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The long term characteristics of greenschist

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The greenschist in the Jinping II Hydropower Station in southwest China exhibits continuous creep behaviour because of the geological conditions in the region. This phenomenon illustrates the time-dependent deformation and progressive damage that occurs after excavation. In this study, the responses of greenschist to stress over time were determined in a series of laboratory tests on samples collected from the access tunnel walls at the construction site. The results showed that the greenschist presented time-dependent behaviour under long-term loading. The samples generally experienced two stages: transient creep and steady creep, but no accelerating creep. The periods of transient creep and steady creep increased with increasing stress levels. The long-term strength of the greenschist was identified based on the variation of creep strain and creep rate. The ratio of long-term strength to conventional strength was around 80% and did not vary much with confining pressures. A quantitative method for predicting the failure period of greenschist, based on analysis of the stress–strain curve, is presented and implemented. At a confining pressure of 40 MPa, greenschist was predicted to fail in 5000 days under a stress of 290 MPa and to fail in 85 days under the stress of 320 MPa, indicating that the long-term strength identified by the creep rate and creep strain is a reliable estimate.