# IAG Webinar Western Europe



1 March 2024 at 10:00-12:00 CET

Coordinators: Susan Conway and Achim Beylich
*LPG Nantes, France & Geomorphological Field Laboratory (GFL), Selbustrand, Norway*

INTERNATIONAL GEOMORPHOLOGY WEEK 2024

10:05–10:17

### Sediment connectivity in proglacial environments: spatio-temporal pattern of sediment deliver from hillslopes to alluvial plains of the Haut-Arolla catchment in the Swiss Alps

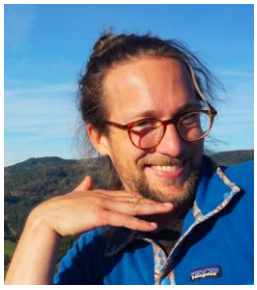
*Mathilde Bayens, Institute of Earth Surface Dynamics, University of Lausanne, Switzerland*

Since the early 1980s Alpine catchments have experienced rapid glacier recession, certainly increasing water yield and sediment transport capacity. Evidence of what this means for sediment supply, the balance between changing supply and capacity, and hence sediment export in mountain environments is less clear. In particular, the role played by connectivity in transporting sediment through proglacial landscape is less frequently considered. This project addresses the spatio- temporal evolution of sediment delivery from hillslopes to alluvial plains based on high resolution DEMs. The aim is to quantify how the potential connection and disconnection between proglacial valley sides and valley bottoms is evolving after glacier recession and then to assess the implications of these findings for basin scale sediment flux.

10:17–10:29

### Structural shifts in plant functional diversity during biogeomorphic succession: Moving beyond taxonomic investigations in an alpine glacier foreland

*Stefan Haselberger, Department of Geography and Regional Research, University of Vienna, Austria*



The complex interrelation between plants and geomorphic processes is described in the concept of biogeomorphic succession. While ecological research on succession and community assembly has transitioned towards functional approaches, studies on functional diversity in biogeomorphic settings, particularly in glacier forelands, remain limited. This talk introduces a template for future (bio)geomorphological research, aiming to propel investigations beyond conventional taxonomic perspectives and towards a more comprehensive understanding of the dynamic relationships within these ecosystems.

10:29–10:41

### Reconstruction of late Pleistocene glacier fluctuations in the French Massif Central and their paleoclimatic implications

*Arthur Ancrenaz, Université Clermont Auvergne, GEOLAB UMR 6042, France*

In the French Massif Central, knowledge of glacier fluctuations during the late Pleistocene is lacking. This research aims to define the chronology of glacier fluctuations in two areas (Aubrac and Cantal) based on morphostratigraphic arguments and surface exposure dating with cosmogenic nuclides. These results constrain glacier simulations that allow to quantify climatic conditions, prevailing during the last glacier maximum (LGM). These new data are compared to other proxies from the Western Europe region and support potential reorganization of atmospheric circulations.

10:41–10:53

### Exploring Karstic Challenges: Insights into Hazards and Risks in Boukadir's Covered Karst

*Meriem Moulana, Department of Geography, University of Liege, Belgium*

Assessing the risk of karst collapse can be difficult when events are infrequent and the karst is covered. This is the case of the Boukadir covered karst, which affects a Messinian carbonate platform covered on the southern edge of the Chélif basin by more than 60 m of plio-quaternary sediments (Moulana et al., 2021, 2022). This study aims to highlight the karstic hazard and associated risks in this region by combining different data. Our results enable us to delimit the karstic collapse risk zone, which is around 1.5 km wide and extends over a length of around 9 km.

10:53–11:05

### The hum of our environment – Understanding landscape dynamics through their seismic footprints

*Michael Dietze, Georg-August University Göttingen, Department of Geosciences & Geography, Germany*

The world we live in but also live from experiences a major transient, imposed by climate change and human activities. That transient is implemented by geomorphic processes involved in gravitational mass wasting, hydrological extreme events, and landscape transformation by biological agents. Here, I illustrate how we can use seismic sensors to study these processes with unprecedented detail, by detecting, locating, tracking, quantifying them, by gaining insight into the anatomy of catastrophic events, and by studying their drivers, triggers and landscape scale coupling mechanisms – in role model landscapes of European mountains, uplands, and coasts.

11:05–11:17

### Exploring the dynamics of slow-moving landslides: a combined approach integrating monitoring and on-site investigations

*Edoardo Carraro, ENGAGE group, Department of Geography and Regional Research, University of Vienna, Austria*

Slow-moving landslides are often underestimated among the many different landslide processes, even if these can permanently impact local infrastructure and land use planning. This talk shares the current insights of an ongoing study at the Brandstatt landslide observatory (Lower Austria, Austria). The methodological approach combines landslide monitoring with on-site investigations in a spatio-temporal framework to establish an effective method to assess the evolution of slow movements. By interpreting the results in terms of the landslide's kinematics, markers of potential deformation trends can be identified, providing practical solutions to support local authorities in hazard management.

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**11:17–11:29** ~~~~~~~~~~ **COMFORT BREAK**

**11:29–11:41**

### Tracking sediment transport through the Miage Glacier, Italy, combining luminescence burial dating of englacial clasts with glacial modelling

*Audrey Margirier, University Grenoble Alpes, University of Lausanne, Switzerland*

Constraining the time scales of englacial sediment transport is essential for both understanding processes controlling sediment dynamics through glacierised catchments and quantifying the response of glaciers to climate change. However, englacial sediment transport occurs through a set of processes that are difficult to observe. We developed a novel approach combining luminescence dating of individual englacial rock debris with ice-dynamical glacier evolution modelling with Lagrangian particle tracking. Using this approach, we quantified rates and paths of sediment transport through Miage Glacier catchment in the Italian Alps to explore the processes controlling englacial sediment transport though the Holocene.

**11:41–11:53**

### Assessing frequency and magnitude of flood impacts in drylands – a hydrogeomorphic perspective

*Janek Walk, Department of Geography, University of Vienna, Austria*

Rare but heavy precipitation events are the fundamental driver for geomorphic activity in drylands. Quantifying the frequency and magnitude of the hydrogeomorphic impacts of episodic discharge is essential for a robust characterization of flood hazards and a better understanding of the poorly studied hydromorphodynamics in deserts. However, observation data from both precipitation and stream gauges is often sparse. A novel approach in hydrogeomorphology is therefore presented, which relies on spatial time series analysis of Landsat and MODIS multispectral satellite imagery by cloud computing. Application on the gauged Hoanib in Northwest Namibia allows for validation before transfer to other ephemeral streams.

**11:53–12:05**

### Gravity-Driven Differences in Fluvial Sediment Transport on Mars and Earth

*Lisanne Braat, European Space Agency (ESA), The Netherlands*

There is much evidence that liquid water once flowed on the surface of early Mars. Preserved ancient landscapes altered by water provide valuable insight into the past processes on Mars, the presence of water, past environmental conditions, and habitability. To better understand the fluvial geomorphology on Mars, we use knowledge from systems on Earth. However, is it fair to do so when gravity is much lower? How does gravity affect sediment transport? And how does this, in turn, influence the morphology and stratigraphy on Mars?

**12:05–12:17**

### A data driven gully head susceptibility map of Africa at 30 m resolution

*Sofie De Geeter, KU Leuven and University of Liège, Belgium*

Predicting gully erosion at the continental scale is challenging with current generation models. Moreover, datasets reflecting gully erosion processes are still rather scarce, especially in Africa. This study aims to bridge this gap by collecting an extensive dataset and developing a robust, empirical model that predicts gully head density at high resolution for the African continent. We developed a logistic probability model that predicts the likelihood of gully head occurrence using currently available GIS data sources. Based on this model, with AUCs for validation around 0.8, we present the first gully head susceptibility map for Africa at 30 m resolution.

**12:17–12:29**

### Controls on debris-flow erosion

*Tjalling de Haas, Utrecht University, The Netherlands*

Debris flows can grow greatly in size and hazardous potential by eroding bed and bank materials. However, erosion mechanisms are poorly understood because debris flows are complex hybrids between a fluid flow and a moving mass of colliding particles, bed erodibility varies between events, and field measurements are hard to obtain. I will present results from field measurements in the Illgraben (CH) and physical-scale experiments to show how flow and bed conditions jointly control debris-flow erosion. In particular, data shows how erosion is controlled by both shear and impact forces of the debris flow, as well as transfer of pore pressure, loading conditions, and contraction-dilation behaviour of the bed.