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New observations on the kinematics of Hurd rockglacier (Livingston Island, Antarctic Peninsula)

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Rockglaciers have been identified by various authors in the South Shetlands archipelago in the Antarctic Peninsula region, with Serrano and Lopez-Martínez (2000) having described 9 rockglaciers and 11 protalus lobes in the islands. However, little is known about the deformation rates of rockglaciers and their response to climate change. Hurd rockglacier is located in the south part of Hurd Peninsula in Livingston Island. It occupies the floor of a small glacial valley that descends from about 301 m asl to sea-level, at False Bay, where it presents a series of raised-marine terraces. The bedrock is the low-grade metamorphic sandstones, shales and greywackes Myers Bluff Formation. The valley shows steep rockwalls with extensive scree slopes and a small retreating valley glacier with a prominent frontal moraine, from where the rockglacier develops. The rockglacier body is 630 m long and 290 m wide and the surface shows pressure ridges and furrows, especially in the lower sector. The rockglacier front is 15-20 m high and shows a slope of c. 45°. We present a detailed geomorphic survey of Hurd rockglacier based on the analysis of drone-derived orthomosaics and digital surface models. The structure of the rockglacier was analysed using electrical resistivity tomography surveys, which allowed identifying a frozen body at depth. The kinematics was analysed using historical aerial photos of 1956/1957 and recent very high-resolution satellite imagery, showing average deformation rates of 10 to 30 cm/year during that period. D-GPS measurements of stakes in the rockglacier body measured annually since 2011 show deformation rates of c. 8 to 15 cm/year. Permafrost boreholes located in the vicinity of the rockglacier are used to discuss its climate sensitivity.