

Analysis of Climate Change Impacts on Vegetation Growth in the Aral Sea Basin: a case study in Uzbekistan

OXue HU, Kenji TANAKA

1. Introduction

In recent years, the Aral Sea region has become known for its uneven spatial distribution of water resources in the basin. At the same time, climate change has also had an extremely significant impact on surface vegetation cover. Changes in land cover characteristics will have a corresponding feedback effect on the climate and climate system in the Aral Sea region. The Aral Sea region is facing serious environmental and water resource problems, so it is necessary to study the local climate change and its impact on the regional hydrological system. This study chooses Uzbekistan in the Aral Sea region as the main research area. By analyzing the changes of the normalized difference vegetation index (NDVI) and climate factors of non-artificial irrigated land and irrigated land in Uzbekistan in recent decades, the relationship between vegetation and climate factors was found. Sensitive regions to climate change responses were identified after excluding the influence of human activities. Temperature and precipitation are key climate factors affecting plant growth and development. Climate change will inhibit the increase of vegetation coverage and even lead to vegetation degradation in some areas. Vegetation has obvious interannual and seasonal variation characteristics. It is a sensitive indicator of the impact of climate on the environment, the most vivid reflection and symbol of ecological environment changes, and can represent land cover changes to a certain extent. Therefore, the dynamic change of vegetation can reflect the trend of climate change to a certain extent. Remote sensing dynamic monitoring of vegetation status and the interaction process between surface vegetation and the atmosphere are also research hotspots in the field of earth science in recent years. These findings help us better understand the relationship between vegetation dynamics and climate in the Aral Sea region, and provide decision-making basis for environmental protection and sustainable development.

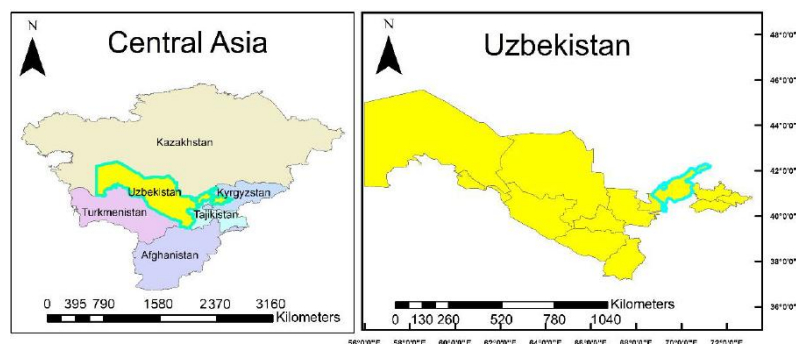
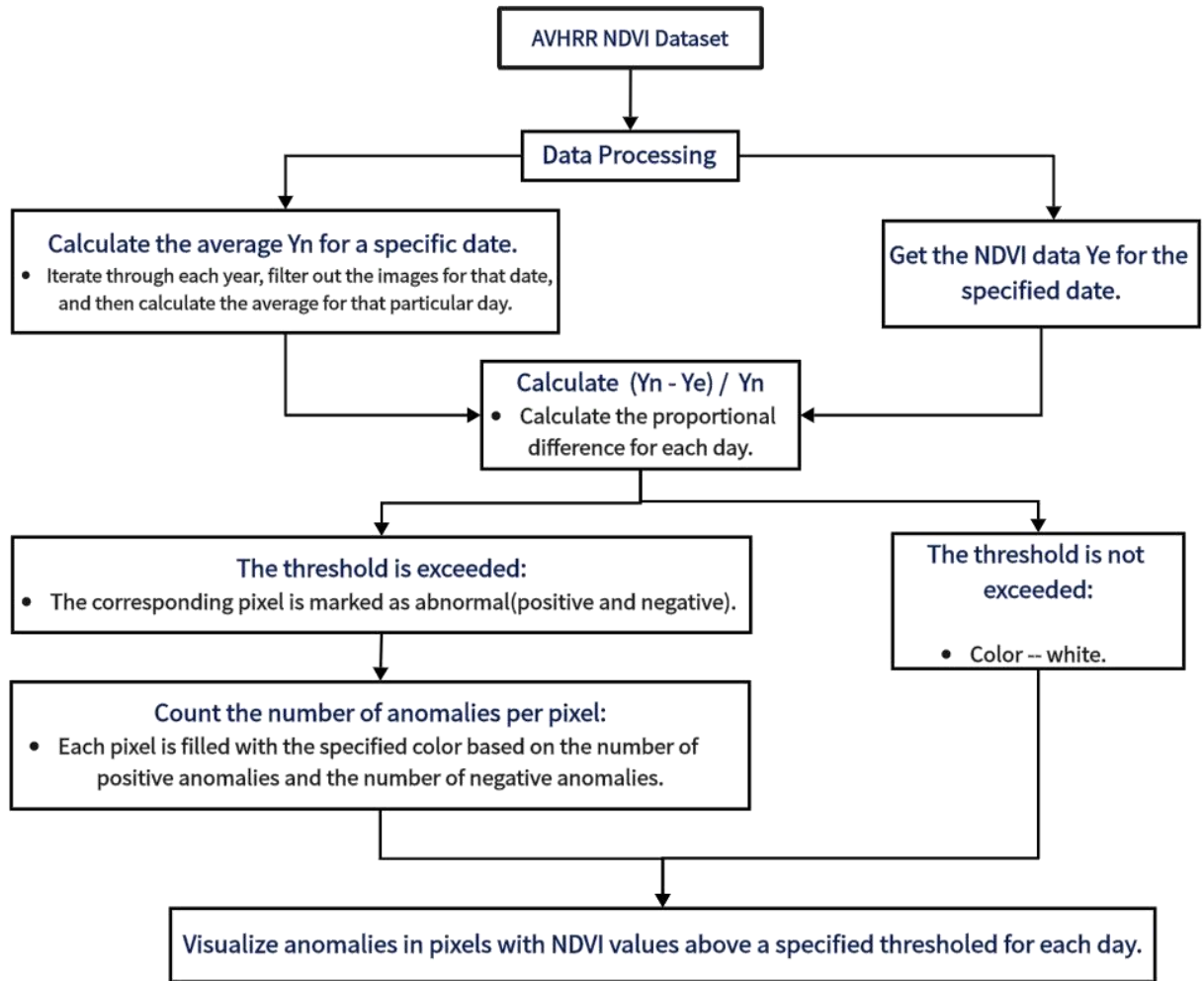


Fig. 1 Location of the study area.

2. Method



NDVI data is NOAA Climate Data Record (CDR) of AVHRR NDVI, and pixel size is 0.05 degree. The pixel size of SPEI data is 0.5 degree

The purpose is to count and visualize the anomalies of pixels with NDVI values exceeding a specified threshold per day in Uzbekistan, and to display the number of anomalies for different pixels by color.

3. Results and Conclusions

The NDVI in natural vegetation area is sensitive to the influence of climate factors.

This study enables the integration of statistics, remote sensing, and existing irrigation products into a hybrid irrigation dataset to produce reliable maps of irrigated farmland in Uzbekistan.

The method used in this study can save labor costs and statistical time, provide a more timely and reliable method to estimate the spatial distribution and extent of irrigated farmland in Uzbekistan, and provide better data support for the evaluation and management of irrigated farmland.

In terms of water resources management and the sustainable development of local agriculture, the cultivation of cotton, rice and corn requires large amounts of water for irrigation. In some growing areas where climate conditions are not suitable, plants that require less water can be replanted, such as wheat.