ORAL ABSTRACTS
(In Programme Order)

Wednesday 4th June 2025

SESSION ONE: MOUNTAIN HAZARDS AND LANDSLIDES

KEYNOTE: Recent tsunamigenic landslides in Greenland and what they are telling us about the impact of climate change

Kristian Svennevig[1]

[1]Geological Survey of Denmark and Greenland (GEUS)

In June 2017, a catastrophic rock avalanche in Greenland's Karrat Fjord triggered a tsunami that devastated a nearby village, destroying 11 houses and resulting in four fatalities. This disaster underscored a significant knowledge gap regarding tsunamigenic landslide hazards in Greenland and the broader Arctic, prompting a focused risk assessment led by the Geological Survey of Denmark and Greenland (GEUS). Our project identified and analyzed eight recent (post-1952), large-scale (>2×10^6 m^3) landslides across Greenland. Investigations revealed a consistent pattern of climate-driven preconditioning: four landslides can be directly attributed to permafrost degradation, three others likely relate to similar processes, and one event correlates with glacial thinning and debuttressing. Despite the relatively small dataset, these events collectively indicate an acceleration of landslide activity associated with recent climatic warming, supported by the absence of visible fresh landslides in the earliest photographic records. Furthermore, the identification of several giga-scale (>1 km^3) post-glacial (<11 ka BP) landslide deposits suggests the potential for even larger future events under ongoing climate warming scenarios, raising significant concerns for risk management and mitigation strategies in Arctic communities.

Rainfall induced landslide behaviour and implications of climate change, Undercliff, Isle of Wight, UK

***Claire Czarnomski*[1], *Roger Moore*[1], *Ross Fitzgerald*[1], *Anya Champagne*[1]**

[1]Jacobs Engineering UK Limited, UK

The Undercliff, on the south coast of the Isle of Wight UK, is a complex deep-seated mass movement, the origins of which date back to the Late Quaternary, when sea level and climate conditions were different than today. Development of the Undercliff expanded rapidly from the 1850s which has since been subject to damage from ground movement and landslides. The sustainability of development within the Undercliff is at risk from the impacts of future climate change and sea level rise. Forecasting the effects of climate and sea level change requires long-term empirical data to model the effects of weather (rainfall), groundwater and landslide behaviour. The likelihood and severity of the landslide behaviour scenarios range from the present day i.e. progressive slope creep to those that require pre-cursor initiating events i.e. failure of coastal defences, and others that cause a step change i.e. new landslide mechanism. Linking the landslide behaviour response to climate change, threshold events and mitigation using quantitative methods provides an objective basis to inform strategies to manage the risk, including planning and development control, engineering measures, in situ monitoring and engagement of the local community to share information and homeowner guidance.

Climate-Driven Landslide Dynamics in Northern Pakistan: Integrating Machine Learning and Climate Projections for Future Risk Assessment

Muhammad Ramzan[1], *Peng Cui[1]*

[1]Chinese Academy of Sciences, China

Landslides, increasingly influenced by climate change, present a growing threat to mountainous regions globally. Northern Pakistan, particularly along the N-15 Highway, is highly susceptible to landslides, exacerbated by extreme climatic factors such as heavy rainfall, fluctuating temperatures, snowmelt, and soil moisture. Despite the escalating frequency and severity of landslides in the area, few studies have comprehensively explored the interplay of climatic and environmental factors driving landslide activity. This research addresses this gap by analyzing the relationship between key climatic variables and landslide occurrences along the N-15 Highway. The study uses a dataset compiled from 455 satellite images (1990-2023) and ground surveys to investigate five primary climatic factors: precipitation, temperature, snowmelt, soil moisture, and vegetation cover. Temporal analysis revealed a significant rise in landslides after 2005, correlating with rising temperatures, increased precipitation, and accelerated snowmelt ($p < 0.05$). Seasonal analysis found that 84.1% of landslides occurred between April and October, coinciding with peak precipitation and snowmelt periods. The study identifies regional variations in landslide dynamics due to different climatic zones. Balakot's subtropical climate sees rainfall as the primary landslide driver, while Babusar-Naran's alpine environment is dominated by snowmelt, and Chilas, with its semi-arid conditions, is influenced by high temperatures and specific geological features. Climate projections predict a rise in temperatures (1.6°C–6.5°C) and a 35% increase in precipitation by 2100, amplifying landslide risks. To improve risk assessment, the study employs advanced machine learning models—Random Forest, XGBoost, and others—to produce accurate landslide susceptibility maps. These models, outperforming traditional methods, predict future risks, emphasizing the role of climate change in shaping landslide hazards. This research highlights the need for adaptive strategies, resilient infrastructure, and enhanced monitoring to mitigate future landslide risks in northern Pakistan.

Assessing Moraine Stability in High Mountain Asia

Katie Qunicey[1], *James Gelder[1], Deryck Chan[1], Duncan Quincey[2]*

1Mott MacDonald
2University of Leeds

Glacial lakes frequently store hundreds to millions cubic metres of water, but are commonly impounded by unconsolidated, loosely packed moraine dams. These dams may contain a degrading ice-core, and in almost all cases show evidence of seepage and piping, and thermokarst features associated with slumping and unstable material. We present a numerical modelling approach using slope stability limit equilibrium analyses (Geostudio SEEP/W) to quantify the stability of a representative moraine dam in the Nepal Himalaya in various conditions. We find that under steady-state conditions (and all sensitivity scenarios) the slopes are stable (FoS ≥ 2) and therefore failure can only occur if triggered by other glacial or geological processes (e.g. moraine overtopping following a rock avalanche). Under seismic loading, pseudo-static accelerations greater than 0.25g (equivalent to peak ground acceleration 0.5g) are required to compromise moraine stability (FoS < 1). This agrees with observations from the 2015 Ghorka earthquake during which glacial lakes in this region remained intact at peak ground accelerations just below 0.5g. Our work suggests that further analysis of moraine dam structures, in particular their internal characteristics, is required, if quantification of the hazard posed by them to downstream communities is to be robustly characterised.

Adapting to Emerging Geohazards as a Consequence of Weather Extremes - A case study: Ardingly Reservoir Boat Park Landslide

Adam Dargan[1]

1AtkinsRéalis

In the summer of 2022, the UK saw a significant period of dry weather with record-breaking high temperatures and a drought declared in parts of Southern England. At the South East Water (SEW) Ardingly Reservoir in West Sussex, water levels reached their lowest ever recorded, leading to a large landslide that damaged the boat park retaining wall. The landslide was attributed to reduced load against the slope, due to low water levels and the complex geological and groundwater conditions. AtkinsRéalis' involvement began in late 2021 and included a comprehensive project scope encompassing a desk study, ground investigation, interpretative reporting, and a feasibility study. The team employed innovative remote sensing techniques, including drone photogrammetric and bathymetry surveys, to determine the extent of the landslide. These surveys were repeated to create digital surface comparison models, highlighting elevation changes and delineating the landslide extents and the rate of landslide movement. The interpretative reporting informed the feasibility study, which explored remedial solutions and the detailed design of the remedial solution. Key constraints included limited access via narrow lanes, the necessity of overwater work due to fluctuating water levels, and stakeholder management. An innovative remediation solution was designed to stabilise the landslide and reinstate the boat park retaining wall and activity centre area. The solution will require a detailed phased approach to construction with over-water work as well as innovative construction techniques. The activation of the landslide in 2022 highlighted the dynamic nature of geohazards and the impact of climatic factors, such as drought-induced low reservoir levels, on slope stability. The engineering services provided by AtkinsRéalis aim to develop a resilient and effective mitigation strategy to stabilise the slope and prevent further failures. This project underscores the importance of understanding site-specific geological conditions and the need for adaptive engineering solutions in response to evolving geohazards.

Landslides in Denmark – is that even a thing? Nationwide mapping shows hidden geohazard

Kristian Svennevig[1], *Marie Keiding[1], Anne-Sophie Høyer[1], Verner Brandbyge Ernstsen[1], Jacob Kidmose[1], Samuel Paul Jackson[1], Trine Dahl-Jensen[1], Aurelién Mordret[1], Peter H. Voss[1], Christine Thomas[1,2], Erik Vest Sørensen[1], Henrik Jønsson Granat[1], Mikkel Skovgaard Andersen[1], Ingelise Møller[1], Lars Øbro Hansen[1], Thomas Højland Lorentzen[1], Tine B. Larsen[1]*

1Geological Survey of Denmark and Greenland
2University of Münster

Until recently, landslides in Denmark were not widely recognised as significant hazards. However, a nationwide LiDAR-based Digital Elevation Model (DEM) mapping identified over 3,200 landslides across the country. While most of these are minor coastal events, several larger, active rotational landslides—some spanning up to one kilometer wide—have also been documented. Significantly, some of these larger landslides affect residential areas, exhibiting annual movements up to tens of centimeters. Elevated groundwater levels, increasingly common due to climate change, have intensified landslide activity, particularly during recent winters marked by record precipitation. Critical questions remain concerning the overall activity level of these mapped landslides, as well as the geological and structural factors conditioning the largest landslides. Additionally, future risks posed by rising groundwater levels, extreme rainfall events, accelerated coastal erosion due to increased storm frequency, and sea-level rise also present concerns. To tackle these challenges, GEUS has initiated a comprehensive national mapping project. This initiative employs multitemporal high-resolution LiDAR surveys alongside detailed site-specific studies at key locations. These studies integrate continuous GNSS monitoring, local seismic network data, groundwater logging, terrestrial geophysical methods, bathymetric LiDAR, and shallow marine geophysical surveys to examine offshore extensions of landslides. Through this integrated approach, GEUS aims to significantly enhance the understanding of landslide dynamics and triggers in Denmark, establishing a robust foundation for informed land-use planning and improved resilience to climate-induced geohazards.

SESSION TWO: HUMAN ACTIVITIES

The impact of climate change on pore water pressures in clay earthworks

Kevin Briggs*[1]*, *Wengui Huang[2], Fleur Loveridge[3], Joel Smethurst[1]*

1University of Southampton
2Teesside University
3University of Leeds

Clay earthworks (embankments and cuttings) supporting the UK's transport infrastructure are in direct contact with the atmosphere and are influenced by seasonal weather changes. Both the magnitude and frequency of seasonal weather patterns and extreme weather events are likely to change as the UK experiences wetter winters and drier summers. Seasonal wetting and drying can induce volume change in earthworks, affecting the alignment of overlying road and rail infrastructure. Periods of wet weather can increase pore water pressures (PWPs) and trigger disruptive slope failures. The aim of this study was to investigate the effect of forecast climate change on pore water pressures within transport infrastructure earthworks. One-dimensional simulations of earthwork pore water pressures were undertaken using weather data derived from the UK Climate Projections 2018 (UKCP18) for three discontinuous periods 1981-2000, 2021-2040 and 2061-2080. These assumed the highest carbon emissions scenario, (RCP8.5) and used 12 perturbed parameter ensembles (PPEs) to capture the widest possible range of possible weather conditions. The UKCP18 projections show that (i) potential evapotranspiration (PET) will increase and rainfall will decrease in the summer, while (ii) rainfall will increase in the winter. The simulations showed that increased summer drying (i.e. net evapotranspiration) increased the ground water storage capacity and therefore the amount of rainfall required to saturate the ground in the winter months. This led to fewer 'wet days' each year, when hydrostatic PWPs reached the ground surface. However, the simulations showed that the magnitude of seasonal PWP cycles increased in a changing climate. This will increase the rate of strength deterioration in strain-softening clay materials and increase the vulnerability of earthworks to PWP-triggered shallow translational failures, even if worst-case PWP conditions become less onerous. In addition, the spatial extent and magnitude of seasonal PWP cycles was greater beneath tree-covered slopes than grass-covered slopes.

Climate change and the increasing reliance upon developing and unstable countries for Critical Raw Materials - the problem with mine waste

Susan Digges La Touche

Last year there were 5 recorded major failures related to the storage of mine tailings. This year there have already been 7 major events arising from tailings storage failures, leading to impact to the environment, human health and reputational loss in the first quarter of 2025. This substantial impact should be viewed against the backdrop of an increasing need for mining to provide the raw materials to fuel the green economy, the increasing reliance upon developing countries for these raw materials and the corresponding concerns regarding the political stability of many of the countries that we rely on. Moreover, although a tailings storage facility (TSF) failure is generally the result of a number of interlinked factors, failure or movement can be triggered by an extreme rainfall event. We already understand that one of the consequences of climate change is that rainfall events are likely to be more extreme in some areas, whilst precipitation will tend to be less reliable in others. Deficiencies in design, monitoring, failure to recognise a potential failure mode, and failure to implement a rapid action / remedial plan, may all contribute to a minor slump or movement becoming a major failure. Moreover, the quality of these factors and implementation of lessons that should have been learns from past failures, may exhibit substantial variation globally. The dilemma that we have, is that there are substantial gaps within the dataset of reported failures and within the data contained within the Global Tailings Portal database to understand failure risks and mechanisms worldwide. Although approximately 1800 records are available within the Global Tailings Portal database for study, this dataset covers only approximately 10% of TSFs globally . In this paper is presented a review of the current state of knowledge of TSF failures relating to extreme rainfall events and outlines the gaps in our knowledge (e.g., the impact of re-mining), and within our dataset, that should be areas of urgent research. This paper also addresses the question of responsibility for safety within our critical raw material supply chain, and outlines areas where these issues should be addressed within the circular economy (e.g., the role of mining within Europe and consideration of social aspects within LCA).

Washout Vulnerability Assessment – Assessing the risk of runoff generated debris slides on linear infrastructure in the face of a changing climate

Christopher Cox[1], Migle Mefle[1]

1AtkinsRéalis

The derailment of a passenger train at Carmont in August 2020 highlighted the urgent need for improved management of earthworks and drainage assets during extreme weather events. These failures, often linked to weather, can occur rapidly and unpredictably. Climate change projections by asset owners and the Met Office indicate an increase in both the intensity and frequency of extreme weather events, leading to more frequent washout failures. Building on research from the University of Southampton, AtkinsRealis developed the Washout Vulnerability Assessment tool. This innovative tool uses readily available LIDAR data and geotechnical parameters to assign risk ratings for washout failures at specific locations, promoting a proactive maintenance strategy. The method significantly enhances the prediction of rapid cutting slope failures, even when there are no visible signs of distress. Given the extensive number of infrastructure earthworks nationwide, an efficient desk-based analysis is essential to identify critical areas for targeted maintenance and renewal. This presentation will demonstrate the application of this novel methodology on highway and railway earthwork assets, aiding owners in developing new geo-risk management strategies. Additionally, the tool provides new insights into known washout areas, informing mitigation and remedial strategies. The Washout Vulnerability Assessment tool is the first method to quantitatively assess the risk of washout failures triggered by overland flows. It evaluates the increased susceptibility of linear assets under future climate change scenarios, which are likely to result in more frequent and intense rainfall events. By identifying high-risk areas, decision-makers can better plan, prioritise, and phase investments in adaptation solutions.

Thursday 5th June 2025

SESSION THREE: Resilient Communities

KEYNOTE: Coastal water and soil salinity hazards in Bangladesh

Mohammad Shamsudduha[1]

1University College London

Soil and water salinity hazards are increasingly being recognised as critical threats to agriculture, freshwater resources, and livelihoods in deltaic environments, particularly across the densely populated Asian mega-deltas. In this keynote lecture, attention is given to the Ganges-Brahmaputra-Meghna (GBM) delta in coastal Bangladesh, where salinity dynamics are shaped by complex interactions among climate, hydrology, and extreme weather events. Observational data collected from 24 monitoring stations between 2004 and 2022 were used to examine the spatiotemporal variability of soil and surface-water salinity, and their links to local weather patterns, tropical cyclones, and oceanographic drivers.

A combination of time-series analysis, cross-correlation, and wavelet decomposition was applied to investigate seasonal trends and temporal coherence between salinity and environmental variables. Pronounced seasonal fluctuations were observed in soil and surface-water salinity in the southwest coastal Bangladesh. Salinity levels were found to increase during the dry season and decrease sharply during the monsoon period due to rainfall and freshwater discharge. Short-term salinity spikes were triggered by tropical cyclones, particularly those making landfall during the pre- or early monsoon period (April–May), while monsoon cyclones had comparatively minor impacts.

Statistical modelling revealed that temperature, lagged rainfall, sea surface salinity, and sea-level anomalies significantly influence both soil and surface-water variability. A 1°C rise in seasonal temperature was associated with an estimated 7.3% increase in soil salinity. These findings reinforce the need for salinisation to be framed as a slow-onset hydrogeological hazard within disaster risk reduction (DRR), and for adaptive strategies to be adopted in climate-sensitive coastal regions.

Lessons learnt from the Sikuttiaq project: Sea ice travel safety, Inuit Qaujimajatuqangit, sea ice monitoring

Michel Tsamados[1]

1University College London

Climate Change and Transport Infrastructure: A Multi-Hazard Analysis of Combined Flood and Landslide Risks

Rachel Hannah Doley[1], *Dr Xilin Xia[1], Dr Emma Ferranti[1], Prof Andrew Quinn[1]*

1University of Birmingham

Transport infrastructure is critical for societal functioning allowing for the movement of goods and services whilst facilitating societal connections. These assets are vulnerable in different ways and are exposed to different hazards with a varied spatial spread; for example, extreme precipitation and earthquakes can trigger landslide and slope failures potentially leading to blockages of road networks. Whilst flooding may submerge roads and damage railway infrastructure. Moreover, multiple hazards can occur at the same time with the potential to interact, such as landslides following flooding caused by heavy rainfall or earthquakes triggering landslides causing landslide dams. Considering this, this work develops a multi-hazard risk assessment framework for transport infrastructure. The methodology integrates a slope stability model based on the infinite slope model and factor of safety analysis to map stability under precipitation and earthquake conditions. Additionally, the Synxflow modelling package is used to simulate landslide runouts and flooding. GIS techniques are then applied in tandem with hazard classification metrics to determine the passability of vehicles along affected roads. Following this, transport network modelling is incorporated to evaluate the impacts on mobility when roads and railways are blocked by floodwater and landslides. This segment of the methodology simulates network disruptions by integrating blockage scenarios into the transport models to determine how transport movement is affected post-hazard events. Through network flow and accessibility analyses, the approach quantifies delays, detours, and overall system resilience, ensuring that the spatial and operational consequences of infrastructure blockages are accurately captured. This comprehensive framework is designed to not only addresses the physical vulnerabilities of transport infrastructure but also translates these into operational impacts, providing a robust tool for planning and resilience enhancement in a changing climate. But also to be scalable and adaptable, allowing for its application in various geographic contexts.

Long-term physical health impacts of disasters: Evidence from the 2006 Yogyakarta earthquake

***Rozana Himaz*[1]**

1University College London

This paper looks at the impact of the 2006 Yogyakarta earthquake on physical health outcomes 18-24 months after the event. The data come from the longitudinal Indonesia Family Life Survey (IFLS) 2000 and 2007, for a sample of over 4400 individuals representing a treatment group (those affected by the earthquake) and a carefully constructed control group (those not affected). Health outcomes are measured using an index capturing long-term health (the Activities of Daily Living (ADL) index), physical pain, chronic illness onset and medication, and ability to take up paid work. These health outcomes are regressed on a variable capturing earthquake destruction (using household asset losses as a proxy), along with a vector of pre-hazard individual and household characteristics. To account for potential endogeneity, we employ instrumental variable analysis. The results indicate that earthquake destruction had large and statistically significant negative impacts on long-term physical functioning. On average, a 100% loss of household assets increased ADL difficulty by 11 percentage points, the number of chronic illnesses diagnosed (such as asthma, tumours, heart disease, depression) by 0.44, the number of medicines taken weekly for such illnesses by 0.49 and limits the amount of paid work that respondents can take up. Moreover, sample attrition due to death in the subsequent round of data collected in 2014 was higher among the treatment group (those that experienced asset damage) compared to the control group. Those from the treatment group who dropped out of the survey since 2007 had significantly worse ADL scores than their counterparts from the control group. Thus the negative physical health impacts of the earthquake persisted even two years later, leading to earlier death in some cases. The work suggests the importance of post-disaster health support beyond the emergency phase.

Drowning in the Margins: Youth-Driven Tech and Community Intelligence in Flood-Resilient Lagos

Muna Okorie[1]

1University College London

As Lagos contends with increasingly severe annual floods—exacerbated by coastal erosion, land subsidence, and rapid urban sprawl—it is often the informal, underserved communities that face the brunt of disaster. Yet, these same communities—particularly their youth—are emerging as critical actors in the city's fight for climate resilience. This presentation explores how grassroots innovation, youth-led digital mapping, and hyperlocal early warning systems are reshaping geo-risk responses in Lagos. Drawing on case studies from Makoko and Ajegunle, it investigates how informal settlements are leveraging low-cost tech (e.g. mobile apps, WhatsApp groups, drone mapping, and open-source GIS) to identify flood-prone zones, coordinate community responses, and hold local authorities accountable. The health and economic toll of recurrent flooding—ranging from outbreaks of waterborne disease to loss of homes, jobs, and educational continuity—reinforces the urgency of inclusive risk strategies. This work argues that resilience in Lagos is not just a matter of infrastructure, but of inclusion—especially the inclusion of tech-savvy, socially engaged youth. The project offers a vision for future geo-risk strategy rooted not in top-down models, but in distributed, people-powered intelligence that can adapt faster than rising waters.

Mapping Landslide Preparedness Risks through Facility Accessibility and Demographic Vulnerability in Cox's Bazar Refugee Camps

Ziyue Shang[1]

1Department of Risk and Disaster Reduction, University College London

The growing frequency and severity of climate-driven geohazards present acute challenges for displaced populations. This study maps landslide preparedness risks within the Cox's Bazar refugee camps by integrating geospatial analysis of terrain hazards, demographic vulnerabilities, and health facility accessibility. Using slope and elevation data combined with population density, shelter heatmaps, and road network density, high-risk zones were identified, notably in Camps 10 and 12 where landslide events have been historically frequent and severe. Demographic analysis reveals a large and increasing refugee population, with a disproportionately high ratio of women and a rapidly expanding youth demographic, amplifying gender-based risks and age-specific vulnerabilities. Spatial assessment of health, education, and evacuation facilities indicates that critical services are unevenly distributed, with significant gaps in proximity to landslide-prone areas. Distance calculations between recorded landslide events and the nearest health facilities demonstrate that current service accessibility is inadequate for timely disaster response. These findings suggest that climatic pressures, demographic concentration in hazardous zones, and infrastructure limitations intersect to undermine resilience. The study argues for targeted interventions that enhance facility accessibility and integrate demographic-specific vulnerabilities into landslide preparedness and risk reduction strategies, contributing to broader discussions on geo-resilience in displaced and climate-affected communities.

SESSION FOUR: Coastal Hazards

Using forward stratigraphic modelling to predict continental-scale coastal response to climate change , experience from Australia and the Baltic

Cedric M. Griffiths[1]

1StrataMod Pty Ltd

Over a period of five years the stratigraphic forward process modelling tool ‘Sedsim’ was used to quantitatively predict changes in sediment erosion and accretion around the entire Australian coastline given three plausible future climate-change scenarios (low-energy, continuation of present-day, and higher energy) at 2000 m resolution from 2005 to 2055. Collaboration with a wide range of interested parties/agencies was essential to provide apprpriate base-line offshore and coastal surface sediment at appropriate resolution as of 2005. Input data included climate (wind speed, current, wave heights and frequencies, temperature, salinity), as well as coastal and estuarine bathymetric profiles. The resultant predicted data sets are in the public domain. This was a world-first use of a fully-integrated continental-scale process model capable of combining coastal subsidence and uplift, clastic and organic sediment movement and vegetation production at high temporal resolution in response to wind, waves, tidal currents, storms, cyclones, sea temperatures, carbonate production, and river flow change. The project identified a need for regional-scale shelfal/coastal sediment mapping to provide the base-line conditions. Subsequent to the Australian project the same modeling system was used to model parts of the southern margin of the Baltic Sea which is extremely vulnerable to coastal inundation. This approach has enabled coastal developers and insurers to make suitable provision for worst-case scenario planning in the Australian coastal margins, and at least one Australian State Government has changed coastal planning regulations as a result of this work. Coastlines, of course, are a function of the energy of the interface, and the enormous financial investment in infrastructure around this interface is at risk (The IPCC (2022) estimates that US$18.3 trillion will be needed for global coastal protection by 2100). This talk discusses the approach used, benefits, limitations, and the results available.

Impact of Groundwater in Compound Flooding: A Case Study of the Conwy Estuary in Wales.

Ankita Bhattacharya[1]

1 British Geological Survey

Compound flooding occurs when multiple flood drivers act concurrently, leading to more severe and complex flood events. Low-lying deltas and estuaries are particularly vulnerable as they face storm surges, high river discharge, intense rainfall, tides, and sea-level rise. Globally, 2.15 billion people reside in near-coastal areas, including 898 million in low-elevation coastal zones. The UK has a long history of estuarine flooding driven by compound events. Despite its importance, the role of groundwater and soil moisture in compound flooding remains under-researched due to its lesser frequency and perceived lower severity. Recent studies highlight coastal aquifers' increasing exposure to flooding, yet few have examined the compound effects of groundwater rise and other flood drivers. This study integrates a coupled catchment and groundwater model using Caesar Lisflood to assess groundwater's influence in compound flooding within the Conwy estuary in North Wales, UK – a flashy catchment with a history of flood events. A notable example ocurred during Storm Ciara in February 2020, where record river levels, intense rainfall, and high storm tides combined to inundate 172 properties. Conwy River drains a 600 km² catchment, receiving 1,700 mm of annual precipitation, with baseflow contributing 27% of total streamflow. The model is calibrated using historical fluvial and tidal data to assess how different drivers influence flood magnitude, timing, and behaviour. The study also examines sensitivity of the estuary to hydrogeological variations by analysing changes in modelled groundwater heads and discharge in response to changes in aquifer properties such as hydraulic conductivity and specific yield.

POSTER ABSTRACTS

Assessing Flood-Driven Geohazards Using UAV Photogrammetry and Machine Learning: Insights from Gravel-Bars of River Sense, Switzerland

Nahin Rezwan[1], *Alex Whittaker[1], David Mair[2], Fritz Schlunegger[2]*

1Imperial College London
2University of Bern, Switzerland

The increasing frequency and severity of extreme hydrological events associated with climate change extreme is expected to amplify geomorphic hazards in alpine river systems significantly, prominently affecting sediment dynamics and riverbed morphology. Understanding the geomorphic response to these events is essential for accurate hazard prediction and effective community resilience planning. This study employs high-resolution unmanned aerial vehicle (UAV) photogrammetry, digital elevation model (DEM) analysis, and machine learning-based grain size characterization to quantitatively assess the morphological impacts of a significant (ca. 100-year recurrence interval) flood event in the River Sense, Switzerland. Using UAV surveys conducted in 2021 and 2024, the DEM of Difference (DoD) method was applied to precisely quantify sediment redistribution patterns and changes in gravel bar morphology. Additionally, high-resolution grain size data (D50, D84, D96) derived from machine learning-based image segmentation provided detailed insights into sediment mobility patterns and threshold conditions for sediment transport. Hourly discharge and water-level data facilitated the calculation of spatially explicit flow depths, bed shear stresses, and Shields parameters, enabling high-resolution calibration of sediment mobilization thresholds at the scale of individual gravel bars. Results indicate marked spatial variability in sediment mobility, linked to variations in local hydrodynamics and sediment grain size characteristics. This study demonstrates that integrating UAV-based remote sensing with paleohydraulic analysis significantly enhances predictive capabilities for flood-related geomorphic hazards. The approach provides robust parameters essential for geohazard assessment, supporting informed decision-making and mitigation strategies in alpine river environments.

The Impact of Landslide Disasters on Public Health Systems in Remote Mountain Areas: Challenges and Responses in the Context of Climate Change

Xiaoyu Gu[1],

1University College London

In recent years, there has been a significant increase in the frequency and intensity of extreme rainfall events, inducing more frequent and severe geological disasters, especially landslides. Remote mountainous areas, due to their complex topography and fragile ecology, are inherently high prone to landslide disasters, which not only damage infrastructure and seriously affect the accessibility and timeliness of healthcare services for residents, but also lead to increased risk of disease spreading, further increasing the pressure on public health. This study aims to explore the pathways of landslide disasters on the public health system in remote mountainous areas in the context of climate change, as well as to assess the vulnerability of the current system and propose improvements. Using a combination of quantitative and qualitative methods, this study firstly analyses the association between rainfall intensity, landslide frequency and the extent of the disaster, and secondly applies GIS to determine the spatial impacts of landslides on access to healthcare services. This study is expected to find that landslides significantly increase the time and cost of access to healthcare services for mountain residents, causing complete or partial disruption of access between multiple settlements and primary health posts. In addition, the deterioration of the health facility infrastructure was highlighted by the shortage of medical supplies and insufficient medical personnel, reflecting a significant decline in the level of health services in the short term after the disaster. This study shows that climate change exacerbates the impact of landslide disasters in mountainous areas on the public health system, severely weakening the accessibility and stability of health services. It is recommended to strengthen the linkage between the health system and the disaster early warning system, and to implement a flexible health service model to improve the resilience of mountain communities.

Building Georesilience: Lessons from Vanuatu's Response to Climate Hazards, a case study of the 2015 Cyclone Pam

***Walter Bishop Zhang*[1], *Yechen Guo*[2]**

1University College London
2Captial Normal University, China

Vanuatu, an island nation in the South Pacific, is highly vulnerable to the impacts of climate change, including tropical cyclones, volcanic activity, and sea level rise. These hazards place immense pressure on the country's ecosystems, infrastructure, and communities, demanding innovative approaches to disaster risk reduction and climate adaptation. This paper explores the concept of georesilience in the context of Vanuatu, focusing on the interdependent relationship between environmental, infrastructural, and community resilience. By analyzing the aftermath of Cyclone Pam (2015), this study highlights how the country's ecosystems, infrastructure, and local communities adapted to and recovered from the disaster. The paper further examines the role of traditional knowledge, modern disaster management strategies, and international cooperation in strengthening Vanuatu's capacity to withstand future climate-related challenges. Ultimately, this paper argues that georesilience—as an integrated, multi-dimensional concept—offers a comprehensive framework for addressing the growing risks posed by climate change in small island states like Vanuatu.

Asking Those Who Feel It: Stories of Mountain Floods and Mental Health Crisis in Gilgit-Baltistan, Pakistan

***Aaliya Aaliya*[1]**

1Duke University

Glacial lake outburst floods (GLOFs) are transboundary mountain hazards resulting from the sudden release of meltwater and sediment retained in a glacial lake. With human-induced climate change, GLOF events have increased in the Gilgit-Baltistan region of the Pakistani Himalayas. In Hassanabad village alone, located in Hunza Valley, four massive GLOF events occurred in the past five years. However, to date, no studies have been conducted to examine how GLOF events impact the mental health of downstream communities. To address this research gap, we conducted a descriptive cross-sectional study in Hassanabad to estimate the prevalence of depression, anxiety, and post-traumatic stress disorder (PTSD) among the residents impacted by past GLOF events. In August 2024, we administered a household survey using the stratified random sampling technique in all six settlements of Hassanabad. The questionnaire instrument comprised GLOF and mental health-related questions. To measure the prevalence of anxiety, depression, and post-traumatic stress disorder, we used self-report measures of the Generalized Anxiety Disorder-7 (GAD-7), the Patient Health Questionnaire-9 (PHQ-9), and the Impact of Event Scale-Revised (IES-R). We surveyed 177 (58%) females and 128 (42%) males between 18 and 60 years (Mean 37.7, SD 12.65). Out of the total surveyed (n=305), 213 (69.84%) witnessed four GLOFs, indicating that a significant number of the respondents experienced GLOF events. The overall prevalence of anxiety, depression, and PTSD in our sample was 15.08% (cut-off score ≥ 10, 95% CI), 15.40% (cut-off score ≥ 10, 95% CI), and 56.60% (cut-off score ≥ 33, 95% CI) indicating mild to severe symptoms among participants. When comparing gender-wise prevalence, women had a higher prevalence of anxiety (PrR=22.03%, 95% CI), depression (PrR=23.72%, 95% CI), and PTSD (PrR=66.24%, 95% CI) than men. The study emphasizes the importance of early identification of mental health issues, the implementation of culturally tailored interventions targeting vulnerable groups, and the allocation of funding for mental health services before and after such hazards. It highlights the need to integrate psychological first aid into existing disaster risk management strategies to ensure prompt access to mental health services following a hazardous event.