

EGU2020-20173

<https://doi.org/10.5194/egusphere-egu2020-20173>

EGU General Assembly 2020

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Permafrost degradation monitoring by InSAR at different spatial resolution in Sanjiangyuan region, China

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Sanjiangyuan, as the Chinese ‘water tank’, is located in Qinghai province, China. It is the fountainhead of yellow river, Yangzi river and Lancang river. Therefore, it’s extraordinary valuable to the environment of China and Asia. The continuous permafrost spreads widely in this area. With the global warming process, the degradation of permafrost becomes faster and consequently changes the distribution of vegetation and hydrological cycle.

In this study, we use Persistent Scatterer InSAR (PSI) technique to efficiently detect the seasonal settlement around Elin lake and Zhaling lake, which are the main parts of Sanjiangyuan region. The subsidence was analyzed by processing 56 Sentinel-1 SAR images from 2015 to 2019 using SNAP and StaMPS. The results were then inverted to derive the corresponding active layer thickness over this region. Moreover, in order to investigate the detailed influence of degradation on infrastructures, we analyzed 3m resolution TerraSAR-X images in StripMap mode from May to October 2015 to get the heterogeneous subsidence along the Gonghe-Yushu road. Results indicate mean subsidence rates exceeding 4 cm/yr along the Gonghe-Yushu road .