Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

FOUNDATION SCHOLARSHIP EXAMINATION 2025-26

TR062 Geography and Geoscience

General Paper (Paper 3)

"How did you go bankrupt?"
"Two ways. Gradually, then suddenly".
The Sun Also Rises - E. Hemingway

How does change occur in the Earth system? Is change gradual, or does it happen all at once? How do landscapes evolve through time, and what are the processes that drive these changes?

The concept of uniformitarianism, the idea that the processes we observe on Earth today also took place in the past, is fundamental across the natural sciences. For example, meandering rivers that carve out banks, transport sediments, and deposit floodplains have shaped the Earth's surface throughout our planet's history. In contrast, catastrophism deals with events that we cannot readily observe or which have not taken place in recent memory. These sudden, powerful events, such as tsunamis, asteroid impacts, volcanic eruptions, or catastrophic floods, can wholly reshape landscapes in days or hours.

Uniformitarianism and catastrophism are paradigms through which we classify Earth processes and consider the ways in which the Earth system changes through time. Whether one type of process has greater influence on our natural history, however, is a question of ongoing scientific (and philosophical) debate. What type of event matters more when we consider the natural world and our place within it? Do small, consistent changes win out, or are these overwhelmed by the impact of sudden, violent events? How should we consider 'uniform' or 'catastrophic' events in a time when storms, floods, heatwaves, and droughts once seen as catastrophic rarities are becoming more common? Are humans agents of

uniform change as we alter landscapes for our civilization, or are we catastrophes? Would your interpretation change your view of Earth's future?

The readings below will strengthen your understanding of modern Earth system processes, both 'natural' and 'anthropogenic', and will elucidate how the lens through which we view events - whether uniform or catastrophic - can impact both our interpretations and our responses to these events. You are also welcome to read beyond the papers suggested to further explore points of particular interest for the reader.

Recommended readings:

Naylor, L. A., Spencer, T., Lane, S. N., Darby, S. E., Magilligan, F. J., Macklin, M. G., & Möller, I. (2017). Stormy geomorphology: geomorphic contributions in an age of climate extremes. *Earth Surface Processes and Landforms*, *42*(1). https://doi.org/10.1002/esp.4062

Foulds, SA, Macklin, MG. 2016. A hydrogeomorphic assessment of twenty-first century floods in the UK. Earth Surface Processes and Landforms 41 : 256-270. DOI: 10.1002/esp.3853

Baker, V. R.: The Channeled Scabland: A retrospective, Annu. Rev. Earth Planet. Sci., 37, 393–411, https://doi.org/10.1146/annurev.earth.061008.134726, 2009.

Lamb, M. P. and Fonstad, M. A.: Rapid formation of a modern bedrock canyon by a single flood event, Nature Geosci, 3, 477–481, https://doi.org/10.1038/ngeo894, 2010.

Gupta, S., Collier, J. S., Palmer-Felgate, A., and Potter, G.: Catastrophic flooding origin of shelf valley systems in the English Channel, Nature, 448, 342–345, https://doi.org/10.1038/nature06018, 2007.+

Shuman, B., 2012. Patterns, processes, and impacts of abrupt climate change in a warm world: the past 11,700 years. *Wiley Interdisciplinary Reviews: Climate Change*, *3*(1), pp.19-43.

Legrain, E., Parrenin, F. and Capron, E., 2023. *A gradual change is more likely to have caused the Mid-Pleistocene Transition than an abrupt event, Communications Earth & Environment, 4, 90* [online]

Kemp, L., Xu, C., Depledge, J., Ebi, K.L., Gibbins, G., Kohler, T.A., Rockström, J., Scheffer, M., Schellnhuber, H.J., Steffen, W. and Lenton, T.M., 2022. Climate endgame: Exploring catastrophic climate change scenarios. *Proceedings of the National Academy of Sciences*, *119*(34), p.e2108146119.

Penuelas, J. and Nogué, S., 2023. Catastrophic climate change and the collapse of human societies. *National Science Review*, *10*(6), p.nwad082.

Lewis, S.L. and Maslin, M.A., 2015. Defining the anthropocene. *Nature*, *519*(7542), pp.171-180.

Hooke, R., 2000. On the history of humans as geomorphic agents. *GEOLOGY-BOULDER-*, *28*(9), pp.843-846.

Tierney, J.E., Poulsen, C.J., Montañez, I.P., Bhattacharya, T., Feng, R., Ford, H.L., Hönisch, B., Inglis, G.N., Petersen, S.V., Sagoo, N. and Tabor, C.R., 2020. Past climates inform our future. *science*, *370*(6517), p.eaay3701.