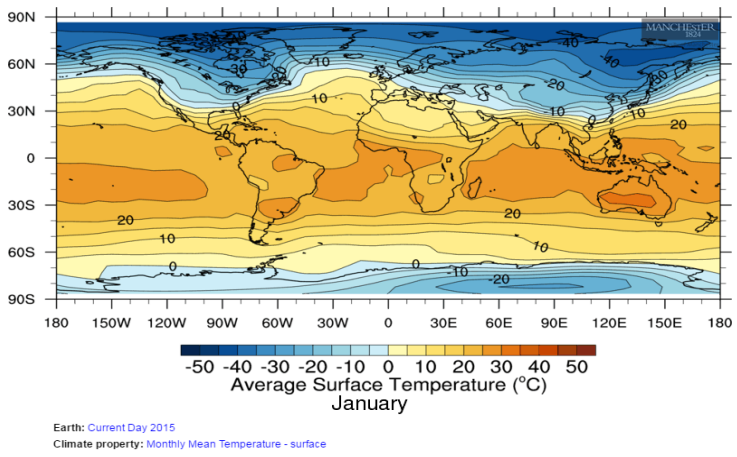
Case Study: N8 HPC and University of Manchester

Build Your Own Earth



Testimonial

"N8 HPC was instrumental in forming the climate model simulations for Build Your Own Earth. We needed computational resources that would be able to produce numerous different simulations of the Earth, and hopefully be able to run these in parallel. The structure of the supercomputer allowed us to easily submit multiple jobs at the same time and have quick results without the lag and queuing problems that would occur with ARCHER. Without N8 HPC, Build Your Own Earth would not be nearly as interesting to explore as there would be far fewer simulations available."

- Dr Jonathan Fairman, University of Manchester

Project

Climate modelling is a crucial measure of how much knowledge we've gained from the past, and how that affects the present, and ultimately our future. As a society we rely heavily on numerical simulations, from civil engineering projects to weather forecasting. Funded by the University of Manchester and NERC, Build Your Own Earth is a web-based climate modelling tool used to visualise climate model output This tool was created with the aim of engaging a broad range of users, from undergraduate Earth Science students to more informal learners. Designing this tool, the team had three specific aims: to inform students that you can make drastic changes to the properties of the Earth and its atmosphere (such as moving the continents around) and the planetary-scale circulation will always retain similar properties, to challenge public perception of Earth being hot and dry during the Mesozoic and to acknowledge the rich patterns that control the local climate.

The team generated 50 preselected Earth simulations and visualised all of the output, ready for the users. Creating Build Your Own Earth was an intense and time conscious project, and by using N8 HPC the team was able to meet their computational demands in terms of speed and size. N8 HPC's speed allowed the team to run FOAM (Fast Ocean Atmosphere Model) with ease so they could generate a large number of climate model simulation that span many years. Additionally, the team were able to include three specific categories: Recent, Ancient and Alien Earths. With the inclusion of these additional categories, the team was able to bridge the gap between the user's own thoughts and imagination with the information provided in textbooks.

Partners

Professor David Schultz – Centre for Atmospheric Science, University of Manchester.

Dr Jonathan Fairman – School of Earth and Environmental Science, University of Manchester.

Impact

The end result was a project that has engaged users in understanding the variables that impact Earth's climate. Build Your Own Earth was designed for educational purposes, and the primary success of this project was the overwhelming majority of undergraduate students (84%) who have found the tool beneficial to their understanding of climate modelling. Furthermore, there have been two published papers that cite Build Your Own Earth in their research. Build Your Own Earth has truly become a multipurpose educational tool, which wouldn't have been possible without the speed or power of N8 HPC.

Success

Without access to N8 HPC, Build Your Own Earth would not have been achievable on the timescale the team was provided with. N8 HPC allowed the team to efficiently run code, which meant that the team could process large numbers of climate model simulations, spanning thousands of years, with ease. The resulting program hasn't just been utilised in a massive open online course (MOOC), but also used to develop interdisciplinary research collaborations. For example, Build Your Own Earth was used to demonstrate cycles in sedimentary deposition in Argentina during the Mesozoic, identified by geologists at Manchester. Build Your Own Earth will continue to develop in the future, pending funding, with more paleoclimate simulations at higher spatial and temporal resolutions. The model output can be found at www.buildyourownearth.com.

MANCHESTER 1824
The University of Manchester

N8 HIGH PERFORMANCE COMPUTING