



Has changed, is changing, will change: Our home the Earth

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HAS CHANGED, IS CHANGING, WILL CHANGE: OUR HOME THE EARTH

Boris Vannière, Graciela Gil-Romera and Sarah Eggleston

Generation Z, or C for change? Most of the faces seen at climate strikes and other international political movements for environmental justice have been those of you – the "Post-Millennials", teenagers and young adults. To provide you with a sound scientific basis for issues concerning current environmental and climate change, we have launched a new PAGES publication, Past Global Changes Horizons, where we have asked scientists from all over the world to explain "global change" to the younger generation, and why it is not merely a hypothesis but rather a reality based on facts. This change can be measured, it needs to be highlighted, and we have to face it. You may consider the following pages as a direct source of information that will help you to defend your voice in the ongoing global change debate. You might also consider the time you take to read these articles as your contribution to slowing down the current climate change!

Right now, the Earth is changing a lot, but let's stop to think: how unique is the change that our planet is experiencing compared to changes in the past? Or even more importantly: what is the role of humans in this global change? The only way to find answers to these questions is by looking back in time. That's what paleoscientists do: travel through time! This isn't done with a time machine like Dr. Who's TARDIS, the Back to the Future DeLorean, or the dark matter holes from Dark or Stranger Things. Instead, paleoscientists travel to Antarctica, caves, deserts, or virtually to super-computing centers, to study ancient societies, explore former landscapes, or look for the reasons for changes in past climate conditions. Their observations allow them to document the long history of the planet that we have inhabited for millennia. All of these observations show that human activities have deeply modified ecosystems and the dynamics of these ecosystems through time.

Like Alice's Adventures in Wonderland, where time runs backwards, and where Alice learns a lot about herself, paleoscientists cross the mirror of time in order to learn from our past to better understand our present and, more importantly, to help inform decisions about how to create a better future. This is one of Past Global Changes' (a.k.a. PAGES) main missions: to understand past changes on Earth and the causes and impacts of these changes in order to explain

the present global changes, and to provide the key knowledge to build a sustainable future. By digging into the Earth's surface, it is possible to learn a lot about the history of the planet. For instance, some PAGES scientists drill into the bottoms of lakes to examine microscopic charcoal particles accumulated in the sediments. This can allow them to calculate how many wildfires occurred at a certain location in the past. Understanding the causes and consequences of these long-gone fires helps to better estimate what might happen in the future.

PAGES research includes all topics in environmental science addressing the past: geology, paleoecology, paleoclimatology, paleogeography, archaeology, and history. The articles in this magazine reflect this, and the topics include life in the desert, micro-organisms in the ocean, pollen grains hidden in mud in lakes, and molecular thermometers in caves. The stories come from all over the world: from some of the coldest regions and some of the warmest, from the deepest parts of the ocean and the shores, from the land and the air. They deal with the history of pollution and present-day Sustainable Development Goals identified by the United Nations. They also explore the long history of human adaptation, because of changes in the climate, and human impacts on the Earth. There are comics and stories with illustrations. Some of the diagrams seem complicated at first, but

sometimes pictures are worth even more than a thousand words: this is the best way for scientists to show what they have measured and what this tells us about the past. More importantly, this collection of articles will give you the facts to tell apart actual science from fake news or non-expert opinions.

Have fun reading this magazine! We hope you enjoy the adventures narrated by our scientists: these are their time-traveling experiences where they describe what they have learned, how this may help them to envision a better future world, and what might be done to help make those dreams come true. Flip through these PAGES, and change how you think about the world. Step into Alice's shoes for a while as you jump through the mirror and turn back the clock. 🕒



Illustration: Alice Favory