

## ***Interactive comment on “Vegetation greenness response to water availability in northern China from 1982 to 2006” by Zhang Fengtai and An Youzhi***

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Detailed response to Reviewers' Comments(se-2016-46-RC2)

Comment: Lines 54 and 58 please include some references related to “previous studies” and “few studies”. Ans: Some references had been added in the paper. e.g.: Previous studies investigating the potential of using NDVI to estimate rainfall and soil moisture have found correlations between both NDVI and rainfall and NDVI and soil moisture, and so the NDVI is frequently used to study rainfall and soil moisture (Helldén and Tottrup 2008; Huber et al., 2011; Fensholt et al., 2012; Gong et al., 2015).

Comment: Line 83 I recommend to include the spatial resolution of the AVHRR is

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1.1 km (when the satellite is directly overhead). Ans: As suggested by reviewer, we accepted the good idea. e.g.: The NDVI dataset was carefully assembled from different AVHRR sensors (the AVHRR sensor onboard NOAA satellites 7, 9, 11, 14, 16, and 17) and the spatial resolution of the AVHRR is 1.1 km, and corrected for atmospheric, calibration loss, orbit drift, volcanic eruption, and other effects not related to vegetation change (Tucker et al., 2005).

Comment: Line 87 “by a maximum value composite approach” I suggest including “increasing the quality of NDVI images by selecting the best observations for each pixel although the temporal resolution decreases” Ans: As suggested by reviewer, we accepted the good idea. e.g.: In order to further reduce the influence of clouds, the original 15-day temporal resolution AVHRR GIMMS NDVI data were aggregated monthly by a maximum value composite approach (MVC), increasing the quality of NDVI images by selecting the best observations for each pixel although the temporal resolution decreases.

Comment: Lines 130 – 131 could be placed in Materials and methods (line 115) Ans: As suggested by reviewer, we accepted the good idea. e.g.: The trend of monthly NDVI, rainfall, and soil moisture was obtained from a median trend (Theil-Sen) procedure for the period from 1982 to 2006 (Theil, 1950; Sen, 1968). Trend analyses were employed for NDVI, rainfall, and soil moisture data using Sen's method to investigate how they changed across the study area from 1982 to 2006.

Comment: Line 122 2.6 Methods for correlation analysis Ans: As suggested by reviewer, we accepted the good idea. This error has been modified.

Comment: Lines 158 – 160 Description of methodology should be included in line 122 Methods for correlation analysis Ans: As suggested by reviewer, we accepted the good idea. e.g.: In this study, Pearson correlation coefficients were calculated among simultaneous NDVI, lagged rainfall, and simultaneous soil moisture on a pixel-by-pixel basis for two different time frames: the full year and the growing season (April to October).A

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linear correlation ( $r$ ) analysis was applied to study the relations between NDVI/rainfall (1982-2006) and NDVI/soil moisture (1982-2006) datasets. The correlations between both NDVI/rainfall and NDVI/soil moisture were obtained for northern China in order to compare the vegetation greenness response to water availability (rainfall and soil moisture) for both the growing season data and all-year data.

Comment: 3.1 I suggest discussing in depth the positive trend of greenness Ans: As suggested by reviewer, we accepted the good idea. e.g.: The NDVI trends mapped in this study are similar in spatial variability to those reported by Huang et al., (2012) in their study from 1982 to 2007 as both studies used the “Theil-Sen method” for estimating the NDVI changes (Yin et al., 2011; Huang et al., 2012). Also, the spatial pattern of the positive trends covering a similar time span (1982-2006) is consistent with the results of Hellden et al. (2008), Piao et al. (2011), Fensholt et al. (2012) and Mao et al. (2012).

Comment: Line 187 Revise grammar “Plants are important in Earth system” or “The importance of plants in Earth system” Ans: As suggested by reviewer, we accepted the good idea. e.g.: Plants are important in Earth system (Lieskovský and Kenderessy, 2014; Berendse et al., 2015; Cassinari et al., 2015; Poelking et al., 2015; Beyene, 2015; Zhao et al., 2015).

Comment: Technical corrections Lines 26 – 27 space after comma Line 132 Figs. Line 104 2.4 in bold Line 167 Figs. Lines 168 – 186 and 207 – 212 justify the text Lines 182 and 230, 260, 305 Revise typography Ans: As suggested by reviewer, we accepted the good idea. These technical problems had been modified.

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