We thank the reviewers for their valuable comments and suggestions. We have incorporated majority of their suggestions, which greatly improved the quality of the manuscript. The specific response to the reviewer's queries are addressed separately.

Below we listed the major changes that have been made in the revised version of the manuscript.

- The data referred to as Swv (19 samples) are not included in the revised manuscript. The meteorological parameters which were measured at the height of 15m above the surface of the ocean and not at the height at which Swv samples were collected (which was close to the ocean surface during calm conditions).
- The stucture of the paper is modified. The explanation of the the Unified and the Traditional Craig-Gordon models and the HYSPLIT back trajectory analysis has been moved to the methods section.
- The models are run for the turbulent indices (x) of 0-1 with an increment of 0.1. In the old manuscript we had run the models for only 0, 0.5 and 1.
- Most of the figures are modified to include the new results from modelling experiments and a few additional figures were included. All these figures with modified captions are presented below
- 4 new tables were also included in the revised submission. These tables along with the captions are presented below

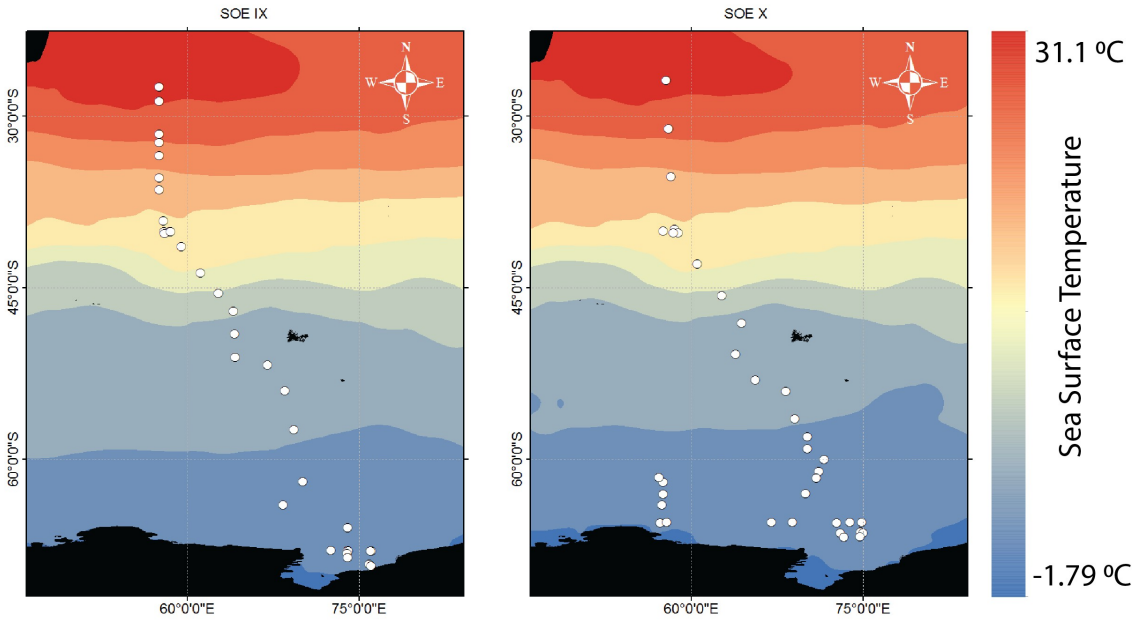

Figure 1. The water vapor sampling locations shown as open circles overlain on the map of mean monthly sea surface temperature during the two expeditions. The sea surface temperature data is from Reanalysis dataset Kanamitsu et al. (2002) .

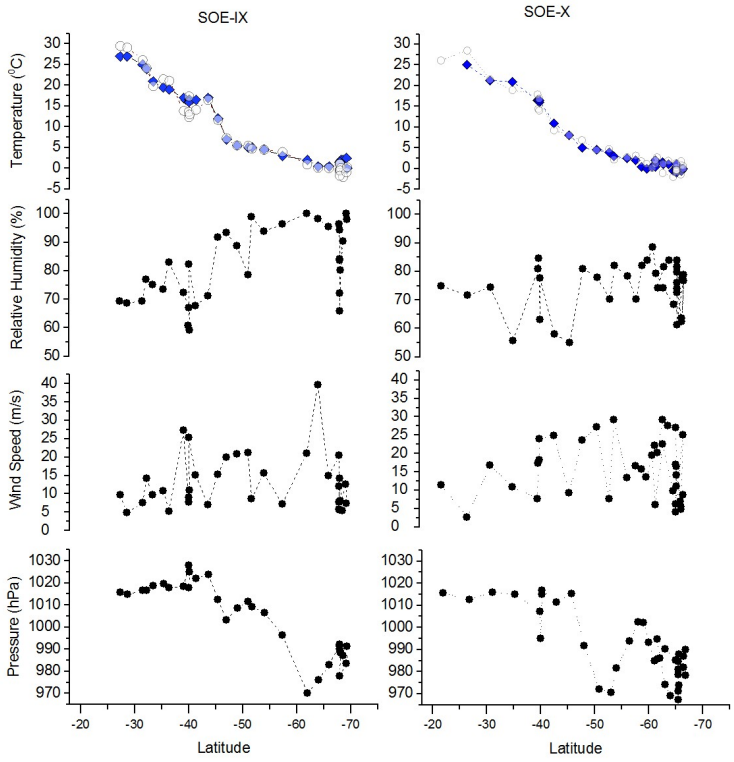

Figure 2. Latitudinal variability of measured meteorological parameters, temperature, relative humidity, wind speed and atmospheric pressure along the sampling transect. Filled blue diamonds and open circles in the temperature plot represent the sea surface temperature and air temperature respectively.

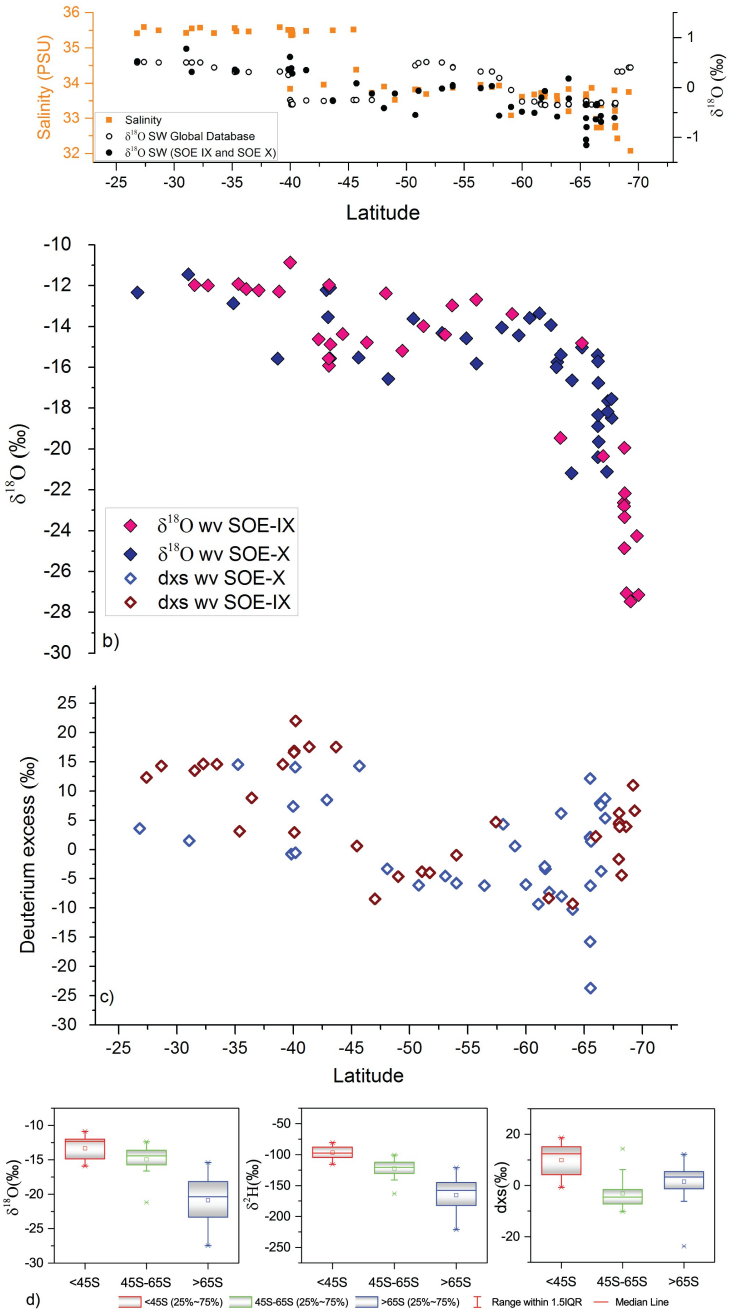

Figure 4. a) Measured $\delta^{18}O_{SW}$ as black filled circled and values of surface water isotopic composition extracted from the global sea water $\delta^{18}O$ database along the latitudinal transect (open black circles). Also plotted as orange filled squares are the salinity values along the transect b) Pink and purple filled diamonds depict the $\delta^{18}O$ of water vapor samples collected during the SOE-IX and SOE-X respectively at height of ≈ 15m above the water surface. c) latitudinal variation of dxs in water vapor samples shown as open red and purple diamonds for SOE-IX and SOE-X respectively, d) variation of $\delta^{18}O$, $\delta^{2}H$ and d-excess of water vapor along the transect as box plots grouped by latitudes, based on the HYSPLIT back trajectories.

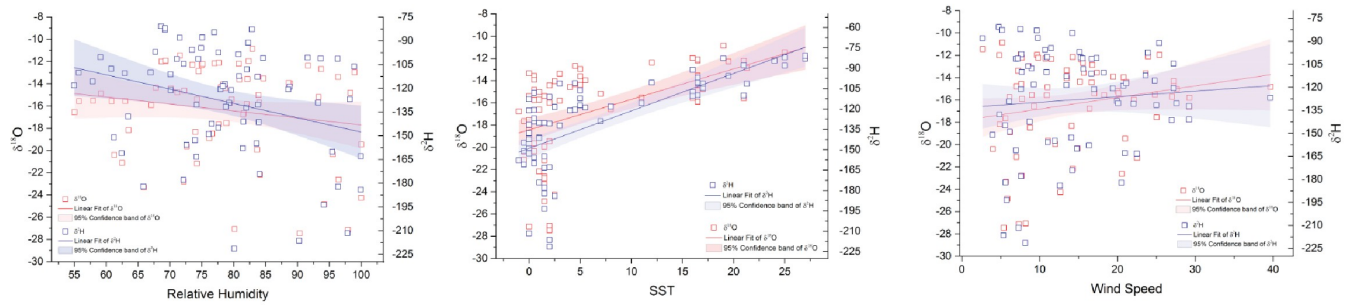

Figure 5. Linear regression for isotopic composition of water vapor and physical parameters(sea surface temperature, relative humidity and wind speed). Hollow red and blue squares represent the $\delta^{18}O$ and $\delta^{2}H$ respectively and the shaded areas depict the 95% confidence bands. The linear regression lines are shown as blue and red for $\delta^{2}H$ and $\delta^{18}O$ respectively. The slope and intercept of the linear regression equations along with data from Uemura et al. (2008) are listed in Table 2 for $\delta^{18}O$ and Table 3 for $\delta^{2}H$.

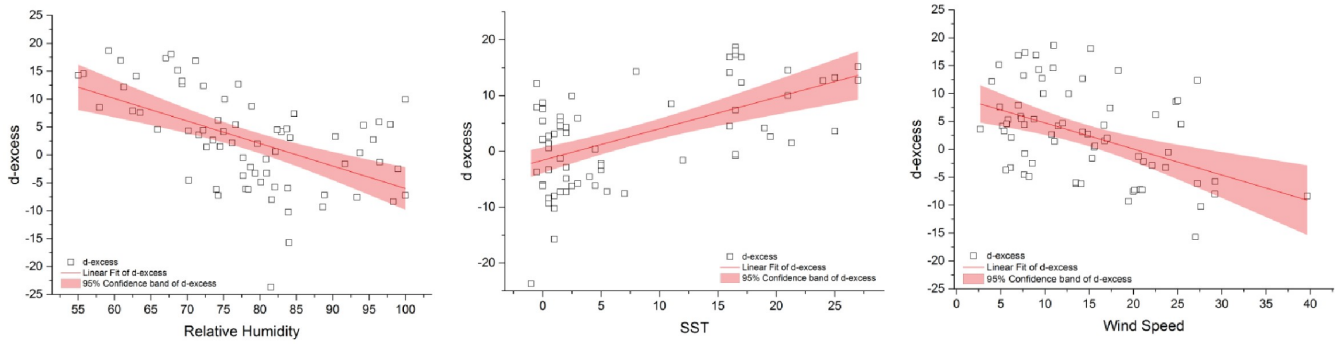

Figure 6. Regression plots for d-excess (hollow black squares) in water vapor and the meteorological conditions (relative humidity, sea surface temperature and wind speed). The shaded region depicts the 95% confidence bands of d-excess. The slope and intercept of the regression equations along with data from Uemura et al. (2008) are listed in Table 4.

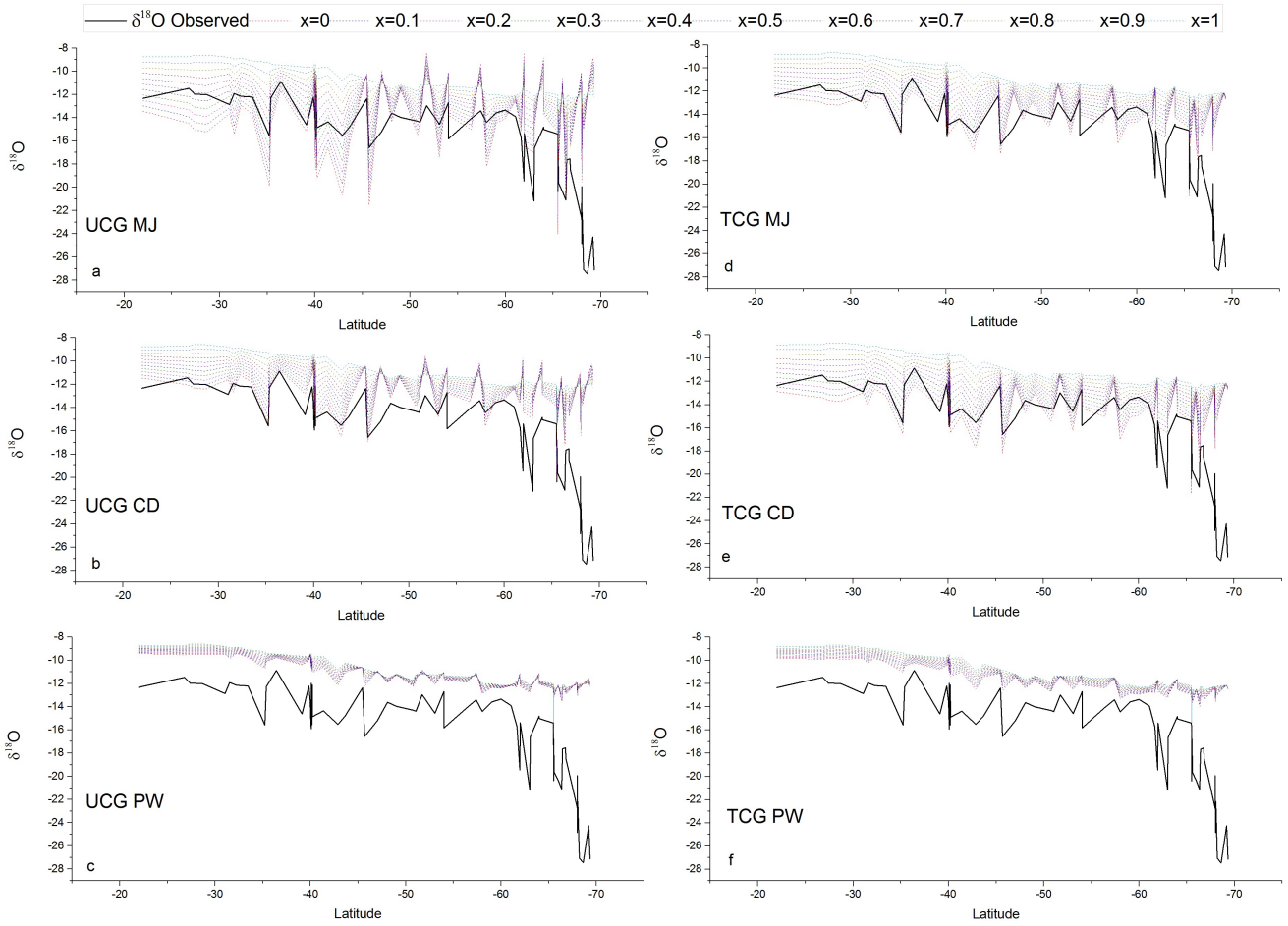

Figure 7. Comparison between the latitudinal distribution of the measured water vapor $\delta^{18}O$ (black lines) and that predicted by the TCG and UCG models for different molecular diffusivity ratios and turbulence indices, shown as colored lines.

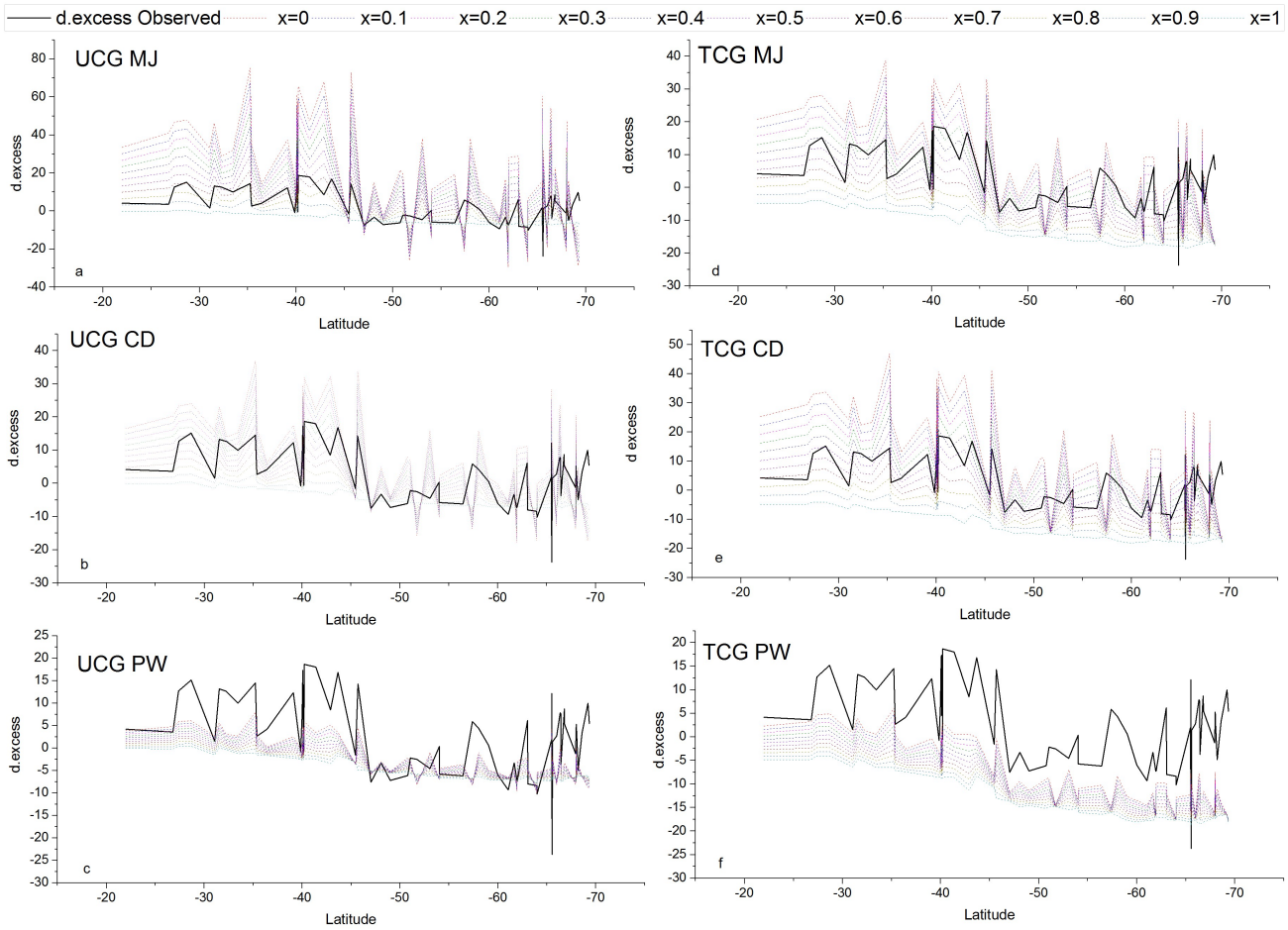

Figure 8. Comparison between the latitudinal distribution of the measured d-excess in water vapor (black lines) and that predicted by the TCG and UCG models for different molecular diffusivity ratios and turbulence indices shown as colored lines

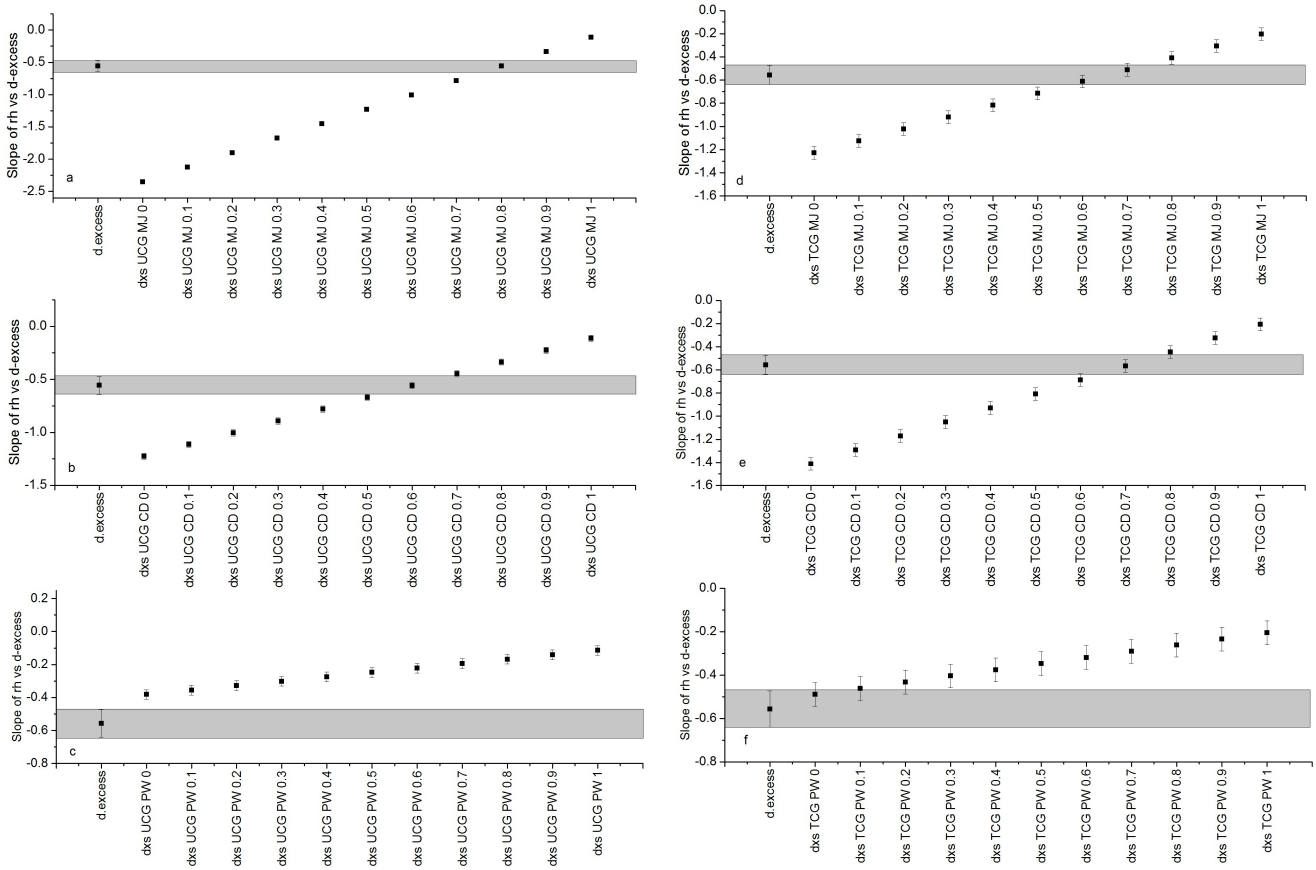

Figure 9. Slope of the relative humidity vs d-excess for the UCG (a-c) and the TCG (d-f) model runs (filled black squares) and the observed slope value (grey band).

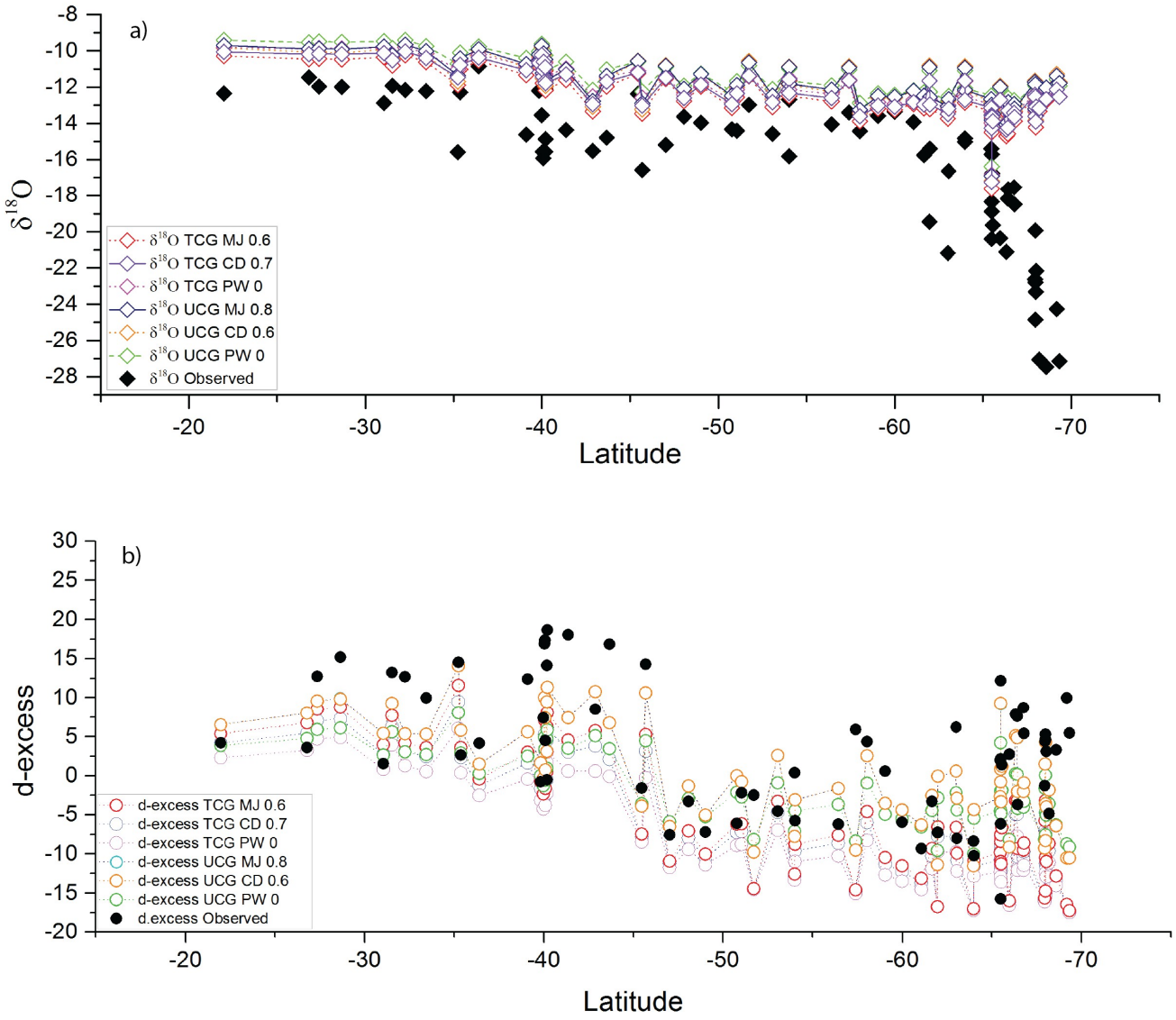

Figure 10. Latitudinal variation of the observed $\delta^{18}O$ (a) as filled black diamonds and d-excess (b) as filled black circles and the modelled values (colored open diamonds and circles) for the model runs where the observed slope is comparable to the modelled slope. The statistical analysis of the observed and the modelled regression is listed in Table 5.

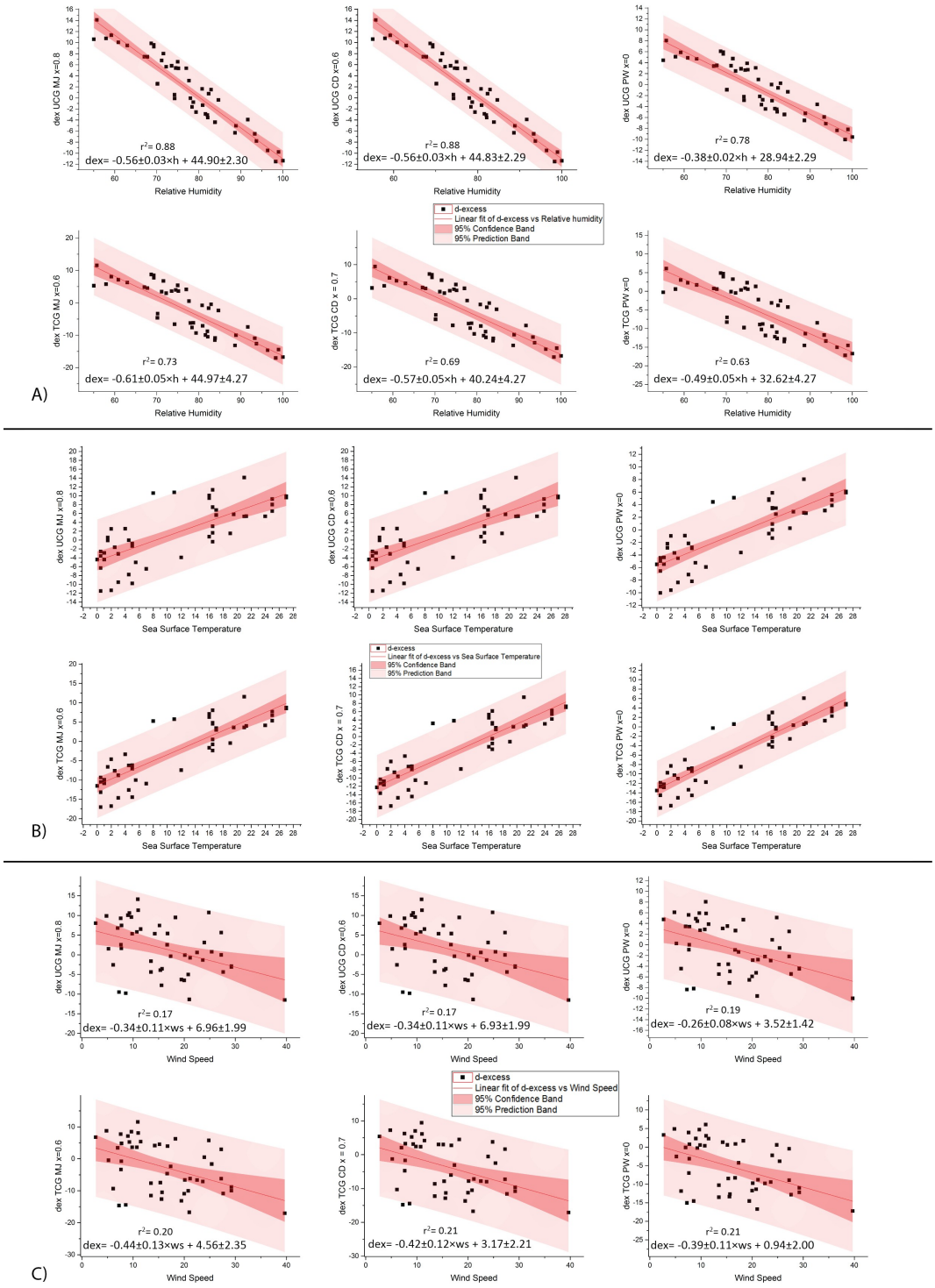

Figure 11. Linear regression equations between relative humidity (A), sea surface temperature (B) and wind speed (C) and the d-excess of the best-fit model runs. The dark and light pink shaded regions depict the 95% confidence bands and 95% prediction bands respectively.

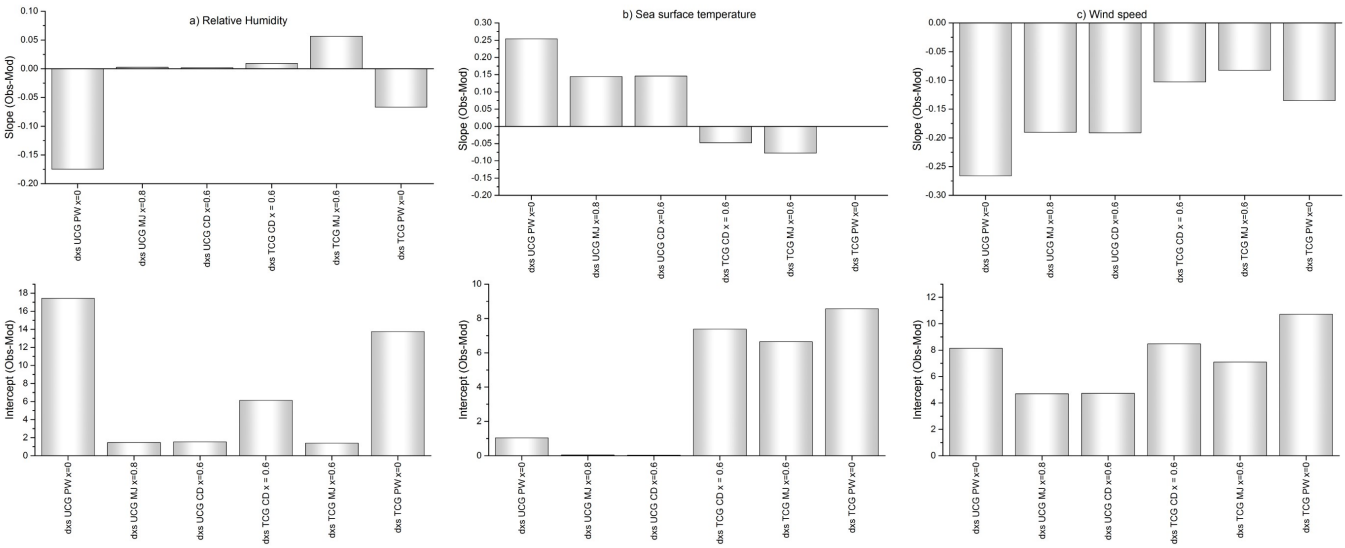

Figure 12. Differences between observed and predicted slopes and intercepts of the relationships between d-excess vs relative humidity, sea surface temperature and wind speed.

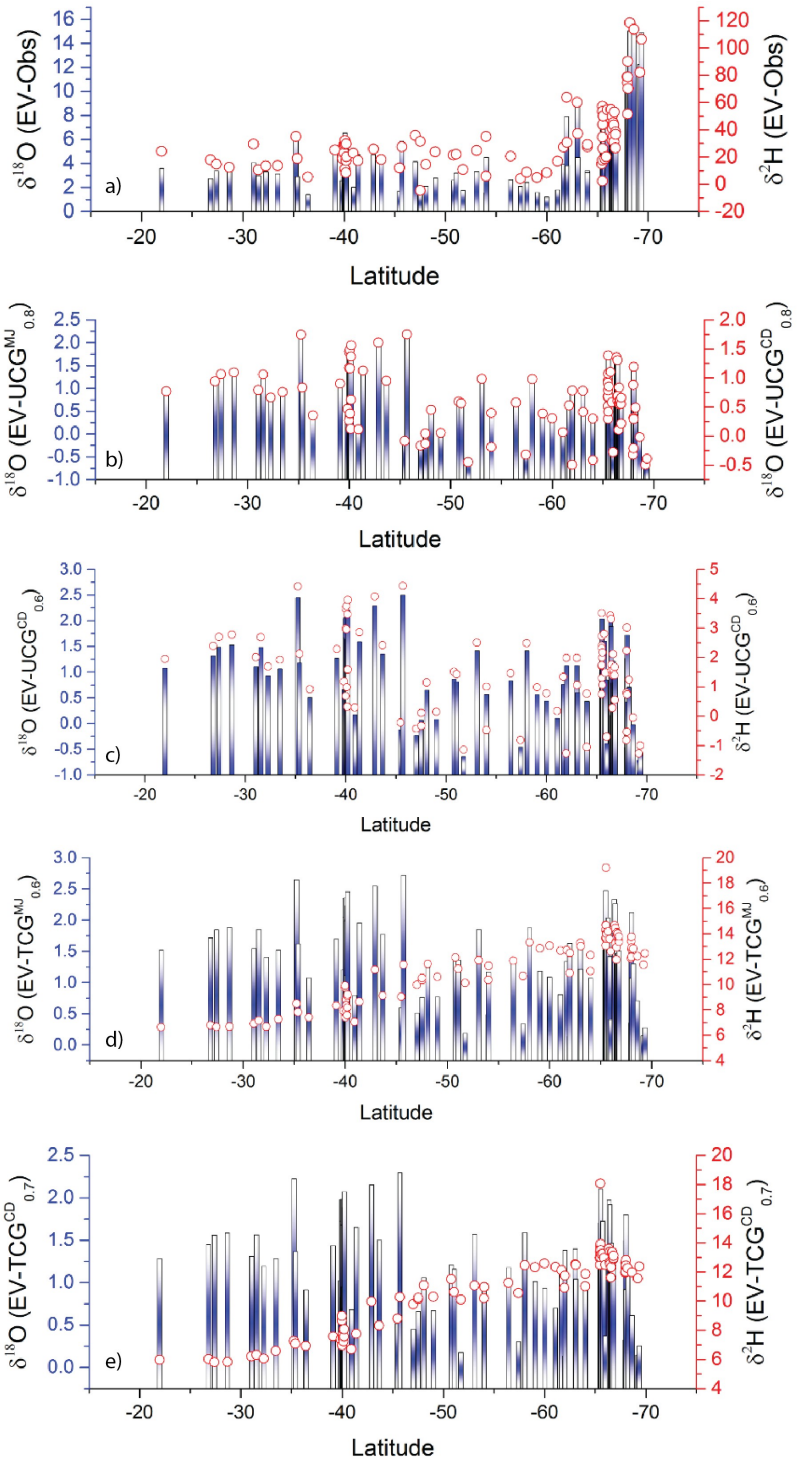

Figure 13. a) the difference between the $\delta^{18}O$ (blue columns) and $\delta^{2}H$ (red open circles) of equilibrium vapor and observed water vapor isotopic composition. b-e) shows difference between the $\delta^{18}O$ and $\delta^{2}H$ equilibrium vapor and that predicted by the best fit model runs.

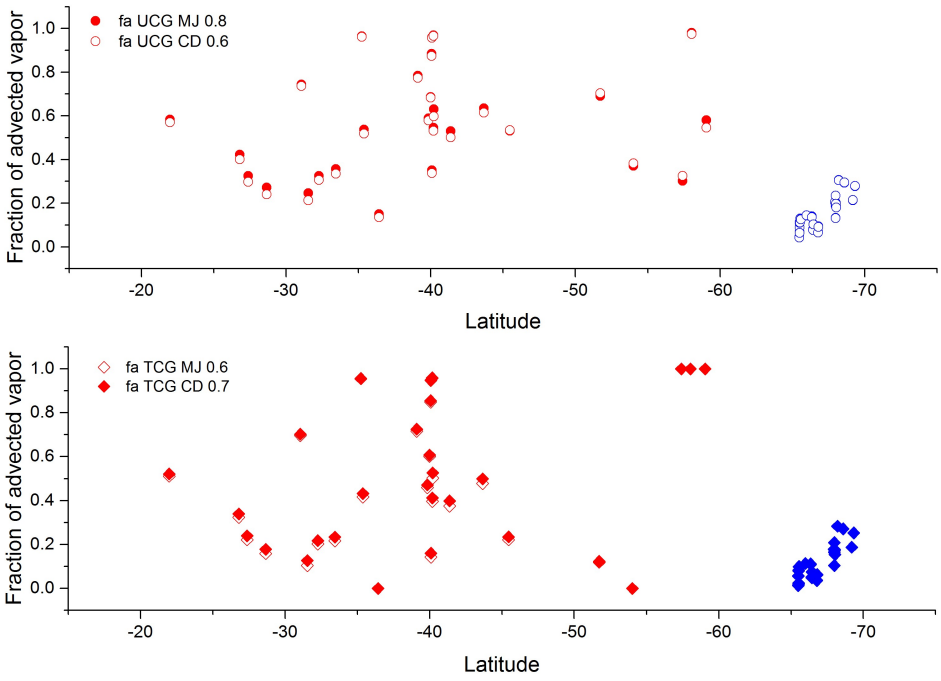

Figure 14. a) Fraction of advected vapor that explains the water vapor isotopic composition for the best fit model runs. Red and blue colors depict the different end member compositions used for calculations.

Table 2. Slope, intercept and r^2 of the linear regression equations between meteorological parameters (relative humidity, sea surface temperature and winds speed) and $\delta^{18}O$ for different sample classifications. Also listed are the regression parameters for the data from Uemura et al. (2008)

Met. vs $\delta^{18}O$	Classification	Intercept		Slope		Statistics
		Value	Standard Error	Value	Standard Error	R-Square(COD)
Relative Humidity	ALL	-11.43	3.43	-0.06	0.04	0.03
	ALL North of 65S	-15.49	2.04	0.02	0.03	0.01
	ALL South of 65S	-11.05	5.11	-0.12	0.06	0.15
	SOE IX North of 65S	-12.37	2.59	-0.02	0.03	0.01
	SOE X North of 65S	-18.95	3.39	0.06	0.04	0.07
	Uemura All	-20.61	2.81	0.05	0.04	0.02
Sea Surface Temperature	ALL	-18.43	0.53	0.27	0.05	0.33
	ALL North of 65S	-15.47	0.40	0.12	0.03	0.27
	ALL South of 65S	-19.38	0.71	-2.37	0.62	0.41
	SOE IX North of 65S	-15.30	0.70	0.12	0.04	0.26
	SOE X North of 65S	-15.52	0.51	0.11	0.05	0.19
	ALL SOE X	-16.82	0.42	0.19	0.05	0.33
	ALL SOE IX	-21.07	0.96	0.41	0.07	0.51
	Uemura All	-17.40	0.46	0.19	0.05	0.16
Wind Speed	ALL	-17.85	1.01	0.10	0.06	0.04
	ALL North of 65S	-12.74	0.60	-0.09	0.03	0.13
	ALL South of 65S	-23.76	1.40	0.25	0.11	0.21
	SOE IX North of 65S	-12.62	0.77	-0.07	0.05	0.11
	SOE X North of 65S	-13.05	0.98	-0.09	0.05	0.12
	ALL SOE X	-16.66	0.93	0.06	0.05	0.03
	ALL SOE IX	-18.77	1.80	0.14	0.12	0.04

Table 3. Slope, intercept and r^2 of the linear regression equations between meteorological parameters (relative humidity, sea surface temperature and winds speed) and δ^2H for different sample classifications. Also listed are the regression parameters for the data from Uemura et al. (2008)

Met. vs δ^2H	Classification	Intercept		Slope		Statistics
		Value	Standard Error	Value	Standard Error	R-Square(COD)
Relative Humidity	ALL	-57.14	27.50	-0.90	0.35	0.09
	ALL North of 65S	-77.52	18.79	-0.42	0.24	0.06
	ALL South of 65S	-41.57	22.20	-0.77	0.27	0.27
	SOE IX North of 65S	-102.94	28.84	-0.18	0.38	0.01
	SOE X North of 65S	-133.31	30.61	0.10	0.41	0.00
	Uemura All	-110.71	22.14	-0.16	0.28	0.00
Sea Surface Temperature	ALL	-149.02	3.84	2.76	0.34	0.49
	ALL North of 65S	-128.58	2.78	1.68	0.20	0.61
	ALL South of 65S	-127.93	5.09	1.76	0.31	0.60
	SOE IX North of 65S	-128.31	3.31	1.41	0.30	0.50
	SOE X North of 65S	-136.73	2.72	1.95	0.30	0.55
	ALL SOE X	-168.91	7.05	3.88	0.53	0.63
	ALL SOE IX	-154.43	5.43	-17.47	4.77	0.39
	Uemura All	-135.09	2.99	2.28	0.36	0.41
Wind Speed	ALL	-133.39	8.50	0.36	0.51	0.01
	ALL North of 65S	-90.28	5.20	-1.24	0.29	0.29
	ALL South of 65S	-85.84	6.89	-1.19	0.41	0.29
	SOE IX North of 65S	-98.47	7.54	-1.04	0.40	0.23
	SOE X North of 65S	-127.16	7.58	0.07	0.43	0.00
	ALL SOE X	-138.60	15.43	0.63	1.01	0.01
	ALL SOE IX	-182.36	11.09	1.49	0.85	0.13

Table 4. Slope, intercept and r^2 of the linear regression equations between meteorological parameters (relative humidity, sea surface temperature and winds speed) and d-excess for different sample classifications. Also listed are the regression parameters for the data from Uemura et al. (2008)

Met. vs d-excess		Intercept		Slope		Statistics
	Classification	Value	Standard Error	Value	Standard Error	R-Square(COD)
Relative Humidity	ALL	34.31	6.23	-0.40	0.08	0.28
	ALL North of 65S	46.36	6.57	-0.56	0.08	0.49
	ALL South of 65S	8.35	12.49	-0.08	0.15	0.01
	SOE IX North of 65S	57.40	6.15	-0.64	0.08	0.77
	SOE X North of 65S	48.66	8.28	-0.64	0.11	0.61
	ALL SOE X	53.37	8.93	-0.71	0.12	0.51
	ALL SOE IX	42.72	6.54	-0.45	0.08	0.51
	Uemura All	54.12	4.27	-0.58	0.05	0.66
	Uemura North of 65S	55.71	5.82	-0.61	0.08	0.62
Sea Surface Temperature	ALL	-1.58	1.15	0.56	0.10	0.31
	ALL North of 65S	-4.83	1.46	0.74	0.11	0.52
	ALL South of 65S	0.59	2.06	1.50	1.81	0.03
	SOE IX North of 65S	-5.54	2.63	0.84	0.16	0.56
	SOE X North of 65S	-4.18	1.76	0.56	0.16	0.35
	ALL SOE X	-2.19	1.62	0.43	0.18	0.14
	ALL SOE IX	-0.36	1.60	0.58	0.12	0.42
	Uemura All	4.13	0.98	0.79	0.12	0.43
	Uemura North of 65S	3.43	1.35	0.85	0.13	0.53
Wind Speed	ALL	9.40	1.97	-0.47	0.12	0.18
	ALL North of 65S	11.68	2.54	-0.53	0.14	0.24
	ALL South of 65S	7.74	3.22	-0.55	0.25	0.19
	SOE IX North of 65S	15.16	3.35	-0.61	0.20	0.31
	SOE X North of 65S	5.93	3.67	-0.33	0.19	0.11
	ALL SOE X	6.08	2.96	-0.38	0.17	0.13
	ALL SOE IX	11.58	2.51	-0.47	0.17	0.20

Table 5. Slope, intercept and r^2 of the linear regression equations between observed and modelled $\delta^{18}O$ and d-excess for the best fit models for samples collected north of 65S

Observed vs Modelled		Intercept		Slope		Statistics	
		Value	Standard Error	Value	Standard Error	Adj. R-Square	Root-MSE (SD)
$\delta^{18}O$ All	UCG MJ 0.8	-8.88	0.57	0.18	0.03	0.28	1.15
	UCG CD 0.6	-9.06	0.59	0.17	0.04	0.26	1.20
	TCG MJ 0.6	-9.42	0.57	0.19	0.03	0.30	1.15
	TCG CD 0.7	-9.15	0.55	0.19	0.03	0.32	1.12
$\delta^{18}O$ North of 65S	UCG MJ 0.8	-6.45	0.89	0.34	0.06	0.38	0.84
	UCG CD 0.6	-6.50	0.91	0.34	0.06	0.38	0.86
	TCG MJ 0.6	-7.02	0.91	0.34	0.06	0.38	0.86
	TCG CD 0.7	-6.89	0.91	0.34	0.06	0.37	0.86
d-excess All	UCG MJ 0.8	-0.94	0.64	0.47	0.07	0.39	5.08
	UCG CD 0.6	-0.94	0.64	0.47	0.07	0.39	5.07
	TCG MJ 0.6	-6.46	0.75	0.58	0.08	0.41	6.00
	TCG CD 0.7	-7.39	0.71	0.55	0.08	0.41	5.66
d-excess North of 65S	UCG MJ 0.8	-0.35	0.63	0.60	0.07	0.63	4.07
	UCG CD 0.6	-0.36	0.63	0.60	0.07	0.63	4.06
	TCG MJ 0.6	-4.93	0.72	0.74	0.08	0.67	4.67
	TCG CD 0.7	-5.85	0.68	0.70	0.07	0.66	4.41