

S2: Relevant p-values from the post hoc Tukey comparison tests following one-way ANOVA1: spatial comparison between $\delta^{13}\text{C-POC}_{\text{water}}$ data from arctic shelves and arctic basins; one-way ANOVA2: spatial comparison between $\delta^{13}\text{C-POC}_{\text{water}}$ data from arctic shelves and arctic rivers; one-way ANOVA3: spatial comparison between $\delta^{13}\text{C-POC}_{\text{water}}$ data from arctic shelves; one-way ANOVA4: spatial comparison of the $\delta^{13}\text{C-POC}_{\text{ice}}$ data; two ways ANOVA5 including the factors “POC origin” (ice *versus* water) and “arctic region”: comparisons between $\delta^{13}\text{C-POC}_{\text{ice}}$ with $\delta^{13}\text{C-POC}_{\text{water}}$ for each arctic regions.

ANOVA1 ($\text{POC}_{\text{water}}$)	Arctic basins								
South Iceland	<0.005								
North water polynya	<0.005								
Chukchi sea	<0.005								
Barents sea	<0.005								
Bering sea	<0.005								
Svalbard	<0.005								
Siberian coast	<0.005								
Hudson bay	<0.005								
Svalbard fjords	0.045								
Beaufort sea	<0.005								
Canadian archipelago	<0.005								
ANOVA2 ($\text{POC}_{\text{water}}$; POC_{riv})	Siberian rivers	North American rivers							
South Iceland	<0.005	<0.005							
North water polynya	<0.005	<0.005							
Chukchi sea	<0.005	<0.005							
Barents sea	<0.005	<0.005							
Bering sea	<0.005	<0.005							
Svalbard	<0.005	<0.005							
Siberian coast	<0.005	<0.005							
Hudson bay	<0.005	<0.005							
Svalbard fjords	<0.005	<0.005							
Beaufort sea	<0.005	<0.005							
Canadian archipelago	<0.005	<0.005							
ANOVA3 ($\text{POC}_{\text{water}}$)	Chukchi sea	Barents sea	Bering sea	Svalbard	Siberian coast	Hudson bay	Svalbard fjords	Beaufort sea	Canadian archipelago
North water polynya	0.999	0.420	<0.005	<0.005	0.084	<0.005	<0.005	<0.005	<0.005
Chukchi sea	-	0.618	<0.005	<0.005	0.149	<0.005	<0.005	<0.005	<0.005
Barents sea	-	-	0.999	0.518	0.989	0.792	0.011	<0.005	0.007
Bering sea	-	-	-	0.383	0.999	0.798	<0.005	<0.005	<0.005
Svalbard	-	-	-	-	0.999	0.999	0.586	<0.005	0.651
Siberian coast	-	-	-	-	-	0.999	0.495	0.019	0.584
Hudson bay	-	-	-	-	-	-	0.343	<0.005	0.358
Svalbard fjords	-	-	-	-	-	-	-	0.976	0.999
Beaufort sea	-	-	-	-	-	-	-	-	0.557
ANOVA4 (POC_{ice})	Svalbard	Amundsen-Nansen basins	North water polynya	Beaufort sea	Canadian archipelago				
Barents sea	0.484	0.006	1.000	<0.005	0.999				
Svalbard	-	0.789	0.352	0.071	0.381				
Amundsen-Nansen basins	-	-	<0.005	0.519	0.006				
North water polynya	-	-	-	<0.005	0.999				
Beaufort Sea	-	-	-	-	<0.005				
ANOVA5	Water <i>versus</i> ice								
Barents sea	0.134								
Svalbard	0.527								
Amundsen-Nansen basins	<0.005								
North water polynya	0.999								
Beaufort sea	0.999								
Canadian archipelago	<0.005								