frontiers | Frontiers in Earth Science

TYPE Editorial
PUBLISHED 21 November 2022
DOI 10.3389/feart.2022.1082090

OPEN ACCESS

EDITED AND REVIEWED BY
Zhenliang Yin,
Northwest Institute of Eco-Environment and Resources (CAS), China

*CORRESPONDENCE
María Fernández-Raga,
maria.raga@unileon.es

SPECIALTY SECTION
This article was submitted to Hydrosphere, a section of the journal Frontiers in Earth Science

RECEIVED 27 October 2022
ACCEPTED 04 November 2022
PUBLISHED 21 November 2022

CITATION
Fernández-Raga M, Kavian A, Yu Y and Rodrigo-Comino J (2022), Editorial: Surface processes and morphodynamics related to climate and human impacts.
Front. Earth Sci. 10:1082090.
doi: 10.3389/feart.2022.1082090

Editorial: Surface processes and morphodynamics related to climate and human impacts

María Fernández-Raga[1]*, Ataollah Kavian[2], Yang Yu[3] and Jesús Rodrigo-Comino[4]

[1]Department of Applied Physics, University of León, León, Spain, [2]Faculty of Natural Resources, Sari Agricultural Sciences and Natural Resources University, Sari, Iran, [3]School of Soil and Water Conservation, Jixian National Forest Ecosystem Research Network Station, CNERN, Beijing Forestry University, Beijing, China, [4]Departamento de Análisis Geográfico Regional y Geografía Física, University of Granada, Granada, Spain

KEYWORDS

Earth surface processes, land degradation, erosion, land sustainability, control measures

Editorial on the Research Topic
Surface processes and morphodynamics related to climate and human impacts

The variation of climate conditions and the rapid increase in human activities such as non-sustainable agricultural or forestry or urban management shape the landscape, sometimes causing negative impacts. Recent scientific literature has been highlighting abundant study cases where Earth's surface morphologies are suffering from exploitation of natural resources (mining, wood, water, etc.), wildfires, or non-controlled urban sprawl. One of the main consequences is an irreparable damage of soil quality. These changes are also affected by an imminent climate change with responses varying dependent on scale, from the pedon to the hillslopes, catchments, or regions. Depending on how fast and intense these modifications of Earth's surface conditions progress, land productivity, water quality, and biomass should be studied.

Due to the unknown dynamics of climate change and the speed with which human population and activities increase, the scientific community is daily seeking new models, designing field measurements, and applying diverse control measures to estimate, quantify, and reduce the possible negative impacts.

Land degradation processes are shaping the Earth's surface, but for scientists, stakeholders, and policymakers it is not a new concept. In this Research Topic, the environmental and dynamic processes that modify the most sensible spheres of the land surface are discussed: bio-, hydro-, and pedospheres. Therefore, it is indispensable that humankind pay attention and raise awareness of the factors, causes, consequences, and possible control measures of soil processes with negative impacts on natural and anthropogenic ecosystems. Moreover, the increasing awareness of the critical role of climate change related to temperature, precipitation patterns, and wind characteristics is discussed. It is demonstrated that climate change could

introduce new trends to the current known surface processes, despite the continuous advances in observational techniques and more comprehensive laboratory and field monitoring programs and application of new models that aim to decipher the interactions between soil, water, and atmosphere. This Research Topic grouped novel investigations, providing a much better understanding of the physical environment and human interventions and new methodologies developed to study erosion using models, sensors, photogrammetry, field research, *in situ* observations, qualitative assessments, etc.

A total of eleven manuscripts have been accepted, including nine studies from China, one on the Tibetan ecosystem, and another one on the Antarctic continent. They aimed to represent the different approaches to erosion, using new techniques and applying novel tools applicable under both natural and human-made processes affected by climatic change. Wang et al. highlighted the determination of the natural processes happening in areas that are likely to determine the fate of terrestrial environments, focusing on the increase in erosion because of the interaction of rainfall intensity and defrosting depth. Their results improved the understanding of the response of freeze/thaw/compound water erosion to hydraulic conditions. Another article explored soil water migration characteristics of two typical vegetation types at the Loess Plateau during seasonal freezing and thawing processes using bare lands (BL) as control plots. It provides a scientific basis for vegetation restoration in arid and semi-arid areas, useful for other countries too. Sun et al. measured the soil water content and mineral composition for 87 different soil profiles distributed along three transects to show that textural layered soils were patchily but extensively distributed throughout a study area in China. Liu et al. demonstrated the combined effects of ridge direction and width on surface runoff and soil losses from hillslopes cultivated with croplands, indicating that ridge direction had significant effects on runoff and sediment yield ($p < 0.05$), although ridge width had no influence. Cross tillage is advised for soil and water conservation on sloping croplands in arid and semi-arid regions of China.

Readers can find two other interesting manuscripts that focused on how the vegetation communities affect aspects such as the redistribution of carbon or the water content, analyzing the influence of micro-dunes in plant adaptation modus considering water-limited environments. Wang et al. used stable isotopes to analyze the variability in water sources of the native species during the growing season in an alpine semi-arid desert on the Qinghai–Tibet Plateau, China. Liang et al., meanwhile, assessed three different environments: naturally regenerating forests (NF), artificial black locust plantation (BP), and a corn field (CK). They found that vegetation restoration of NF slowed migration and homogenized organic carbon distribution.

Other investigations published in this Research Topic were based on the use of robust models to forecast future conditions. For example, Li et al. coupled a model to determine inflow in an ungauged stream and assembled an empirical mode decomposition (EEMD) to group runoff series into several stationary components and a trend. All of them were combined with the long short-term memory (LSTM) model used to build the prediction model for each sub-series. To verify these last two models, Yuan et al. designed the MI method and the Radial Basis Function (RBF) model, which are basics for the decision-making of starting water transfer process, and designed compensation roles of hydrological characteristics and storage capacities of multi-reservoirs to maximize the utilization efficiency of water resources. On the other, Cai et al. in the Datong-Huangshui area, analyzed the composition of the inter-basin water transfer system, and constructed a dispatching rule extraction model including water transfer, water diversion, and water supply rules. In a similar Research Topic, Xu et al. described the main factors influencing the change in temporal stability of soil water content in different seasons such as elevation, root density, and sand content. This allowed the design of scientific guidance for monitoring this hydrological property.

Last but not least, Kreczmer et al. published novel research about the Antarctic continent, in which they identified, mapped, and quantified terrestrial glacial and periglacial landforms developed in front of windy glaciers with the help of digital images and elevation maps elaborated during a UAV BVLOS photogrammetric survey in 2016, Google Earth Pro images from 2006, and maps from 1978/1979.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Acknowledgments

The guest editors would like to express our sincere thanks to all authors who submitted their studies, irrespective of being accepted or not to this particular Research Topic. We also appreciate all reviewers, editors, and the Editor-in-Chief for their continuous assistance in making this Research Topic a success.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note