The S-K characteristics of the borehole areal strains associated with the Ms 8.0 Wenchuan and Ms 7.0 Lushan earthquakes

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The skewness and kurtosis of daily borehole areal strain at Guza station are jointly analysed on the S-K plane for the Wenchuan and Lushan earthquakes. We define a crustal stationary background to distinguish possible anomalies related to the earthquakes on the assumption that the background exhibits a quasi-Gaussian distribution. By calculating the S-K biases of the daily areal strain from the crustal stationary background, we found that before the Wenchuan earthquake, the large S-K bias anomalies were always negative, implying that the crust was compressed near the station. Whereas for the Lushan earthquake, clustered positive bias anomalies appeared within two time periods, revealing tensile changes in the crust. In addition, the S-K distributions of two arthquakes are separated on the S-K plane, further indicating differences in the associated deformation. These results demonstrate that the S-K characteristics of borehole areal strain data are potentially promising as earthquake precursors.

Keywords: borehole areal strain, S-K biases, S-K distributions, Wenchuan and Lushan earthquakes