

Extrema 2018

A review of extreme natural hazard events in the Austrian Alps

Challenge Extreme Events

Extreme natural hazards events are difficult to predict. Consequently, preparing for extreme events is challenging and extreme events have a high potential to evolve into natural disasters. The design and implementation of risk reduction strategies and measures often represent a great challenge for all stakeholders involved.

However, planning for extreme natural hazard events is becoming increasingly important, especially with climate model projections indicating an increased likelihood of occurrence. Robust, clear, and easily accessible information on natural hazards, their potential for extreme events and possible consequences are a valuable tool for decision makers tasked with the design of appropriate risk management practices in a constantly changing world.



Debris flow in Aflritz, Carinthia, August 2016
© Photo: BMNT/ WLV



Rockslide destroyed protection tunnel, East Tyrol, 2013
© Photo: Martin Mergili

The Project

To increase the currently available information on extreme natural hazard events in the Austrian Alps, the project "Extrema 2018" was launched by the Austrian Federal Ministry of Sustainability and Tourism in cooperation with the working group ENGAGE – Geomorphological Systems and Risk Research of the Vienna University's Institute for Geography and Regional Research.

The Aim

The Extrema 2018 project aims to compile the current knowledge on extreme natural hazard events in the Austrian Alps, their causes and consequences, as well as possible climatic and societal influences in a comprehensive, scientifically robust, yet easily understood assessment report. Leading national and international experts are compiling information for event documentation and state of the art reports on their specific fields of expertise. Natural hazards covered include meteorological, hydrological, gravitational, and geophysical processes, their interactions, as well as societal aspects of extreme natural hazard events, such as land use, vulnerability, and economic considerations. The assessment report is intended to be a valuable information resource for stakeholders and decision makers and, as such, shall support the political discourse on appropriate management of risk associated with future extreme natural hazard events in the Austrian Alps.



Avalanche in Gschnitz valley, Tyrol, February 2009
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Forest fire in Neunkirchen, Lower Austria, August 2013
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The Report

For widest possible access for interested readers, the assessment report will be published as Open Access Book by Vienna University Press both in hard copy and as a digital version available for download online. Although the assessment report will be predominantly in German, an English-language executive summary of the report, as well as English-language abstracts of the individual chapters will inform international readers of key findings.

Report structure and contributing experts are listed on the back.
Further information can be found on extrema.univie.ac.at.



Abstract
Executive Summary
Preamble

Challenge Extreme Events

Overview of alpine natural hazards Sattler K (Uni Wien), Mehlhorn S (BMNT)
What are extreme events? Glade T (Uni Wien), Mergili M (Uni Wien/ BOKU)

Objectives of the ExtremA report

**Extreme events by
processes and process domains**

Meteorological extreme events

Temperature extremes Schöner W (Uni Graz), Haslinger K (ZAMG)
Snow- and ice loading Winkler M (ZAMG), Kaufmann H (ZAMG), Schöner W (Uni Graz), Kuhn M (Uni Innsbruck)
Storm Matulla Ch (ZAMG), Feser F (Helmholtz-Zentrum Geesthacht), Brazdil R (Uni Brno), Schöner W (Uni Graz),
Starke H (ÖHV), Hofstätter M (ZAMG), Schlögl M (AIT), Chimani B (ZAMG), Andre K (ZAMG), Tordai J (ZAMG)
Heavy precipitation and hail Pistotnik G (ZAMG), Hofstätter M (ZAMG), Lexer A (ZAMG)
Forest fire Vacik H (BOKU), Müller M (BOKU), Degenhart J (LFV T), Sass O (Uni Graz)

Hydrological extreme events

Low-flows Laaha G (BOKU)
Flooding Blöschl G (TU Wien)
Flash floods Achleitner S (Uni Innsbruck), Kohl B (BFW), Lumassegger S (Uni Innsbruck), Huber A (Uni Innsbruck),
Formayer H (BOKU), Weingraber F (Land OÖ)
Fluvial sediment events Gems B (Uni Innsbruck), Kammerlander J (BMNT), Moser M (BMNT), Aufleger M (Uni Innsbruck)
Overload events Schneiderbauer S (EURAC), Hartmann S (EURAC), Aufleger M (Uni Innsbruck)
Soil erosion Strauss P (BAW), Schmaltz E (BAW)

Gravitational extreme events

Rockslides, rock avalanches and earthflows Zangerl C (BOKU), Mergili M (Uni Wien/BOKU), Prager C (Alps), Sausgruber T (WLV), Weidinger J (Erkudok)
Bergsturz, sackung and rockfall Preh A (TU Wien), Mölk M (WLV), Illeditsch M (TU Wien)
Landslides and hillslope debris-flows Glade T (Uni Wien), Koçiu A (GBA), Tilch N (GBA)
Debris flows Kaitna R (BOKU), Prenner D (BOKU), Hübl J (BOKU)
Snow avalanches Studeregger A (LWD STMK&NÖ/ ZAMG), Podesser A (LWD STMK&NÖ/ ZAMG), Mitterer C (LWD T),
Fischer JT (BFW), Ertl W (LWD KTN)

Glacial and Periglacial extreme events

Permafrost hazards Otto J-C (Uni Salzburg), Krautblatter M (TUM), Sattler K (Uni Wien)
Glacial hazards Fischer A (ÖAW), Schöner W (Uni Graz), Otto J-C (Uni Salzburg)

Other extreme events

Earthquakes Lenhardt W (ZAMG), Hammerl C (ZAMG), Papi-Isaba M (ZAMG), Weginger S (ZAMG)
Multi-hazards and cascades Pöpl R (Uni Wien), Sass O (Uni Graz)

**Social aspects
of extreme natural hazard events**

Land use and land policy Schindelegger A (TU Wien)
Protection forests Kleemayr K (BFW), Perzl F (BFW), Markart G (BFW), Hoch G (BFW), Schüler S (BFW), Wiitsche P (BOKU)
Critical Infrastructure Kurt Hager (BM.I)
Vulnerability Papathoma-Köhle M (BOKU), Fuchs S (BOKU),
Economic considerations Franz Sinabell (WIFO)
Civil protection management Siegfried Jachs (BM.I)

Synthesis
Perspectives
General recommendations