IAG Webinar Western Europe

7 March 2023 at 15:00-18:00 CET

Coordinators: Dr. Susan Conway and Dr. Achim A. Beylich
Laboratoire de Planétologie et Géosciences, Nantes, France - Geomorphological Field Laboratory (GFL),Selbustrand , Norway

INTERNATIONAL GEOMORPHOLOGY WEEK 2023

15:00- 15:05 Introduction

15:05-15:17

Dust emission in South Africa and their relationship to land use and drought

Heleen C. Vos, University of Basel, Switzerland & Stellenbosch University, South Africa

The emission, transport, and deposition of dust have shown to be an important process in South Africa, with consequences for public health, land degradation, and nutrient distribution. However, the spatial and temporal distribution of dust sources in South Africa and the future development of these sources remain a topic of current research. Our study addressed this topic by combining field monitoring, experimental measurements, and remote sensing. The results can give insight into the human influence on dust emission, the possibility of limiting negative effects from this dust, and the possible development of these dust sources with a changing climate.

Semi-diurnal vs. diurnal tides: what are their impacts on coastal wetland adaptability to sea level rise

Jean-Philippe Belliard, 1ECOSPHERE, University of Antwerp, Antwerp, Belgium

15:17-15:29

Coastal wetlands (tidal marshes and mangroves) are showing both signs of vulnerability and resilience to sea level rise (SLR) across the world. Studies that attempted to understand this global variability in coastal wetland adaptability to SLR neglected the role of the tidal pattern, varying from semi-diurnal to diurnal globally. Based on global observations and model simulations, we demonstrate that coastal wetlands forced by diurnal tides are consistently less resilient to SLR. Our findings highlight the tidal pattern as a previously overlooked yet important driver of coastal wetland adaptability to SLR and call for further research.

15:29-15:41

Variability in Lower Meuse deposition (the Netherlands) identified from the meta-analysis of radiometric data

Willem Toonen, Vrije Universiteit Amsterdam, the Netherlands

For the Meuse River, a dataset of 427 radiometric dates derived from its fluvial setting was compiled from existing literature. A cumulative probability density function (CPDF) was deployed to reconstruct the phasing in fluvial activity throughout the Holocene. Wavelet analysis was used to identify persistent periodicities in deposition and stability. It was found that major changes in deposition closely followed the general geomorphic development of the valley and the river's flooding regime. While climatic variability played an important role, it is human impact on land use that has dominated the CPDF outcomes in the last millennia.

Late Pleistocene-Holocene fluvial records from the southern piedmont of the Hajar Mountains (Oman): hydro-climatic and archaeological implications

Tara Beuzen-Waller, Tübingen University, Soil Science and Geomorphology Working Group, Germany

15:41-15:53

In Oman, quaternary climatic fluctuations alternated between humid and arid periods. As humid periods triggered increasing rainfall and fluvio-lacustrine activity, they are a key component in human-environment history. Fluvial archives are of great interest for understanding the hydrosystems' local responses to regional climatic fluctuations and water resources availability. Here, we will present fluvial records from southern part of the Hajar Mountains, especially phases of aggradation around 11,500 cal. BP, between 6,610 - 5,400 cal. BP and around 2,700 cal. BP. We will compare them with prehistoric archaeological sites distribution and hydraulic system from the Bronze age and the Iron age.

15:53-16:05

Evolutionary trajectory of a low-energy river during the Holocene: the Charente River between Angoulême and Saintes (south-west of France)

Amélie Duquesne, La Rochelle University, LIENSs UMR 7266, France

Low-energy rivers are mundane and unchanging. As a result, they are rarely identified, inventoried, and studied. Their long-term evolution and how they responded to past environmental changes and adapt to future ones remain unanswered questions. In the lowlands of SW Atlantic France, we identified a set of low-energy systems with discontinuous anastomosing patterns preserved at the basin scale. This type of river has a strong patrimony character because the anastomosed pattern is very rare in Europe due to anthropic pressure. We will focus on channel and island changes as well as the sedimentary record of the alluvial plain during the Holocene with a specific focus on the last 300 years of the Charente River.

The ecology of a recently deglaciated Alpine floodplain: the case of the Otemma floodplain

Matteo Roncoroni, Institute of Earth Surface Dynamics, University of Lausanne, Switzerland

16:05-16:17

Glaciers are retreating worldwide, creating extensive proglacial margins exposed to colonization by organisms. However, the extremely dynamic nature of proglacial margins makes ecological colonization difficult. Classic research has shown that colonization depends on distance from the glacier terminus. However, with current rates of glacier retreat, long downstream distances are becoming exposed in a relatively short time, questioning the validity of this longitudinal chronosequence model. In this research, we decrypt the physical habitat of periphyton in a recently deglaciated floodplain and we demonstrate the role that periphyton plays in favoring embryonic ecosystem development.

16:17 – 16:32 Break

16:32-16:44

Proglacial areas: sediment sources or sediment storage? What should we expect for the future?

Sara Savi, Institute of Geosciences, University of Potsdam, Germany

Glaciated catchments are among the regions most affected by climatic changes. Increasing temperatures have a direct impact on ice melt and while retiring, glaciers leave behind large amount of loose sediment that widen the proglacial areas. Whatever this material increase or decrease the sediment yield of glaciated catchments, however, it is still matter of debate. By looking at aerial photographs of the last 50 years, and modern digital surface models, I will explore the role of a proglacial area in the South-Eastern Italian Alps to understand how it influences the release and transport of sediment. By locating the most prone source areas and analyzing the dynamics of sediment transport, I will give possible hints on to what we should expect for the future sediment yield.

Global patterns and trends of glacier lake outburst floods since 1900

Natalie Lützow, University of Potsdam, Germany

16:44-16:56

Retreating glaciers have provided new space for glacier lakes to form and grow in past decades, posing hazards to mountain communities when they empty catastrophically. Such Glacier Lake Outburst Foods (GLOFs) often lead to millions of dollars of damages and fatalities in mountain regions worldwide. While there is growing evidence of an increase in the number and size of glacier lake, we find limited evidence that this has led to an increase in the magnitudes of GLOFs since the beginning of the 20th century. Trends in flood volumes depend strongly on the type of dam that impounds the glacial meltwater.

16:56-17:08

Thermokarst processes in rock glaciers as triggering mechanisms of high alpine debris flows

Simon Kainz, Institute of Earth Sciences, University of Graz, Austria

On 13 August 2019, a cascading process including thermokarst lake outburst, debris flow initiation, and river blockage, hit a high mountain valley in the Austrian Alps. Rapid development of thermokarst features on an active rock glacier triggered the failure of ice-cemented debris within its front. This study analyzes a set of potentially destabilizing factors and explores the drivers of thermokarst evolution. The results highlight the need to account for permafrost degradation in debris flow hazard assessment studies in periglacial, mountainous environments.

Cracking and Crumbling – How frost cracking drives alpine rockwall erosion

Daniel Draebing, Utrecht University, The Netherlands

17:08-17:20

Rockfall processes shape high alpine rockwalls. Frost cracking is assumed to be a major driver of rockwall erosion, the crumbling, by preparing and/or triggering rockfall. In this talk, we will review frost cracking processes in alpine rockwalls, model periglacial processes including permafrost and compare model results to measurements of rockwall erosion to re-assess the role of frost cracking in crumbling rockwalls.

17:20-17:32

Chronology and morpho-climatic history of large rock slope failures in the Southern Swiss Alps

Alessandro De Pedrini, Institute of Earth Sciences IST, SUPSI, Switzerland

In the European Alps, the occurrence of large rock slope failures has been largely influenced by the Quaternary glacial history. In the Southern Swiss Alps in the territory between Canton Ticino and Canton Grisons, several deposits of large rock slope collapses can be observed. To characterize the connection between glacial retreat and slope collapse, a detailed geochronological assessment of both phenomena is essential. This research aims to define the exposure age of the mapped rockslide/rock avalanche deposits through Schmidt hammer exposure-age dating (SHD) and analyze the achievements in relation to the collapse volume to obtain a morphodynamic interpretation during deglaciation.

The potential of long-term monitoring of slow-moving landslides for understanding landslide dynamics

Alejandra Jiménez Donato, Geomorphological Systems and Risk Research Group,University of Vienna, Austria

17:32-17:44

Landslides are among the greatest natural hazards, claiming thousands of victims each year and causing significant damage to infrastructure. Although most cases are the consequences of rapid landslides, slow-moving landslides should also be considered a concern. The long-term monitoring and analysis of the hydromechanical behaviour of slow-moving landslides can provide a great opportunity for a better understanding of the complex mechanisms and dynamics of landslides. This is critical for better prediction of potential accelerations or cascading hazards that could be triggered and for progress in formulating of more comprehensive disaster risk reduction strategies.

17:44-17:56

Does the movement of a landslide change when a city is built on it? A study of feedbacks between urbanisation and landslide dynamics in the tropics

Antoine Dille, Royal Museum for Central Africa, Tervuren, Belgium

The movement of large, slow-moving, deep-seated landslides is regulated principally by changes in pore-water pressure in the slope. In urban areas, drastic reorganization of the surface and subsurface hydrology—for example, associated with roads, housings or storm drainage—may alter the subsurface hydrology and ultimately the slope stability. Yet our understanding of the influence of slope urbanization on the dynamics of landslides remains elusive. In this research we combined satellite and (historical) aerial images to quantify how 70 years of hillslope urbanization changed the seasonal, annual and multi-decadal dynamics of a large, slow-moving landslide located in the tropical environment of the city of Bukavu, Democratic Republic of the Congo.

17:56-18:00 Closing remarks

INTERNATIONAL GEOMORPHOLOGY WEEK 2023