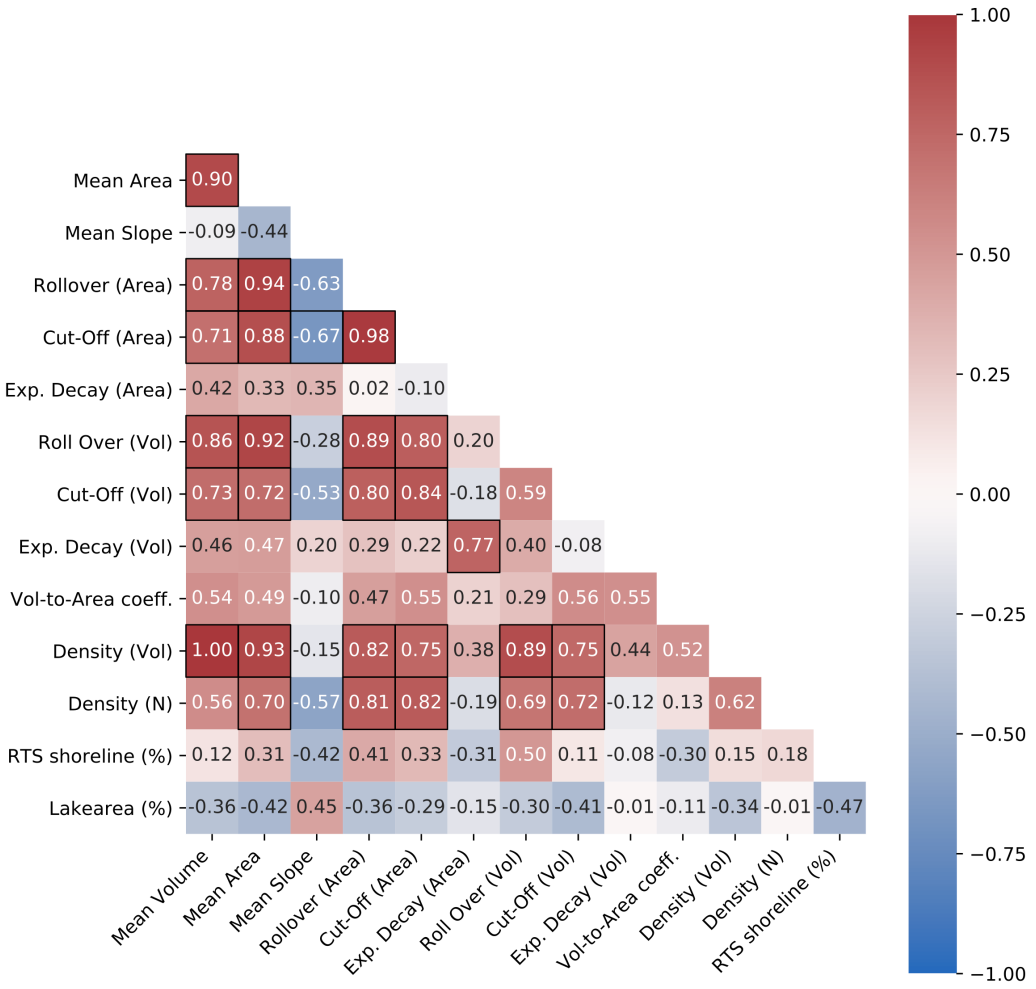

Figure S 1. Correlation coefficients between all computed quantities of all areas. A value below -0.64 and above 0.64 are statistically significant (t-Test with a p-value < 0.05.

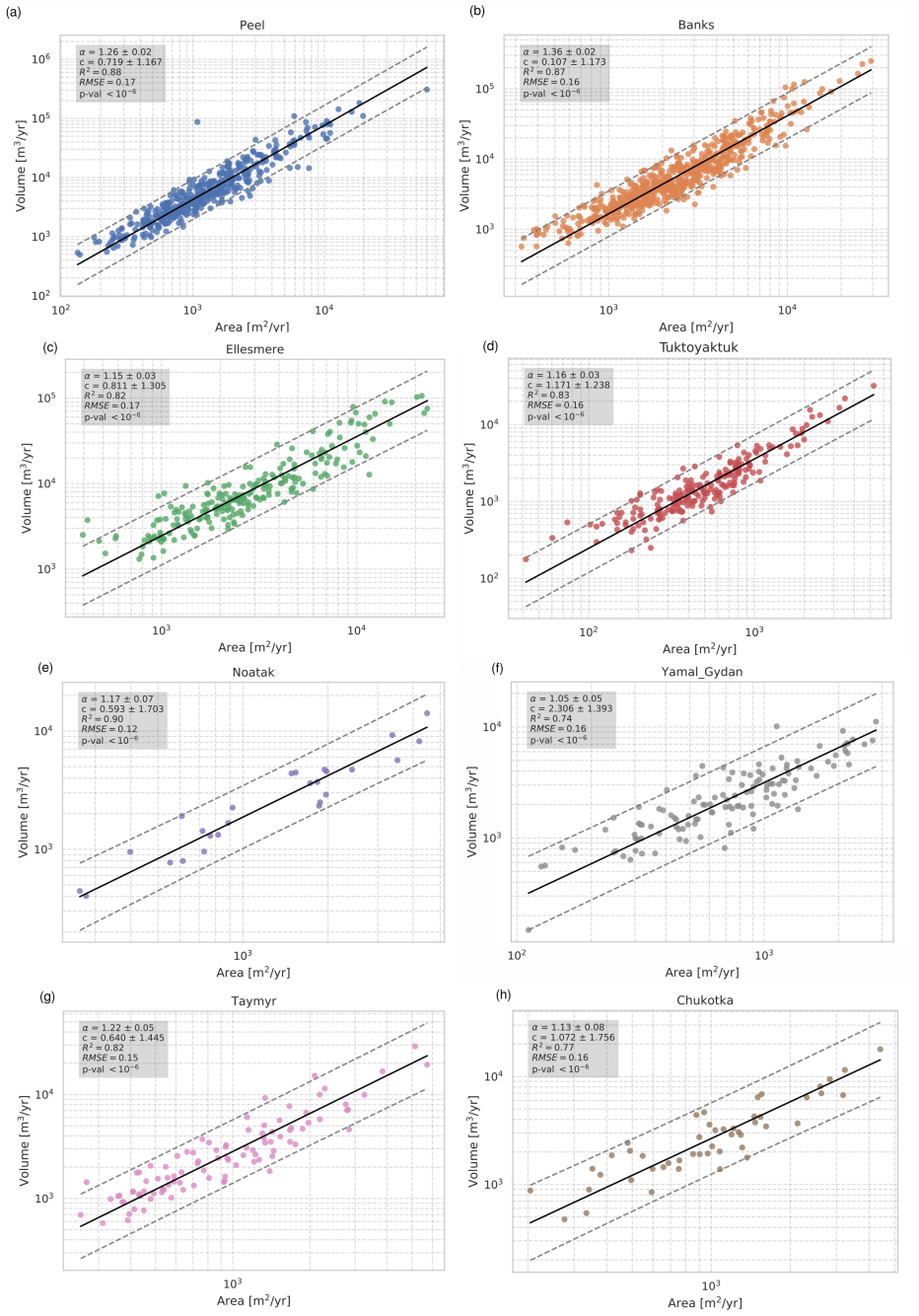

Figure S 2. Area to Volume scaling for each study area.

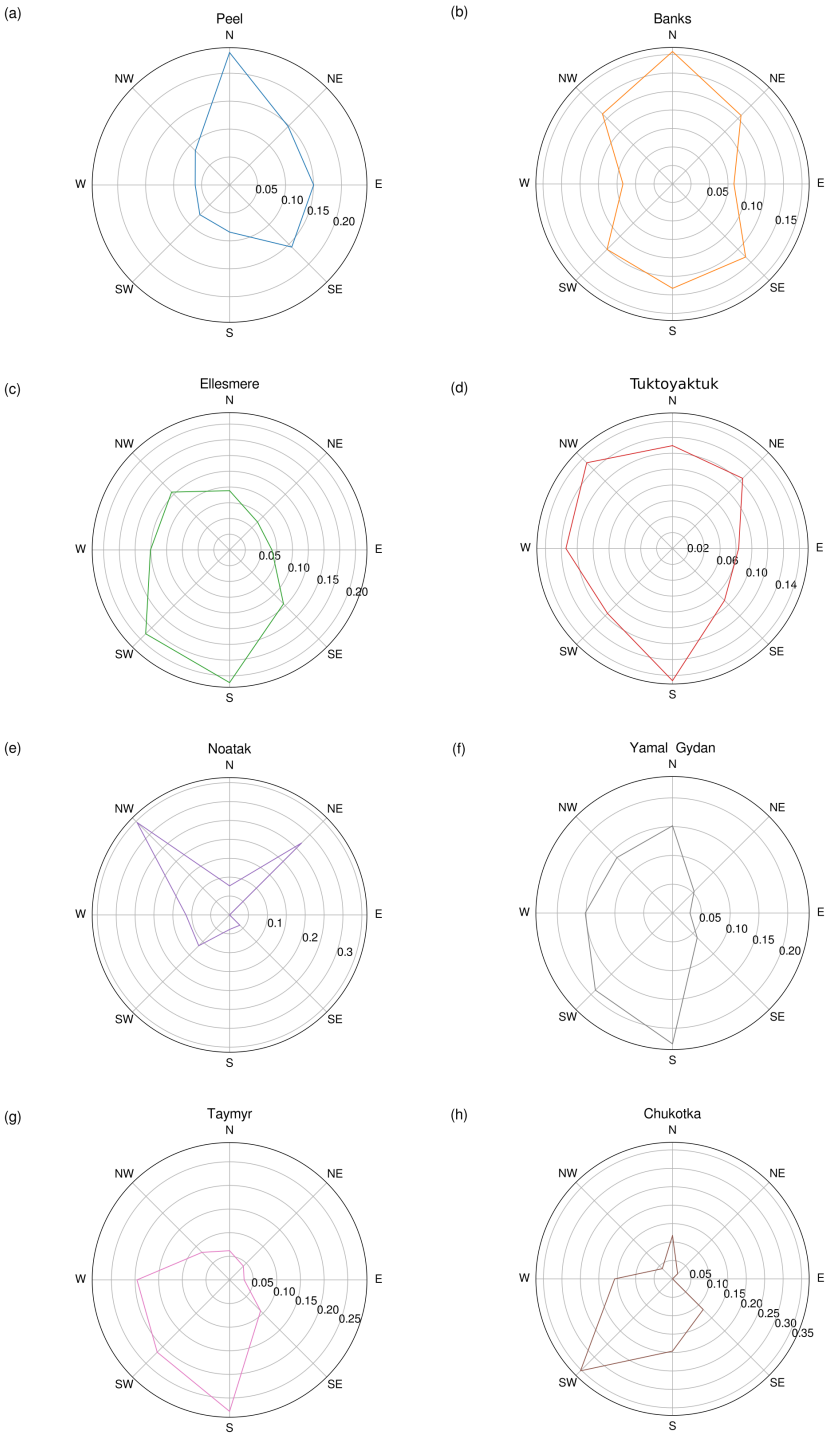

Figure S 3. Aspect distribution of all study areas.