Preface
The Anthropocene: Modern and fossil evidence

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With the arrival to South America some 14000 years ago (Goldberg *et al.*, 2016), *Homo sapiens* became a species distributed through all major continental areas of planet Earth. Since then, human populations have thrived and their activities have been increasing in extension and intensity. Although cultural groups have emerged, flourished, and eventually collapsed (*e.g.*, the Maya, Coe 2011), the human imprint has been a constant in the Earth's history through the last few millennia. Thus, the anthropogenic modification of natural processes and landscapes has been a constant in the areas colonized by human groups (*e.g.*, Martínez-Ballesté and Escurra, this issue). Today, the magnitude of the human imprint on the Earth has scaled up to such levels that the term "Anthropocene" has been coined, referring mostly to the geological epoch though which human activities have modified global-scale natural cycles (*e.g.*, geochemical cycles; Killops and Killops, 2013). This special issue devoted to the Anthropocene, defined in the broadest sense of the expression, aims to explore the human imprint on diverse Latin American systems, providing elements to further illustrate the debate on the definition of the temporal scale of this proposed geological epoch. In this sense, it is paramount to take into account studies of diverse temporal scales, to shed light on the split between natural trends and those driven directly or indirectly by human activities.

The evidence that the Earth system has reached a new functioning state induced by human populations is noticeable on virtually every process. One of the most evident changes associated with human activities is the progressive rise of greenhouse gas concentrations in the atmosphere. Although this process has been especially noticeable during the last century, it started thousands of years ago, paralleling the development of ancient civilizations (Ruddiman, 2003). With the discovery and widespread use of fossil fuels, the concentration of greenhouse gases in the atmosphere stared an exponential increase, with more severe effects on the Earth system (IPCC, 2013): increasing global temperature, melting of ice sheets, and rising sea level. It has been estimated that by 2002 between 30 and 50 % of the land surface had been modified by people, mostly for pastures and crops (Crutzen, 2002). The change of land cover has displaced natural flora and fauna favoring species of economic interest, has induced changes in sedimentary patterns through increases of soil erosion, and has caused pollution of soils and water bodies because of the use of use of chemical for improving production (*e.g.*, the use of pesticides; Salazar-Ledezma *et al.*, this issue). Additionally, urban settlements and infrastructure have created barriers for connectivity of ecosystems, altering the natural fluxes of matter and energy (Waters *et al.*, 2016).

The temporal limits between geological epochs have been defined by substantial climate changes, massive extinctions, or shifts in the oceanic patterns, wich are evident in the geological record. These features are characteristic of the last few millennia: climate changes with no precedent in the geological record (*e.g.*, Correa-Metrio *et al.*, 2013), extinction rates up to 1000 times higher than previous periods (Barnosky *et al.*, 2011), and the inclusion of artificial materials in the sedimentary record (*e.g.*, ceramics used by ancient cultures; see Cabadas-Báez, this issue). That these environmental changes have been mostly caused by human activities is not in discussion, but rather the discussion focuses on when the effects of human activities became a significant driver of environmental process at a global scale.

It is recognized that agricultural activities were one of the earliest modes of environmental modification induced by people. The impact of early agriculture can be accurately tracked back using proxies from sedimentary records (*e.g.*, Franco-Gaviria *et al.*, this issue). However, the signal of these activities shows high variability in terms of their timing and intensity (*e.g.*, Acosta *et al.*, Islebe *et al.*, Temoltzin-Loranca *et al.*, and Urrego *et al.*, this issue), preventing their use as universal stratigraphic markers for the proposed epoch. Instead, they have been referred to as pre-Anthropocene or paleo-Anthropocene indicators (Lewis and Maslin, 2015). An additional key moment for the interference of humankind on natural processes was the start of the intercontinental interchange between the Old and New Worlds, around 1500 AD, which caused the dissemination of exotic species and the relative homogenization of cultural practices (*e.g.*, Quintana *et al.*, this issue). More recently, with the Industrial Revolution around 1800 AD, the use of fossil fuels, the industrialization of production, and the growth of the population have intensified the human footprint and increased the speed of environmental changes (*e.g.*, Martínez-Ballesté and Escurra, this issue).

The consensus regarding the temporal base of the Anthropocene is gravitating towards 1950 AD, when the accumulated sum of human activities generated an apparent tipping point of the natural climatic trends. This moment is also marked on the sediments by a sudden peak of radionuclides produced by the nuclear tests carried out during the Cold War. These stratigraphic markers will be observable in the geological record for millions of years (Waters *et al.*, 2016). The designation of a specific temporal base for the Anthropocene can still take some time, not because of lack of agreement among scientists, but because of the social and even legal implications that would result from the recognition of a geological epoch dedicated to the imbalance produced by humanity on the natural system. Meanwhile, it remains of great importance to keep studying the effects of anthropogenic activities at different scales on the natural system to understand or at least document the responses of the environment to the ongoing humankind interventions of the planet.

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