

An active large rock slide in the Andean paraglacial environment: the Yerba Loca landslide, central Chile

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LANDSLIDES

DOI: 10.1007/s10346-020-01564-7



Acceso anticipado: OCT 2020

Tipo de documento: Article; Early Access

Abstract

A ca. 2.5 million m³ landslide occurred in August 2018 in the Yerba Loca valley, Andes Main Cordillera (33 degrees 15 ' S), at about 4000 m a.s.l. The Yerba Loca landslide is a multirotational slide, with a main scarp and failure surface developed in a volcanic rock mass, with secondary scarps and tilted blocks disturbing the colluvial soil cover. No clear trigger could be identified, although the failure took place some weeks after the largest winter precipitation and a sequence of snowfall and snowmelt, in the context of a severe drought. Inspection of optical satellite images suggests that the landslide suffered slow deformation for at least 15 years, increasing in the months prior to the failure. To corroborate these precursor deformations, InSAR analyses were performed at two time and spatial scales. For over 3 years, deformation in the landslide area was detected, while the local, short-term analysis from the 7 months before failure shows line-of-sight deformation rates at the landslide site of over 10 cm/year. Deformation continues after the failure with decreasing speed, with indications of further activity and expansion of the failure zone. This implies a hazard of rock avalanche, debris flows and/or river damming and subsequent outburst floods that may endanger communities downstream. The Yerba Loca landslide is an example of rock slope failure in paraglacial conditions and the influence of climatic factors in the context of climate change for the central Andes. This event represents an opportunity for learning on landslide mechanisms, remote sensing monitoring and hazard assessment of slow, large volume landslides in the Andean highlands.

Palabras clave

Palabras clave de autor: [Landslides](#); [Paraglacial slopes](#); [InSAR](#); [Geohazards](#); [Chile](#)

KeyWords Plus: [SPATIAL-](#)

[DISTRIBUTION](#); [EARTHQUAKE](#); [INSIGHTS](#); [DEBRIS](#); [INTERFEROMETRY](#); [SEISMICITY](#); [SUBDUCTION](#); [ARGENTINA](#); [RAINFALL](#); [STORMS](#)

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Financiación

Entidad financiadora	Número de concesión
University of O'Higgins, FONDECYT	1201360
Chilean Geological Survey (Sernageomin)	

[Ver texto de financiación](#)

Editorial

SPRINGER HEIDELBERG, TIERGARTENSTRASSE 17, D-69121 HEIDELBERG, GERMANY

Información de la revista

- **Impact Factor:** [Journal Citation Reports](#)

Categorías / Clasificación

Áreas de investigación:Engineering; Geology

Categorías de Web of Science:Engineering, Geological; Geosciences, Multidisciplinary

Información del documento

Idioma:English

Número de acceso: WOS:000585933500001

ISSN: 1612-510X

eISSN: 1612-5118