Response to Reviewer 2

**General comments:**

*The desert ecosystems are vulnerable to climate change, particularly its effect on vegetation development. Previous study on climate change in desert regions of north China was mostly focused on large-scale modelling of arid climate features. This manuscript provides a local to regional-scale analysis of climate changes in the greater desert belt of north China, based on long-term meteorological records, aridity index (AI) and satellite-based NDVI calculation. The obtained results are quite interesting, particularly the change in precipitation which shows“dry areas becoming wetter and wet areas becoming drier”in the north China deserts, an opposite trend compared to global observations. The research plan in this manuscript is sound and overall presentation is well structured. However, some weaknesses may need to be clarified/ improved.*

**Response:** We appreciate reviewer #2’s positive and constructive feedback.

**Specific comment 1:**

*In general, the writing quality in the sections of “Introduction” and “Results” is obviously low, compared with Abstract and Discussion. It would be worth improving the writings accordingly. My specific suggestions are to:*

1. *Re-write the paragraph at Page 2 Line 13-20. Maybe start with a key sentence stating general research findings and pay an attention on linkage of context.*

**Response:** According to the comments, we have revised the “Introduction” and “Results” sections of the manuscript. For logical flow, we have re-written the paragraph on page 2, line 9-28 (lines 13-20, in the original manuscript) as follows:

Extended periods of dryness can alter local-to-regional biogeochemical cycles and key ecosystem functions and services and, in the process, enhance regional desertification ([Delgado-Baquerizo](http://www.nature.com/nature/journal/v502/n7473/abs/nature12670.html#auth-1) et al., 2013). Knowledge regarding drying and wetting trends regionally is critical for proper planning and management of land and state resources, including their allocation and deployment, to ensure the sustainable development of vulnerable desert environments.

Previous studies have indicated that increasing precipitation and subsequent wetting in northwest (NW) China during the past 50 years represents a major climate signal anticipated to persists for some time into the future (Wang et al., 2007; Xu et al., 2010; Huo et al., 2013; Li et al., 2013 and 2016). Some drylands in northern (N) China have been reported to have undergone some expansion in the last 50 years with their boundaries extending eastward to NE China by about 2° of longitude and southward to the middle-to-lower reaches of the Yellow River by about 1° of latitude (Li et al., 2015). This expansion has led to water scarcity and land degradation in many parts of the region. Differences in wetting and drying patterns across China are clearly not uniform, potentially condemning many existing and planned re-vegetation projects in N China to failure.

Earlier studies addressing the variation and long-term patterns of aridity in N China are generally unsuitable for ecological-restoration-project planning because of their coarse spatiotemporal resolutions. Precipitation, air temperature, and aridity patterns over large areas vary in both space and time as a result of differences in climatic regimes induced by differences in geographic placement, synoptic-scale weather patterns, topography, prevailing wind directions, proximity to sources of moisture, and other controlling configurations. Spatial variation in related eco-hydrometeorological variables in N China have yet to be investigated at spatial resolutions appropriate for ecological-restoration planning. Under the background of climate change, it is largely undetermined if aridity patterns in N China, particularly at sub-regional scale resolutions (e.g., < 10-km resolution), have changed appreciably over the past 50 years.

**Specific comment 2:**

*Revise the sentence at Page 6 Line 19-21, such as: “The increasing trend is statistically significant and strongest in the northern-half of the western desert region (p < 0.05). Comparably, a decreasing trend, though not statistically significant (p > 0.05), was observed in the eastern part of the study area, affecting about 30% of the greater desert region.”*

**Response:** We revised the sentence on page 6, line 23-27 as follows:

The results show that during the observation period (1961-2013), an increasing trend in precipitation occurred within about 70% of N China, mainly in the western half of the greater desert region, with a particularly strong, statistically significant trend in the northern-half of that region (*p* < 0.05; Fig. 1). Whereas, a decreasing trend, though not statistically significant (i.e., *p* > 0.05), was observed to have occurred in the eastern part of the study area, affecting about 30% of the greater desert region.