A Big Earth Data Platform for Three Poles

**Seasonal cycles of lakes on the Tibetan Plateau detected by Sentinel-1 SAR data**

1、Description

The long-term evolution of lakes on the Tibetan Plateau (TP) could be observed from Landsat series of satellite data since the 1970s. However, the seasonal cycles of lakes on the TP have received little attention due to high cloud contamination of the commonly-used optical images. In this study, for the first time, the seasonal cycle of lakes on the TP were detected using Sentinel-1 Synthetic Aperture Radar (SAR) data with a high repeat cycle. A total of approximately 6000 Level-1 scenes were obtained that covered all large lakes (> 50 km2) in the study area. The images were extracted from stripmap (SM) and interferometric wide swath (IW) modes that had a pixel spacing of 40 m in the range and azimuth directions. The lake boundaries extracted from Sentinel-1 data using the algorithm developed in this study were in good agreement with in-situ measurements of lake shoreline, lake outlines delineated from the corresponding Landsat images in 2015 and lake levels for Qinghai Lake. Upon analysis, it was found that the seasonal cycles of lakes exhibited drastically different patterns across the TP. For example, large size lakes (> 100 km2) reached their peaks in August−September while lakes with areas of 50−100 km2 reached their peaks in early June−July. The peaks of seasonal cycles for endorheic lakes were more pronounced than those for exorheic lakes with flat peaks, and glacier-fed lakes with additional supplies of water exhibited delayed peaks in their seasonal cycles relative to those of non-glacier-fed lakes. Large-scale atmospheric circulation systems, such as the westerlies, Indian summer monsoon, transition in between, and East Asian summer monsoon, were also found to affect the seasonal cycles of lakes. The results of this study suggest that Sentinel-1 SAR data are a powerful tool that can be used to fill gaps in intra-annual lake observations.

2、Keywords

Theme：Area,Surface Water,Lake,Radar remote sensing,Cryosphere remote sensing products,Lake ice,Hydrologic characteristic value,Surface Freeze-thaw Cycle/state Remote Sensing,Water resources utilization,Seasonal cycle,Hydrology,Area,Terrestrial Surface Remote Sensing,Hydrological remote sensing products  
Discipline：Terrestrial Surface,Cryosphere  
Places：Tibetan Plateau  
Time：2015-2017

3、Data details

1.Scale：None

2.Projection：

3.Filesize：10.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：40.0 | - |
| west：70.0 | - | east：105.0 |
| - | south：29.0 | - |

5、Time frame:2015-01-18 00:00:00+00:00--2018-01-17 00:00:00+00:00

6、Reference method

References to data:

ZHANG Guoqing, ZHANG Yu. Seasonal cycles of lakes on the Tibetan Plateau detected by Sentinel-1 SAR data. A Big Earth Data Platform for Three Poles, doi:10.​1016/​j.​scitotenv.​2019.​1355632020

References to articles:

Zhang, Y., Zhang\*, G., and Zhu, T. (2020). Seasonal cycles of lakes on the Tibetan Plateau detected by Sentinel-1 SAR data, Sci Total Environ, 703, 135563, doi: 10.​1016/​j.​scitotenv.​2019.​135563

7、Supporting project information

8、Data resource provider

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