Asian Conference on Remote Sensing (ACRS 2024)

**MEASUREMENT ACCURACY OF EXTERNAL DEFORMATION OF ROCKFILL DAM BY PSINSAR ANALYSIS USING SENTINEL-1 SAR DATA**

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***ABSTRACT***

The external deformation measurement of a rockfill dam is one of the most critical measurements for dam maintenance, as it enables the behavior of the entire embankment to be evaluated. Permanent Scattering interferometry (PSInSAR) analysis was applied to provide highly accurate measurements only for the displacement of the permanent scattering points. The surface of a rockfill dam is covered with a rock material called riprap, which can obtain many permanent scattering points. PSInSAR analysis requires extensive SAR data to be observed under the same conditions. Sentinel-1 SAR data was employed with a large amount of data available at intervals of 12 days (6 days considering a two-unit system) under the same conditions. Displacement measurements using PSInSAR analysis were carried out on one large rockfill dam with annual displacements of up to 10 mm and six large rockfill dams with annual displacements of up to 2 mm using Sentinel-1 SAR data for about six years from 2017 to 2022 for ascending and descending orbits, respectively. The accuracy of PSInSAR analysis was evaluated by comparing the external deformations with the survey. The accuracy of displacement measurement by PSInSAR analysis is shown in the order of mm, with many permanent scattering points obtained over the entire dam embankment. The results show that PSInSAR analytical measurements are effective for maintaining and managing rockfill dams.

**Keywords:** Rockfill dam, Deformation monitoring, PSInSAR, C-band SAR, Sentinel-1