

**Table S1** The location information of observation sites

Observation items	Sites Name	Latitude ( °N)	Longitude ( °E)
Meteorological Stations	XDT	35.72	94.13
	TGL	33.07	91.94
	LDH	31.82	91.74
	ZNH	35.49	91.96
	AYK	37.54	88.80
	TSH	35.62	94.06
Active Layer Observation Stations	Ch01	34.73	92.89
	Ch04	31.82	91.74
	Ch06	35.62	94.06
	QT01	35.14	93.04
	QT03	34.82	92.92
	QT05	33.96	92.34
	QT08	35.22	93.09
	QT09	35.72	94.13
Boreholes Observation Stations	TSHGT	35.36	79.55
	FCKGT	37.46	88.57
	AYKGT	37.52	88.61
	ZNHGT	35.49	91.96
	QTB01	35.72	94.08
	QTB02	35.63	94.06
	QTB03	35.52	93.78
	QTB05	35.36	93.45
	QTB06	35.29	93.27
	QTB08	35.22	93.08
	QTB09	35.13	93.03
	QTB15	33.10	91.90
	QTB18	31.82	91.74
	XDTGT	35.72	94.13
	QTB11	34.39	92.66
	WQ01	35.36	99.13
	WQ04	35.26	99.22
	WQ07	35.39	99.30
	WQ12	35.48	99.40
	WQ19	35.48	99.50
ZK001	35.69	79.49	
ZK002	35.73	79.46	
ZK003	35.72	79.46	
ZK004	35.79	79.42	
ZK005	35.72	79.37	
ZK006	35.76	79.38	
ZK007	35.77	79.40	

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ZK009	35.86	79.39
ZK016	34.54	80.42
ZK017	34.62	80.64
ZK018	34.62	80.62
ZK020	34.59	80.32
ZK022	34.57	80.40
ZK024	34.63	80.39
ZK025	34.64	80.39
ZK026	34.56	80.39
ZK027	34.57	80.39
k308+860	36.43	77.58
k514+950	35.84	79.40
k520+050	35.80	79.41
k529+100	35.73	79.45
k572+000	35.40	79.55
k582+000	35.32	79.54
ZK036	33.05	84.16
ZK044	33.18	85.31
ZK045	33.21	85.35
ZK046	33.39	85.63
ZK048	33.39	85.63
ZK049	33.39	85.63
ZK050	33.35	85.65
ZK052	33.80	85.13
ZK053	33.39	85.63
AYK02	37.52	88.61
AYK03	37.51	88.70
AYK04	37.54	88.79
AYK05	37.54	88.83
STG	37.57	88.60
STGK	37.58	88.60
FZB	37.61	88.59
HT02	37.66	88.68
ZNH02	35.50	91.96
ZNH03	35.50	91.96
ZNH04	35.50	91.96
ZNHX	35.49	91.86
KXL01	35.53	92.28
KXL03	35.48	92.96
KXL04	35.39	93.22
HT01	37.75	88.72
ZK008	35.86	79.37
ZK012	35.80	79.03
ZK013	35.80	79.03

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ZK019	34.64	80.39
ZK032	32.95	84.04
ZK033	32.91	84.07
ZK034	33.07	84.15
ZK035	33.07	84.15
ZK042	33.03	84.03
ZK043	33.16	85.29
ZK051	33.45	85.77
AYK06	37.54	88.87
WQ10	35.40	99.33
ZK015	35.36	79.55
ZNH01	35.50	91.96

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