

Collapse of civilisations worldwide defines youngest unit of the Geological Time Scale

The Late Holocene Meghalayan Age, newly-ratified as the most recent unit of the Geologic Time Scale, began at the time when agricultural societies around the world experienced an abrupt and critical mega-drought and cooling 4,200 years ago.

Agriculture-based societies developed in several regions after the end of the last glaciation, but experienced an abrupt and critical mega-drought and cooling around 4200 years ago. This 200-year climatic event affected agricultural societies that formed after the last Ice Age, forcing the collapse of civilizations and migrations and regenerations in Egypt, Greece, Syria, Palestine, Mesopotamia, the Indus Valley, and the Yangtze River Valley. Evidence of this period, now called the 4.2 kiloyear climatic event, has been found on all seven continents.

According to Stan Finney, Professor of Geological Sciences at Long Beach State University and Secretary General of the International Union of Geological Sciences (IUGS), the Maghalayan Age is unique among the many intervals of the Geological Time Scale in that its beginning coincides with a cultural event produced by a global climatic event.

The convergence of stratigraphy and human cultural evolution is extraordinary, according to Professor Martin Head, a geologist at Brock University in Canada and Chair of the International Subcommittee on Quaternary Stratigraphy.

Professor Harvey Weiss, Professor of Environmental Studies and Near Eastern Archaeology at Yale University, considers this decision to be a significant moment in the history of Holocene climate and archaeology science.

The International Commission on Stratigraphy, which is responsible for standardising the Geological Time Scale, approved the definition of the beginning of the youngest unit of the Geological Time Scale based on the timing of this event. Furthermore, it approved proposals for two other ages: the Middle Holocene Northgrippian Age and the Early Holocene Greenlandian Age with beginnings defined at climatic events that happened about 8,300 years and 11,700 years ago, respectively. The three ages comprise the Holocene Epoch, which represents the time since the end of the last Ice Age. The Commission then forwarded these proposals to its parent body, the IUGS, for consideration, and the executive committee of IUGS voted unanimously to ratify them.

Units of the Geological Time Scale are based on sedimentary strata that have accumulated over time and contain within them sediment types, fossils and chemical isotopes that record the passage of time as well as the physical and biological events that produced them.

The three new ages of the Holocene Epoch are represented by a wealth of sediment that accumulated worldwide on the sea floor, on lake bottoms, as glacial ice, and as calcite layers in stalactites and stalagmites. Those sedimentary strata on which the ages are based are referred to as stages, and together these strata comprise the Holocene Series.

The lower boundary of the Greenlandian and Northgrippian stages are defined at specific levels in Greenland ice cores. The lower boundary of the Meghalayan Stage is defined at a specific level in a stalagmite from a cave in northeast India. The ice cores and the stalagmite are now identified as international geostandards, and have been placed in protected archives accessible for further study.

The decision to define these new stages of the Holocene Series and thus the three new corresponding ages of the Holocene Epoch allows for an update to the International Chronostratigraphic Chart (www.stratigraphy.org), which depicts the timeline for the earth's full geologic history.

This is a key achievement for the International Union of Geological Sciences and particularly for its Commission on Stratigraphy, of which Professor Philip Gibbard of the University of Cambridge is Secretary General and participating member. The proposals were developed by a dedicated, international team of Holocene scientists led by Mike Walker of University of Wales. They were subsequently approved by the International Subcommittee of Quaternary Stratigraphy and the International Commission on Stratigraphy before being forward to IUGS for ratification. According to Professor David Harper of Durham University in the United Kingdom and Chair of the International Commission on Stratigraphy, the many years of scientific research and international collaboration followed by intense scrutiny of the proposals as they are evaluated at several levels in the IUGS organization give legitimacy to the new units as global standards

As Secretary General of IUGS, Finney administered the vote involving members of its Executive Committee and released the results today.



4.2 Interval

Figure Caption: Portion of Indian stalagmite that was sectioned and analysed layer by layer, and contains the layers chosen to define the beginning of the Late Holocene Meghalayan Age, 4200 years ago.