



Supplement of

Consumption of atmospheric methane by the Qinghai–Tibet Plateau alpine steppe ecosystem

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1 Supplement

2 Supplementary Table 1 Seasonal soil water content (SWC, %) of winter, spring, summer, and autumn from 2012

3	to 2016.
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Seasonal	Period	10 cm	20 cm	40 cm	80cm	160cm		
		Soil Water Content (SWC), %						
Winter	2012 early	0.11	0.08	0.07	0.11	0.14		
	2012-2013	0.10	0.08	0.07	0.11	0.16		
	2013-2014	0.10	0.08	0.07	0.11	0.13		
	2014-2015	0.10	0.08	0.07	0.11	0.17		
	2015-2016	0.10	0.08	0.07	0.11	0.16		
	2016 later	0.10	0.08	0.07	0.12	0.19		
	Average	0.10	0.08	0.07	0.11	0.16		
Spring	2012	0.13	0.09	0.08	0.11	0.13		
	2013	0.12	0.09	0.08	0.11	0.13		
	2014	0.12	0.08	0.07	0.11	0.13		
	2015	0.13	0.09	0.08	0.11	0.14		
	2016	0.12	0.09	0.08	0.13	0.15		
	Average	0.12	0.08	0.08	0.11	0.14		
Summer	2012	0.18	0.11	0.10	0.17	0.27		
	2013	0.16	0.11	0.11	0.19	0.25		
	2014	0.16	0.10	0.10	0.16	0.24		
	2015	0.16	0.10	0.10	0.19	0.28		
	2016	0.16	0.10	0.09	0.18	0.28		
	Average	0.17	0.10	0.10	0.18	0.26		
Autumn	2012	0.14	0.09	0.08	0.14	0.21		
	2013	0.14	0.09	0.09	0.15	0.20		
	2014	0.16	0.10	0.10	0.16	0.22		
	2015	0.15	0.10	0.09	0.15	0.21		
	2016	0.16	0.10	0.09	0.16	0.21		
	Average	0.15	0.10	0.09	0.15	0.21		



6 **Supplementary Figure 1.** Air temperature (T_{air}) measured 3 meters above the ground surface:

7 (a), (b), (c), and (d) are half–hourly mean values in spring, summer, autumn, and winter,

8 respectively; (e) shows diel–scale mean values from 2012 to 2016.



10 Supplementary Figure 2. Net radiation (Rn) measured 3 meters above the ground surface: (a),



respectively; (e) shows diel–scale mean values from 2012 to 2016.

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15 Supplementary Figure 3. Vapor pressure deficit (VPD) measured 3 meters above the ground

surface: (a), (b), (c), and (d) are half-hourly mean values in spring, summer, autumn, and winter,

17 respectively; (e) shows diel mean values from 2012 to 2016.

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Supplementary Figure 4. Diel mean of wind speed and direction between 2012 and 2016: (a) is
winter, (b) is spring, (c) is summer, and (d) is autumn. Note the direction of wind means the
direction wind blows *from*. All data are presented as mean values with standard deviations (mean
± standard deviation).



30 Supplementary Figure 5. Comparison between soil water content (SWC) of two different time

resolutions from 2012 to 2016, (a) is the half–hourly SWC at soil depths of 10 cm, 20 cm, 40 cm,

32 80 cm, and 160 cm; and (b) is the 4–hourly mean SWC for the same depths.

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Supplementary Figure 6. Half–hour measurements of 0 - 200 cm soil temperature (T_{soil})

36 variations from 2012 to 2016, (a) is for soil depths of 0 cm, 5 cm, 10 cm, 20 cm, 30 cm, 40 cm,

37 50 cm, (b) is for soil depth of 70 cm, 80 cm, 100 cm, 150 cm, 160 cm, and 200 cm.



Supplementary Figure 7. Soil heat flux (SHF) at depth of 5 cm and 15 cm: (a), (b), (c), and (d)

40 are half-hourly mean values in spring, summer, autumn, and winter, respectively; (e) shows diel

41 mean values from 2012 to 2016.

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Supplementary Figure 8. Characteristics of the seasonal freezing and thawing processes of the
active layer for years: 2012, 2013, 2014, 2015, and 2016. Different colors represent the soil
temperature gradients from -16 °C to 20 °C. The depth of 0 °C represent the active layer
thickness (ALT).



Supplementary Figure 9. Seasonal CH₄ rate mean value from 2012 to 2016: (a) is winter, (b) is
spring, (c) is summer, and (d) is autumn. In the (a), 2012E is started from January 1st, 2012 and
ended on February 17th, 2012; 2012W is started from 19th November, 2012 to 4th February, 2013;
2013W is started from 1st December, 2013 to 17th February, 2014; 2014W is started from 6th
November, 2014 to 4th February, 2015; 2015W is started from 9th November, 2015 to 15th

- February, 2016; 2016L is started from October 26th, 2016 and ended on December 31st, 2016. All
- 56 data are presented as mean values with standard deviations (mean \pm standard deviation).



Supplementary Figure 10. Mean half–hourly values of 0 - 450 cm soil temperature (T_{soil}) from 2012 to 2016, (a) is for spring, (b) is for autumn. Note, that during spring T_{soil} of 100cm, 200cm, 450cm is always below -2 °C and during autumn the T_{soil} of 40cm almost overlap to T_{soil} with 50cm. To make the figure more readable, we removed the T_{soil} values of 100cm, 200cm, 450cm in figure (a) and removed the T_{soil} values of 40cm for figure (b).



Supplementary Figure 11. A bird's eye view of the eddy covariance site at the Beilu'he station