International Geomorphology Week 2021

Virtual Round Table organised by the IAG Working Group on Denudation and Environmental Changes in Different Morphoclimatic Zones (DENUCHANGE)

4 March 2021, 15:00-17:00 CET

The DENUCHANGE Virtual Round Table will include public discussions on

- Presented DENUCHANGE field test sites (catchment systems), field activities and measurements at these field sites (selected field test sites will be presented by A.A. Beylich, I. Bollati, D. Li, L. Mao, O.T. Pop);
- The creation of a DENUCHANGE field test site database;
- Planned synthesis papers by A.A. Beylich et al. and J. Gudowicz, M. Mazurek, Z. Zwoliński et al. (SWAT modelling) on drivers of contemporary denudation rates in different morphoclimates including field data and information from DENUCHANGE field sites;
- A planned DENUCHANGE synthesis paper on Denudation, global change and the Anthropocene presented by A. Cendrero, J. Remondo and L. Forte;
- Possible other DENUCHANGE synthesis or review papers prepared by the group.

Detailed information on DENUCHANGE, including working group core members, the working group objective and DENUCHANGE test site fact sheets, can be found at the DENUCHANGE website: http://www.geomorph.org/denuchange-working-group/.

For further information on the DENUCHANGE Round Table and registration for this virtual event please contact Dr. Achim A. Beylich (Chair of DENUCHANGE) before 1 March 2021: achim.beylich@geofieldlab.com

<u>IAG DENUCHANGE Working Group Objective</u> (by November 2018)

The key question of DENUCHANGE is:

What are the contemporary chemical and mechanical denudation rates in different morphoclimatic zones on the Earth?

Denudation, including both chemical and mechanical processes, is of high relevance for Earth surface and landscape development and the transfer of solutes and sediments from headwater systems through main stem of drainage basin systems to the world oceans. Denudation is controlled by a range of environmental drivers and can be significantly affected by anthropogenic activities.

The better understanding of possible effects of ongoing and accelerated environmental changes on present-day denudation requires systematic and quantitative studies (environmental monitoring) on the actual drivers of denudational processes. Only if we have an improved knowledge of drivers and quantitative rates of contemporary denudational hillslope and fluvial processes as well as of the (dis)connectivity in landscapes and between hillslope and fluvial systems across a range of different selected climatic environments, possible effects of global environmental changes on denudation can be better assessed. Special focus will be given to selected morphoclimatic zones that are expected to react particularly sensitively to ongoing and accelerated environmental changes, and the key focus of DENUCHANGE will therefore be on (i) cold regions (including glacierized, glaciated and unglaciated cold climate environments), (ii) temperate regions, (iii) arid / semi-arid regions and (iv) tropical regions. The different morphoclimatic zones are defined by morphometric characteristics/signatures detected in the various zones.

DENUCHANGE will

- Provide a detailed compilation and comparison of contemporary chemical and mechanical (drainage-basin wide) denudation rates in selected and clearly defined drainage basin systems in selected cold regions, temperate regions, arid / semi-arid regions and tropical regions worldwide. As denudation is scale-dependent, the selected drainage basin systems will be of a defined and comparable size to allow direct comparisons between the drainage basin systems situated in the different morphoclimatic zones. The existing/available and compiled data on contemporary chemical and mechanical denudation must be based on comparable sampling periods, sampling frequencies, and on comparable monitoring methods and techniques applied.
- Provide a process-oriented, coordinated and integrated analysis and compilation of the respective key drivers of contemporary denudation occurring under the different present-day morphoclimates.

- Based on the previous two compilations: Address the key question how environmental changes are affecting contemporary denudation rates in different morphoclimates. This also includes human activities in different morphoclimatic zones, in the context of environmental changes in the Anthropocene.

Table 1. IAG DENUCHANGE test site fact sheet A (compiled by A.A. Beylich, revised 23 Oct. 2020)

Parameter	***Information***	***Additional comments (if applicable)***
DENUCHANGE test site (catchment/field site name and country where the test site is located)		
Climatic zone/region		
Responsible investigator (name, postal and e-mail address of contact person)		
Are the requested data for SWAT modelling available (see **Table 2**) (yes/no)? If **yes**, please complete also **Table 2**.		
Period of (field) investigations (years, seasons)		
Geographical coordinates for studied catchment/field site		
Catchment area (km^2)		
Lithology within the catchment area		
Elevation range of catchment (m a.s.l.)		
Topographic relief (m)		
Mean slope angle within the catchment (°)		
Relevant sinks / storage elements within the catchment area (both natural and man-made sinks, e.g. reservoirs)		
Glacier coverage (yes/no); if yes, surface area with glacier cover (% of total catchment surface area)		
Surface area with bedrock surfaces (% of total catchment surface area)		

Surface area with sedimentary covers (% of total catchment surface area)		
Vegetation coverage in surface areas with sedimentary covers (type of vegetation and % of surface area covered by vegetation)		
Permafrost (yes/no); if yes, surface area with permafrost (% of total catchment surface area)		
Is environmental change visible (yes/no); if yes: Type of climatic changes visible; types of land use; Direct human impact (yes/no); if yes, please describe briefly		
Mean annual air temperature (°C)		
Annual precipitation (mm)		
Runoff period		
Runoff regime		
Annual solute yield (atmospherically corrected) ($t\ km^{-2}yr^{-1}$)		
Annual suspended sediment yield ($t\ km^{-2}yr^{-1}$)		
Annual bedload yield ($t\ km^{-2}yr^{-1}$)		
Description of types of data used for quantifying denudation rates; methods and techniques applied or reference(s) to published methods descriptions (methods/techniques used for quantifying fluvial transport and/or yields)		
Most important slope processes within the catchment		
Most important sediment sources for fluvial transport		
Any other relevant catchment information		
Relevant <u>publications</u> and/or <u>sources</u> related to the information/data provided		

Table 2. IAG DENUCHANGE test site fact sheet B: Requested catchment data for SWAT modelling (Table compiled by Joanna Gudowicz, Małgorzata Mazurek and Zbigniew Zwoliński, revised 24 Oct. 2020)

1. Hydrological data: daily discharge and suspended load at the closing point of catchment - based on this data the model will be verified:

NO	
YES	Average daily discharge [m^3 s^{-1}] - time range of measurements: from ..... to ..... Concentration of suspended load [mg dm^{-3}] - time range and frequency of measurements: from ..... to .....; frequency (daily, monthly etc.): ..... Other ..... (e.g. concentration of dissolved load, concentration of bed load, organic nitrogen, organic phosphorus, mineral phosphorus, nitrate, nitrite, ammonium) Yes / No - time range and frequency of measurements: from ..... to .....; frequency (daily, monthly etc.): ..... - time range and frequency of measurements: from ..... to .....; frequency (daily, monthly etc.): ..... ….

2. Meteorological data:

NO	
YES	Sum of precipitation falling during the day [mm]: Yes / No - time range of measurements: ..... Daily minimum temperature [°C]: Yes / No - time range of measurements: ..... Daily maximum temperature [°C]: Yes / No - time range of measurements: ..... Daily average wind speed [m s^{-1}]: Yes / No - time range of measurements: ..... Daily average relative humidity [%]: Yes / No - time range of measurements: ..... Daily total solar radiation [MJ m^{-2}]: Yes / No - time range of measurements: .....

For modeling to be comparable among different catchments, the spatial input data, i.e. DEM, soils, types of land cover and land use should have the same quality. The following questions will help to unify the structure of input data to the model, which will allow comparability of results between catchments:

1. Digital Elevation Model (DEM)

NO	
YES	Data based on: LIDAR / contour map / field measurements / other: ..... Spatial resolution of data: .....

2. Land Cover and Land Use map (LULC)

NO	
YES	Data based on: database / satellite image / aerial photo / topographic map / field measurements / other: ..... Spatial resolution (raster data) or scale of data (vector data): .....

3. Soil map

NO	
YES	Data based on: database / satellite image / aerial photo / thematic map / field measurements / other: ..... Spatial resolution (raster data) or scale of data (vector data): .....

4. Hydrographic network

NO	
YES	Data based on: database / satellite image / aerial photo / topographic map / field measurements / other: ..... Spatial resolution (raster data) or scale of data (vector data): .....