

DYNAgeoZONES Working Group

The IAG Working Group on “DYNAgeoZONES” (Dynamic geodiversity of critical zones in mountain and polar regions) focusses on the accelerated geodiversity change in Critical Zones of mountain and polar regions. In these zones, complex abiotic and biotic interactions exert a dynamic control on the geomorphological landscape, but also determine the availability of geosystem services. Many field areas can expand from the Landform Geodiversity and Critical Zones studies:

- Weathering and denudation processes in mountain and polar Critical Zones and their changes, especially formation of new critical zones in deglaciating areas at the forefront of retreating glaciers, i.e. formation of widespread paraglacial areas;
- Short- and long-term changes in the geodiversity of Critical Zones in mountain and polar regions, comprising the effects of temperature increase, hydrological modifications, permafrost thaw and glacier retreat.

Since impactful socio-economic and cultural consequences can derive from the changes occurring in mountain and polar regions, geodiversity studies can help in assessing of changes in geosystem services and improve awareness on natural risks. Therefore, by means of multitemporal repeatable geomorphological mapping and environmental monitoring at mountain observatories and polar stations, the proposed Working Group aims at improving human perception of geodiversity of these fragile and sensitive environments. Today's challenge is not only to face the consequences of global warming in Critical Zones, but also to rapidly assess geomorphological changes in mountain and polar "dynamic" geodiversity. The aim of the IAG DYNAgeoZONES Working Group will be multiple:

- to cooperate with local communities of mountain and polar regions to raise awareness on geodiversity and geosystem services;
- to build a geomorphological and historical record of changes in mountain and polar landscapes, as part of our cultural and geographical heritage;
- mapping the changes in mountain and polar environments, with a particular focus on the rise or decline or exchange of respectively new and old Critical Zones, to aid both the reconstruction of past geodiversity scenarios and the assessments of future ones.

Past activities:

The IAG/AIG Working Group on “Dynamic geodiversity and Critical Zones in mountain and polar regions” is a logical consequence of previous Working Group on Landform Assessment for Geodiversity. Activities have been performed in agreement with:

- ACZON initiative on Arctic Critical Zones Observation Network by the Terrestrial Working Group (TWG) of the International Arctic Science Committee (IASC);
- UNITA Montium - European Alliance for Mountains - UE H2020 R&I - Geodiversity and Cultural Heritage Group: “EnviCulturAlp: Geodiversity, Climate Change and mountains: past, present and future challenges to local communities’ life and culture”.

Meetings and seminars:

- 2022.03.30: Prof. Marco Giardino and Prof. Zbigniew Zwoliński gave talks at Geodiversity Workshop 3 celebrating the International Geodiversity Day under the title Geodiversity of Europe. Workshop was organized by the Association for Geoconservation in Hong Kong.
- 2022.05.23-27: As part of the IAG Working Group on Landform Assessment for Geodiversity, a virtual session 4.5 Geodiversity and Geosystem Services of Drainage Basins: from Assessment to Enhancement was organized during the European Geoscience Union General assembly in Vienna, during which 10 talks were presented.
- 2022.06.06-09: Several IAG Working Group on Landform Assessment for Geodiversity members presented their talks at the Oxford Geoheritage Virtual Conference in Oxford.
- 2022.09 26-30: the WG chair lead the scientific committee of the 16th European Geoparks Conference held in Verbania (Italy) within the Sesia Val Grande UNESCO Global Geopark. Within the general themes of "Nature, Culture and Sustainability" 4 WG members offered specific contributions on geodiversity of critical zones in mountain regions thus highlighting the holistic approach necessary in responding to climate change, in which geoparks can play a key role.
- 2022.09.12-14: Many IAG Working Group on Landform Assessment for Geodiversity members presented lectures on geodiversity at the in-person session ICG2022-24 - Geoheritage, Cultural Geomorphology and Geotourism, organized during the International Conference on Geomorphology in Coimbra, Portugal; altogether 55 talks.
- 2022.10.06: Many members of the IAG Working Group on Landform Assessment for Geodiversity presented various local and international activities related to the International Day of Geodiversity; among others, Prof. Zbigniew Zwoliński gave lectures on geodiversity during the virtual session organized by UNESCO Global Geopark Świętokrzyski and during the "Contributions of Geomorphologists to the International Geodiversity Day" event. Prof. Marco Giardino lead an hybrid (on line and in person) event at the Rectorate of the University of Torino: "GEOdiversUNITO" to celebrate Geodiversity day under the auspice of UNESCO IGCP.
- 2022.10.25-28: Prof. Zbigniew Zwoliński represented IAG Working Group on Landform Assessment for Geodiversity at the official conference "The First 100 geoheritage sites" organized by the International Union of Geological Sciences in Zumaia, Basque Country.
- 2022.11.27: Prof. Zbigniew Zwoliński presented the lecture "Still life (inanimate nature) and the Sustainable Development Goals" for schools associated with the Polish National Committee for UNESCO.
- 2023:01.11-12: Within the same framework, the WG coordinating members participated in the IASC ACZON Workshop "Towards and Arctic Critical Zone Observation Network" held on 11-12 January 2023, at the National Research Council in Pisa, Italy. This workshop helped to harmonize the efforts to monitor, measure and model the dynamics of the CZ, considering all components (soil, water, microbiota, vegetation, fauna, geodiversity and biodiversity) in a range of different environments.

Forthcoming activities:

- 2023.04.23-28: Our WG will participate to EGU general assembly in Vienna by co-sponsoring Session GM11.3 on "Geodiversity and its relevance for nature conservation, critical zone and land use planning" (<https://meetingorganizer.copernicus.org/EGU23/session/47064>). The aim of this session is to discuss aspects such as: GIS methods to assess and map geodiversity, assessment of

ecosystem services from geodiversity viewpoint, relations between geodiversity and biodiversity; relations between geodiversity and geoheritage, geodiversity and land-use; data on dynamic geodiversity for land-use, land planning and nature conservation.

- 2023.06.22-23, the WG has been invited to the final events of the PhD Programme in Technologies for Cultural Heritage (T4C) started in 2018 thanks to funding from the European Commission (H2020-MSCA-COFUND) and the Compagnia di San Paolo Foundation. Within this interdisciplinary and transdisciplinary programme that involves humanities, digital sciences, physics, biology, chemistry and geology, the WG will present the importance of climatic, environmental and biotic variables for characterizing the Critical Zones and their changes, particularly in relations to the proper management of geodiversity and geoheritage. 2023.09.12-14: session proposal was sent Geoheritage and Geodiversity: present and future challenges during the Regional Conference on Geomorphology in Cappadocia (Turkey).
- Paola Coratza, Antonio Viera and Zbigniew Zwoliński they are preparing a Special Issue on Geomorphology journal with the working title "Geoheritage, Cultural Geomorphology and Geotourism".
- Lucie Kubalíková, Paula Naomi Irapta, Márton Pál, Zbigniew Zwoliński, Paola Coratza, Benjamin van Wyk de Vries are in the process of finishing the publication of a book titled Visages of geodiversity and geoheritage: A multidisciplinary approach to valuing, conserving and managing abiotic nature published in the Lyell Collection by the Geological Society London; altogether 17 chapters.