A Big Earth Data Platform for Three Poles

**North America groundwater variation data products (2002 to 2017)**

1、Description

We release three data products for monthly groundwater storage (GWS) changes in North America. In the first one, we provide an independent estimate for monthly GWS changes within North America in 1-degree-grids and their trends. In the second one, we give the monthly GWS changes and the trends averaged for the 5 major GWS trend anomalies in around Saskatchewan, Nevada, California, Arizona and Texas, respectively. The third data product includes the monthly GWS changes and the trends averaged for the 14 states or provinces in the US and Canada, affected by the above GWS trend anomalies, i.e., for Saskatchewan, Montana, Nevada, California, Arizona, New Mexico, Texas, Oklahoma, Kansas, Alberta, North Dakota, Minnesota, Colorado and Chihuahuas, respectively. Our estimates of monthly GWS changes and their trends can serve as alternative and beneficial input for sustainable management of groundwater resources in North America. Our data products are derived from the release-6 version of GRACE monthly level-2 data, GNSS data, two land surface models of GLDAS 2.1 for soil moisture and snow water equivalent, and satellite altimetric lake level data. Unlike previous studies, glacial isostatic adjustment (GIA) effects are eliminated by employing an independent separation approach with the aid of GNSS vertical velocity data (Wang et al., 2013). The monthly changes of those GWS anomalies are validated by well level data. The monthly GWS changes for the 14 states or provinces are basically to show compatible variations with precipitation drought intensity level variations. We find a GWS increasing trend anomaly in Saskatchewan and 4 GWS declining trend anomalies with peaks in Nevada, California, Arizona and Texas, respectively. As they are not estimated using GIA models in the correction and their comparison with available well level and drought data confirms their reliability, we suggest our data products as alternative input to groundwater resource management in the discussed areas.

2、Keywords

Theme：Aquifers,Precipitation,GRACE data,Ground Water,Terrestrial Surface Remote Sensing,Ground water resources amount  
Discipline：Atmosphere,Terrestrial Surface  
Places：North America  
Time：2002-2017

3、Data details

1.Scale：None

2.Projection：

3.Filesize：6.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：65.0 | - |
| west：-125.0 | - | east：-55.0 |
| - | south：25.0 | - |

5、Time frame:2001-12-31 16:00:00+00:00--2021-08-18 16:00:00+00:00

6、Reference method

References to data:

WU Patrick, WANG Hansheng, HAYASHI Masaki, SHEN Qiang, SHEN Qiang, LI Zhen, JIANG Liming, STEFFEN H, XIANG Longwei. North America groundwater variation data products (2002 to 2017). A Big Earth Data Platform for Three Poles, doi:10.11888/Hydro.tpdc.2716542021

References to articles:

Wang, H., Xiang, L., Steffen, H., Wu, P., Jiang, L., Shen, Q., Li, Z., & Hayashi, M. (2021). GRACE-based estimates of groundwater variations over North America from 2002 to 2017, Geodesy and Geodynamics, in revision.  
  
Wang, H., Jia, L., Steffen, H., Wu, P., Jiang, L., Hsu, H., Xiang, L., Wang, Z., & Hu, B. (2013). Increased Water storage in North America and Scandinavia from GRACE gravity data, Nature Geoscience, 6(1), 38-42, doi:10.1038/ngeo1652.

7、Supporting project information

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Alberta Innovates (the Groundwater Recharge in the Prairies project)

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