

Interactive comment on “Enhanced cold-season warming in semi-arid regions” by J. Huang et al.

Anonymous Referee #2

Received and published: 16 April 2012

Climate models suggest that deficits in soil moisture can lead to intensified warming. This study confirmed these effects and showed that the warming trends during the past 109 years were particularly enhanced over the semi-arid regions. In this regard, this paper is timely and important for the audience of ACP. However, there is still much room to improve the quality of this paper. I thereby recommend some mandatory revision prior to publication. Hope the comments below are of help for the authors.

1) The temperature dataset from the Climatic Research Unit (CRU) was filled with long-term climatological values (the mean temperature during 1961-1990) when nearby observations were unavailable. This affects the Arctic and the arid and semi-arid regions, where observations are scarce in the early years. An example of this problem can be found in the following figure. Because the long-term mean temperature during 1961-1990 was cooler than the air temperatures in recent decades, the infilling of the long-term mean values in the early half of the 20th century would exaggerate the over-

C1569

all warming trends during 1901-2009. Users should be mindful of this problem when using the CRU data. Does the filling of long-term mean values affect the overall conclusions of this study? Do your conclusions also hold in recent 60 (or 30 years) when more observations in the arid and semi-arid regions become available?

2) The semi-arid is characterized by relatively low annual precipitation and having scrubby vegetation with short, coarse grasses. It is fine to define the arid and semi-arid regions based merely on annual total precipitation. However, besides the traditional arid and semi-arid regions in the middle latitudes and subtropical, this definition also classified the majority of the Arctic as the semi-arid regions. Enhanced warming was previously identified in the Arctic. Observations showed that the surface air temperatures in the Arctic have warmed at about twice the global rate in the past several decades (ACIA, 2004). How much warming identified in the semi-arid regions (defined in this study) is due to the warming in the Arctic? It would be nice to evaluate the relative contributions of the enhanced warming in the semi-arid regions over the middle latitudes and the Arctic.

3) The authors claimed that the semi-arid regions play a dominant role in the global warming and account for nearly half of the continental warming. This is not a surprise as the semi-arid regions occupied nearly half of the global land areas (see your Fig.1).

4) Was the temperature in the Antarctic used to calculate the mean temperature over the global land surface? The CRU dataset contains no temperature data in the Antarctic, but the trends in the Antarctic were shown in Fig.2.

5) What method was used to estimate the long-term trend?

Reference: Arctic Climate Impact Assessment (ACIA), 2004. Impacts of a warming Arctic: Arctic climate impact assessments. Cambridge University Press, Cambridge.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 4627, 2012.

C1570

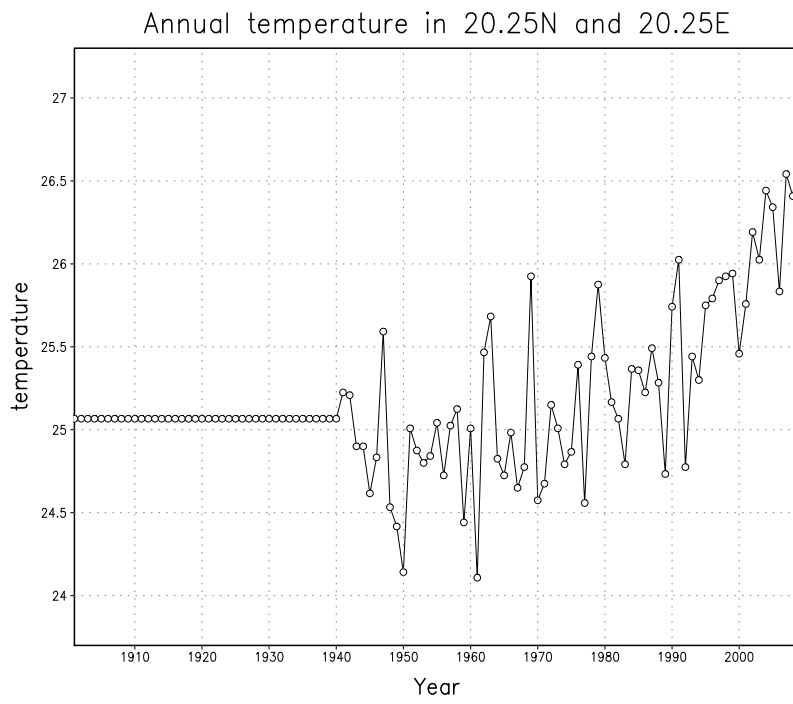


Fig. 1.

C1571