



## **Carbon isotope discrimination of C3 vegetation in Central Asian Grassland as related to long-term and short-term precipitation patterns**

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The relationship between carbon isotope discrimination ( $^{13}\Delta$ ) of C3 vegetation and long-term (30 years) and short-term (growing period) precipitation was investigated. Members of *Stipa*, a dominant grass genus in the (semi-)arid Asian steppes, and other C3 species were collected along aridity gradients in Inner Mongolia in 2005 (11 sites, 71 samples) and in the Republic of Mongolia in 2006 (40 sites, 45 samples). The data set was expanded with published and unpublished data of *Stipa* and other C3 species (11 studies covering 8 years, including 64 observations of *Stipa*, and 109 observations of other C3 species) and C3 community bulk-samples (11 samples). Weather data were geostatistically interpolated for all sampling sites and years.  $^{13}\Delta$  of *Stipa* followed different relationships for the individual years when related to mean annual precipitation due to large anomalies between annual and long-term average precipitation patterns. But, the  $^{13}\Delta$  response to rainfall converged when mean annual precipitation was replaced by year-specific mean daily growing period precipitation ( $P_G$ ). Remarkably, the  $^{13}\Delta$ -response to  $P_G$  for C3 species as a whole (including herbaceous dicots, semi-

shrubs and grasses) and also the C3 community-level response were virtually identical to that of *Stipa*. The relation was also valid outside the geographical and climatic range where it was developed, giving proof of its robustness.