and limited structural complexity, and are characterized by large rock bodies of contrasting density, where landscapes can reasonably be considered to be at steady state. Further work that carefully integrates modelling, geochronologic analysis, geologic study and geomorphic observation is required to continue refining our understanding of the relative importance and complex

interplay of isostatic, tectonic, lithologic, climatic and mantle dynamic phenomena in the topographic evolution of Earth's diverse landscapes.

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THOMAS J. CROWLEY

A broad view of climate history

Over the past few million years, the Earth's climate has oscillated between cold glacial and warm interglacial states. The nature of these climate swings — and the idea of the interactions between solar radiation and the land-sea-air-ice system that govern them — seems incontrovertible. However, it was only a few decades ago that scientists such as Thomas Crowley began working to bring our understanding of these climate fluctuations to the fore. Tom Crowley, it might be said, wrote the book on the subject (*Paleoclimatology* Oxford Univ. Press, 1991). With this book, for which I served as a minor co-author, he aimed to introduce geologists and geographers to climate modelling, and conversely show climate modellers the types and properties of the data available. The book fulfilled its mission.

Tom received his PhD at Brown University, USA, in marine geology under the direction of John Imbrie in 1976. Afterwards, he taught oceanography to sailors on US Navy ships for a few years, and then joined the University of Missouri–St Louis where he taught introductory geology. His seminal book was founded on a series of lectures on palaeoclimatology delivered at the NASA Goddard Space Flight Center in the summer of 1981. As his career took a leap, he summarized his lectures into a review article published in 1983 in the journal *Reviews of Geophysics and Space Physics*. The article explored how changes in atmospheric carbon dioxide concentrations and atmospheric and oceanic circulation were required to explain past climate changes. His scholarship led to his appointment at the US National Science Foundation to help develop a programme to fund palaeoclimate research.

After working for NASA and the private sector, Tom Crowley joined the Department of Oceanography at Texas A&M University as a research scientist and soon after as a full professor (1996–2001). It was during

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this time that he married a fellow climate scientist, Gabi Hegerl, with whom he had two sons, Michael (13) and John (11).

In the following years, he made a broad and very significant contribution to our understanding of the history of Earth's climate, both in the USA and ultimately at the University of Edinburgh in Scotland, from which he retired a few years ago. His retirement did not, however, mark the end of his research: he finished his last paper shortly before his death.

In total, Tom Crowley published more than 100 refereed papers on climate research. He was a man of great integrity, reluctant to publish work he considered marginal. He worked hard and was very dedicated to science. His greatest gift was to see patterns persistent across several different — and often obscure — sources of information. He had a unique combination of creativity and vast but deep knowledge of both the empirical and theoretical bases of climate change. His interests ranged from the deep geological past to the current issues regarding anthropogenic causes of global warming.

He was deeply troubled that society was unable to moderate its desire for near-term growth and acquisition as opposed to preventing or even preparing for serious environmental consequences. In his retirement he frequently wrote criticisms to newspapers for their lack of accuracy or their inconsistency in reporting on matters of climate and environment. He did not write these letters to gain attention for himself; he simply felt it was his responsibility to share his knowledge and express his opinions.

Tom was also a spiritual person — after long periods of hard work, he often took off for a few weeks to be by himself at some remote spot. During his time in the USA, he especially liked to visit the Big Bend Park in West Texas (pictured).

We had been close friends and collaborators for more than thirty years. It was an interesting and complementary partnership venturing into palaeoclimatology together — Tom a marine geologist, learning to be an atmospheric scientist, and myself a theoretical physicist learning to be a climate modeller. Nevertheless, our partnership worked. Our research interests diverged somewhat in later years, but our friendship continued.

Tom Crowley enjoyed good literature, history, movies and sports. During the years we were located near each other, we frequently had lunch, gossiping about friends and colleagues and arguing about science, sports, politics and religion — sometimes to exhaustion, but we always returned the next day to start over. He was a great colleague and friend. I will miss him dearly.

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