Dear professor,

Thank you very much, and your comments and suggestions for modification are very good. We will try to modify and emphasize your comments in our paper. We want to make an explanation and presentation on our dataset and paper again.

Our work is very important and meaningful. The dataset has been downloaded 1910 times (https://zenodo.org/record/3378912#.XmwrCXK-s2w) and the method of data set papers have been cited by two papers which shows that our method is no problem, and we have received praises and thanks from many users for our dataset.

Temperature is one of the most important geophysical parameters in studying ecosystems. Global and regional surface temperature datasets are very important data [1-14] for studying climate change, agricultural production, and urban heat island effects, and so on. This work is very meaningful for the following reasons. At present, there are mainly two methods for obtaining global surface temperature data set.

1. Traditional Methods

There are four major global indices of temperatures that incorporate station data. These efforts are led respectively by NOAA's National Climate Data Center (NOAA NCDC), NASA's Goddard Institute of Space Sciences (NASA GISS), a collaboration between the University of East Anglia's Climatic Research Unit and the UK Met Office's Hadley Centre (CRU), and the Berkeley Earth Surface Temperature group. They all primarily rely on the GHCN (Global Historical Climatology Network) for their input data. Their global temperature results all make use of the GHCN data collection in their analyses, which includes data from about 7000 stations [1-14]. The distribution of the observation stations is like Fig. 1, which is provided by NOAA's National Climatic Data Center. According to the introduction for data by the National Climatic Data Center (NCDC) in Asheville, NC, the data summaries provided are based on data exchanged under the World Meteorological Organization (WMO) World Weather Watch Program. For air temperature, the daily dataset (as available from each station) are only including mean temperature, maximum temperature, and minimum temperature.

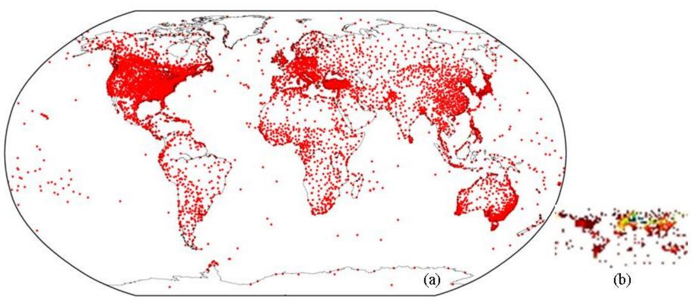

Fig. 1. (a). The distribution of the observation stations, (b) Global monthly mean temperature

Shown from Fig. 1(a), for land, although North America and Europe have large number of meteorological observation stations, the number of meteorological observation stations in other regions is not enough, especially for South America, Africa, Asia, ocean regions, and the Polar regions. Fig. 1(b) is the global monthly mean temperature map, and its data were obtained from GHCN (Global Historical Climatology Network) [15]. The total number of pixels is 2592 (36×72), the number of invalid pixels is 2112 which account for 81% of the global total pixels. Different research groups individually utilize different averaging techniques, quality control procedures, homogenization techniques, and datasets, thus these differences would cause uncertainty and obtain different conclusions[1-14].

2. Remote sensing method

NASS has two polar-orbiting Earth Observing System (EOS) satellites (Terra and Aqua) in orbit at all times, with one satellite crossing the equator in the morning (10:30) and evening (22:30) and the other crossing the equator in the afternoon (13:30) and evening (1:30). The satellite sensors provide frequent global coverages which ensure the consistency of the retrieved surface temperature data and overcome disadvantages of Combined Land-Surface Air and Sea-Surface Water Temperature Index (Land-Ocean Temperature Index). The resolution of MODIS thermal bands is 1000 m. The algorithms for retrieving surface temperature from MODIS are mature and NASA has provided the surface temperature product [16, 17]. Since the observation time is symmetrical, the global mean surface temperature is more approximate to absolute mean surface temperature because of the high coverage of satellite data.

3. Discussion and Conclusions

These two methods have their own advantages and disadvantages. The first method is guaranteed in time series and less affected by the cloud, but the number of sites is insufficient. The advantage of the second method is that it can be observed over a large area, but it is more affected by clouds.

We have been studying the surface temperature retrieval method since 2001 to try to improve the observation accuracy of the surface temperature. Published papers are as follows:

(1) **Kebiao Mao***, Jiancheng Shi, Peng Gong, Zhihao Qin, **A practical split-window algorithm for retrieving land surface temperature from MODIS data**, International Journal of Remote Sensing, 2005,26:3181-3204.

(2) **Kebiao Mao***, J. Shi, Z. Li, and H. Tang, **An RM-NN algorithm for retrieving land surface temperature and emissivity from EOS/MODIS data**, Journal of Geophysical Research-atmosphere, 2007, 112,D21102, 1-17.

(3) **Kebiao Mao***, Jiancheng Shi, Huajun Tang, Zhao-Liang Li, Xiufeng Wang, Kunshan Chen, **A neural network technique for separating land surface emissivity and temperature from ASTER Imagery**, IEEE Trans. Geosci. Remote Sensing, 2008, 46(1), 200-208.

(4) **Kebiao Mao***, Huajun Tang, Xiufeng Wang, Qingbo Zhou, Daolong Wang, **Near-surface air temperature estimation from ASTER Data using neural network**, International Journal of Remote Sensing,2008, 29(20): 6021-6028.

(5) **Kebiao Mao***, Y. Ma, X. Shen, et al., **Estimation of broadband emissivity (8-12um) from ASTER data by using RM-NN**, Optics Express, 2012, 20(18): 20096-20101.

(6) Lang Xia, **Kebiao Mao***, Y. Ma, F. Zhao, L.P. Jiang, X.Y. Shen, Z. H. Qin, **An algorithm for retrieving land surface temperature using VIIRS data in combination with multi-sensors**, Sensors, 2014, 14, 21385-21408.

(7) Hanwang, **Kebiao Mao#***, Fengyun Mu, Jiancheng Shi, Jun Yang, Zhaoliang Li, Zhihao Qin, **A split window algorithm for retrieving land surface temperature from FY-3D MERSI-2 data**, Remote Sensing, 2019, 11, 20183, 1-25.

(8) **Kebiao Mao***, Zhiyuan Zuo, Xinyi Shen, Tongren Xu, Chunyu Gao, Guang Liu, **Retrieval**

of land-surface temperature from AMSR2 Data using a deep dynamic learning neural network, Chinese Geographical Science. 2018, 28,1, 1–11.

(9) Jiancan Tan, Nusseiba NourEldeen, **Kebiao Mao***, Jiancheng Shi, Zhaoliang Li, Tongren Xu, Zijin Yuan, **Deep learning convolutional neural network for the retrieval of land surface temperature from AMSR2 data in China**, Sensors, 2019, 19, 2987:1-20; doi:10.3390/s19132987.

We have made global surface temperature change analysis based on MODIS data from 2001 to 2012 (Kebiao Mao*, Ying Ma, Xuelan Tan, Xinyi Shen, Guang Liu, Zhaoliang Li, Jingming Chen, Lang Xia, Global surface temperature change analysis based on MODIS data in recent twelve years, Advance Space Research, 2017,59,503-512.). Through 20 years of temperature research, we found that if we can take advantage of both methods, which can improve the accuracy of global or regional temperature datasets. So we produced a combined Terra and Aqua MODIS land surface temperature and meteorological station data product for China from2003–2017.

Our method combines the advantages of remote sensing and traditional methods to improve accuracy. The most important is the data set papers have been cited in two papers, and the dataset has been downloaded 1910 times (https://zenodo.org/record/3378912#.XmwrCXK-s2w). We have received praises and thanks from many users. After this work, we will continue to make global or reginal high-precision temperature data sets. Please support our work, and thank you for your consideration.

Sincerely,

Kebiao Mao et al.

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