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Characteristics of net CO_2 exchange during the growing season over the alpine steppe ecosystem on the Tibetan Plateau

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Based on open-path eddy covariance measurement data of the alpine steppe ecosystem at Nam Co Monitoring and Research Station for Multisphere Interactions, CAS (NAMORS) from May to September in 2008 and 2009, the characteristics of the NEE (net ecosystem exchange) for the two growing seasons was analyzed. The average temperature was 7.5[U+2103] and 9.1[U+2103] in this two summer, respectively. And the total precipitation from May to September was 493.1 mm and 327 mm in 2008 and 2009, respectively. The rainy season arrived later in 2009. Especially in the early period of the growing season (May to July), the precipitation (129mm) was only half of that in 2008 (261mm). So compared with the 2008, there was a warm and dry growing season in 2009. The results showed that:

(1) The CO_2 concentration was low during daytime but high in nighttime in both growing season. It had an inverse correlation between VPD (vapor pressure deficit). The mean value in 2008 was 365.4 mg•m-3 and lower than that in 2009 (375.7 mg•m-3).

(2) The NEE had diurnal variation. During daytime (08:00∼19:00), alpine steppe uptakes CO_2, but net CO_2 emission occured in the nighttime (20:00∼23:00, 00:00∼08:00) for both growing season. The monthly mean NEE was 1.49, 3.09 and 2.7 g CO_2 m-2 day-1 from June to August in 2008, while 0.94, 1.2 and 2.82 g CO_2 m-2 day-1 in 2009, respectively .

(3) The ecosystem respiration was influenced significantly by the soil moisture and soil temperature. When the alpine steppe ecosystem did not threaten by water, it had lower Q10 (the monthly mean Q10 was 2.06 in July and August in2008), but higher Q10 (3.88 in July 2009) when drought stress happened.