

# Newsletter of the Anthropocene Working Group



**Volume 6: Report of activities 2014-15**

**December 2015**

**International Union of Geological Sciences  
International Commission on Stratigraphy**



**Subcommission on Quaternary Stratigraphy**

<http://quaternary.stratigraphy.org/workinggroups/anthropocene/>

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Newsletter edited by Colin Waters and Jan Zalasiewicz.

Thanks to all colleagues who contributed to this Newsletter.

Cover Illustration: Attendees at the Anthropocene Working Group meeting held at the McDonald Institute for Archaeological Research at Cambridge University, Tuesday 24th and Wednesday 25th November 2015. Photograph taken by Cath Neal.

## CHAIRMAN'S COLUMN

Dear all,

Study of the Anthropocene continues apace, both within this group and beyond it, and there seems to be some sense that the concept – at least stratigraphically - is gaining in coherence. This, at least, was the general feeling that emerged from our first 'proper' meeting in October 2014, at and kindly enabled by the Berlin's Haus der Kulturen der Welt, to whom we extend sincere thanks.

The overall consensus that emerged was that the Anthropocene is 'real' as a stratigraphic entity, with a specific identity in geological process, reflected in distinctive proxy indicators in recent strata. Although its roots extend back many thousands of years (back, indeed, into the Pleistocene Epoch) it seems most globally well-marked from the mid-20th century, and is indeed sufficiently well-marked, and sufficiently different from Holocene proxy signatures to remain consistent with the case for formalization at epoch level (although, of course, this decision is not ours to take, but that of bodies above us within the hierarchical structure of the ICS).

Subsequent studies during the year, conducted by our normal modus operandi via lively email discussions, in general strengthened this consensus view. These included studies of the 'Great Acceleration' graphs, now published in updated form, of the biosphere, of plastics (in a paper in submission), of the archaeological evidence (at a meeting hosted by the McDonald Institute in Cambridge in November 2015) and so on. This evidence is being summarized for a paper to be published (in the journal *Science*) in early 2016. However, these general points represent a consensus, rather than a unanimous declaration, and so other possibilities (including a possible 'early Anthropocene' boundary) are being examined with equal seriousness.

Meanwhile, work has begun on the summary book detailing the evidence gathered to date, to be published by Cambridge University Press.

All this work, and other studies (both within and outside the AWG) will be debated in an AWG meeting (only our third meeting, in person), kindly hosted by and sponsored the Fridtjof Nansen Institute in Oslo, Norway in April 2016. Here, we hope to develop the interim summary of evidence and preliminary recommendations to the SQS that we had said, some years ago, that we will provide by mid-2016, for the International Geological Congress in Cape Town, regarding potential formalization of the Anthropocene on the Geological Time Scale.

So far, so good. However, once that first, rapid phase of work is done, that will not leave our exploration of the Anthropocene in a wholly finished state. The CUP book, for instance, is unlikely to be published by mid-2016, and will need steering through the various writing and editing stages. We will not by then

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have mature and exhaustively researched GSSP candidates for the Anthropocene – that is a task that demands some more time – and also some resources in the form of funding for the sampling and analyses involved. Most importantly, the Anthropocene is still a young concept, with much to develop both in its ‘narrow’ stratigraphic analysis and as regards its wider relationships with other studies and other communities.

We must, therefore, determine, what is to become of us post-2016. Should we disband, or should we stay together as a body (officially or unofficially) to continue to pursue our study of the Anthropocene (perhaps within a different framework, and with a different Chair)? Given that we have developed something of a positive and productive spirit, my feeling is that it would be good to carry on this work in some way. However, this is very much a collective enterprise, with collective decision-making. So ideas welcome!

Jan Zalasiewicz

## INAUGURAL ANTHROPOCENE WORKING GROUP MEETING

The inaugural meeting, kindly hosted and financially supported by Haus der Kulturen der Welt (HKW), Berlin, was held on Thursday 16th October 2014, followed by an Anthropocene Forum on the Friday and a field trip and subsequent face-to-face exchanges on the Saturday. The complete programme of “The Anthropocene Project. A Report” for which this meeting represented a constituent is available at:

[http://issuu.com/hkwberlin/docs/anthropoceneproject\\_areport\\_booklet?e=0/9566398](http://issuu.com/hkwberlin/docs/anthropoceneproject_areport_booklet?e=0/9566398) This is a brief summary of the event.

### **Thursday 16th October 2014**

**1. Introductions- process of ratification and schedule for the meeting by Chair**

*Key questions identified by the International Commission on Stratigraphy*

- 2. Is there a well-documented and significant stratigraphic record for the ‘Anthropocene’ on which to base its recognition worldwide and to define a boundary with underlying Holocene strata?**
- 3. Should the base of the ‘Anthropocene’ be defined using a physical reference section (‘golden spike’ or GSSP) or instead should its beginning be defined in terms of a numerical date (GSSA)?**
- 4. Is the ‘Anthropocene’ a unit of Earth history or human history?**
- 5. What is the usefulness of the ‘Anthropocene’ as a time unit and a material unit to be visualized by geoscientists and other interested communities?**
- 6. What is the relative value of formalizing the ‘Anthropocene’ chronostratigraphic/geochronological unit as opposed to leaving it as an informal term?**

*Discussion on hierarchy and when the Anthropocene should begin*

- 7. Should it be defined as an Epoch or Age?**
- 8. “Early Anthropocene” option linked with agricultural developments**
- 9. “Industrial Revolution” option**
- 10. Mid 20<sup>th</sup> Century option linked with “Great Acceleration”**
- 11. A future option for the start of the Anthropocene**
- 12. Summary of discussions**
- 13. Where do we go from here? Progress towards providing consensus views (or summaries of contrasting views) on the Anthropocene by the AWG**

Attendance at Opening Ceremony

### **Friday 17th October 2014**

Human Impacts and Their Consequences: An open forum on the occasion of

the first meeting of the Anthropocene Working Group

Welcome & Introduction (Bernd Scherer)

**Part 1:** Three cases/proposals for potential stratigraphical basis for the Anthropocene, showing scope and breadth of evidence for the Anthropocene and putting it into geohistoric perspective (Moderation: Jan Zalasiewicz)

- *Colin Waters: Evidence for a mid-twentieth century boundary for the start of the Anthropocene*

Can a radionuclide layer associated with atomic weapons testing be used as a key signature that defines the onset of the Anthropocene? This event broadly coincides with the “Great Acceleration”, a pronounced and sharp threshold in human modification of the global environment. It is associated with expansion of the urban environment, development and dispersal of novel minerals and artefacts and changes in agricultural practices, both with resultant distinctive chemical signatures, increased incursion into the marine and subsurface realms, and ‘globalization’ of trade and the related spread of exotic species.

- *Matt Edgeworth & Dan Richter: The archaeosphere and Earth's Critical Zone in a time-transgressive Anthropocene*
- *Mark Williams: Will human-induced planetary change rank with fundamental step changes seen in the Earth's deep history?*

**Part 2:** Three cases directly linking scientific evidence to implications “on the ground”: (Moderation: Colin Waters)

- *Mike Ellis: Connecting climate change and the Anthropocene*

The connection between climate change and the Anthropocene is easy to recognize in one direction: humans and the human process are the cause of the accumulation of CO<sub>2</sub> in the atmosphere and ocean, and in turn, increased levels of CO<sub>2</sub> are leading to a changing climate. The other direction is less obvious: is there a connection – a signal – of climate change in the evidence base for the Anthropocene? After all, the modern climate has barely increased in its mean temperature by close to 1 °C. This lecture will provide some connective tissue between the two, highlighting both the physical signals of climate change within the Anthropocene and the human-process signals.

- *James Syvitski: Changes in fluvial systems, river sediments and deltas*

Momentum is building to officially declare the Anthropocene a new geological epoch. Humans are changing the Earth's biophysical system — atmospheric and ocean climatology and chemistry, extent of snow cover, permafrost and sea-ice, glacier, ice-sheet and ocean volume, and indeed the hydrological cycle. Striking is the extent and rate at which humans have modified Earth's land surface. Humans are now the largest force in the movement of sediment — greater than ice, wind and water. We have scarred the Earth's surface with millions of abandoned mines throughout the world. We globally mine 8 to 9 Gt/y of coal, and global aggregate

production is 13 Gt/y. Together these two mining activities greatly exceeds the total sediment delivery to the global ocean by all of Earth's rivers. Global hydraulic cement production is 2.2 Gt/y, and global iron ore production is 2.2 Gt/y. The Palm Islands of Dubai required 3 Gt of sand; the Hong Kong airport island required 0.6 Gt of sediment. The Great Wall of China is ~6,250,000m x 7m x 5m or ~0.4 Gt of bricks & stone.

**Session 2: Consequences (Moderation: Bernd Scherer and Jan Zalasiewicz)**

Discussing the quality and magnitude of the shift posed by the Anthropocene, critical assessment of (science-)political solution pathways and a research agenda beyond sustainability, linking scientific practice with societal relevance and local to global strategies of knowledge production

- Andrew Revkin (Pace University, dot.earth blog, Future Earth IC): social debates
- Joyeeta Gupta (Vrije Universiteit Amsterdam): environmental law and politics
- Naomi Oreskes (Harvard University): limits of scientific engagement, political gridlock
- Klaus Töpfer tbc (Institute for Advanced Sustainability Studies): political leeways
- Jürgen Renn (MPIWG Berlin) – envisioning an adequate research architecture

Press Luncheon

**Saturday 18th October**

- *Field Excursion*
1. Man-made geology. Teufelsberg, hiking. Excursion led by Christian Schwägerl (Anthropocene project board member)
  2. Dahlem - birthplace of Anthropocene-related technologies (nuclear fission, Haber-Bosch process and others). Dahlem Max Planck Institutes, talk. Excursion led by Tom Werner from Max Planck Society, short introduction by Christian Schwägerl (Author "The Anthropocene", board member)
  3. Tempelhof Airfield: a prime site for urban nature and participatory decision- making. Excursion led by Tilmann Heuser, managing director of Friends of the Earth Berlin and coordinator for future use of the airfield appointed by Berlin government, introduction by Christian Schwägerl.

- *Exchanges*

Exchanges initiates a set of dialogues between members of the Anthropocene Working Group and social scientists, thinkers, and artists, a serial thread of conversations that draws from a vast range of expertises, disciplines, and practices. Its aim is to reflect on the “what” and “how” of knowledge-articulation in the world, taking the material Earth and its combined history with the “human” as a starting point and combining it with an idea of the academic as a concerned

citizen. Each dialogue addresses the concrete range of hands-on practices that emerge from epistemic infrastructures and worldviews in place, hence engaging with research methods in the lab or field, at the desk or in the studio. These dialogues ask how such varied practitioners from the sciences, humanities, arts, and activism make use of their “everyday” matters, how their diverse practices are affected and what they effect. What informs their concepts and what are the differences in their respective terminologies? How do these undergo transformation in their encounters with other knowledge-forms? And how can such movements of flux between and across specificities of expertise configure possible pathways for reestablishing modes of collaboration?

Participants:

Naomi Oreskes and Colin P. Summerhayes: Petrogeology and Denial

Peter K. Haff and Erich Hörl: Technosphere and Technoecology

Simon Price and Etienne Turpin: Stratigraphy and Urbanism

Joyeeta Gupta and Davor Vidas: Water and Law

Geoffrey Bowker and Irka Hajdas: Geoarchive and Laboratory

## **SECOND ANTHROPOCENE WORKING GROUP MEETING**

The second meeting, kindly hosted and financially supported by McDonald Institute for Archaeological Research at Cambridge University, was held on Tuesday 24th and Wednesday 25th November 2015. This provided the opportunity for group members to interact with a wide audience of archaeologists and to learn of work being carried out by the institute.

### **Tuesday 24th November 2015**

1. Introductions- from representatives of McDonald Institute and AWG and outline of schedule for the meeting

*Simon Stoddart, Jan Zalasiewicz, Matt Edgeworth*

2. Summary of main issues and themes of Anthropocene debate Chair: *Jan Zalasiewicz*

*Colin Waters*

3. Comparison between chronostratigraphic and archaeological approaches to dating. Outline of GSSP/GSSAs. Synchrony/diachrony. Time-transgressive period boundaries (e.g. start of Neolithic/ Iron Age, etc) Chair: *Matt Edgeworth*

*Jan Zalasiewicz*

4. Comparison between how geologists map artificial ground and archaeologists also deal with the same interval as part of the archaeological record, and discussion on soils and landscapes/anthromes Chair: *Jan Zalasiewicz*

*Colin Waters, Matt Edgeworth, Erle Ellis, Rory Flood, Craig Cessford*



5. Artefacts and novel materials. Charting the first appearances and spread of novel materials (from pottery and glass to concrete and plastics) in the stratigraphic record. Their potential use as stratigraphic markers. Chair: *Jan Zalasiewicz*

*Colin Waters, Matt Edgeworth, Mark Williams*

### **Wednesday 25th November 2015**

6. Changes to biota (humanly-induced). Extinction of species, domestication of species, development of agriculture. Chair: *Jan Zalasiewicz*

*Jeremy Bennett, Marc van der Linden, Tracy Rogers*

7. Early Anthropocene geochemical signatures

*Ian Fairchild, Michael Wagemann, Robyn Veal, Alex Wolfe, Martin Jones*

8. Summary of discussions and where do we go from here *Jan Zalasiewicz*

## **SELECTED PUBLICATIONS**

The Working Group has published or has in press the following:

- 1) When did the Anthropocene begin? A mid-twentieth century boundary level is stratigraphically optimal (2015): Jan Zalasiewicz, Colin N. Waters, Mark Williams, Anthony D. Barnosky, Alejandro Cearreta, Paul Crutzen, Erle Ellis, Michael A Ellis, Ian J Fairchild, Jacques Grinevald, Peter K Haff, Irka Hajdas, Reinhold Leinfelder, John McNeill, Eric O Odada, Clément Poirier, Daniel Richter, Will Steffen, Colin Summerhayes, James P M Syvitski, Davor Vidas, Michael Wagemann, Scott L. Wing, Alexander P. Wolfe and An Zhisheng. *Quaternary International*, **383**, 196-203.
- 2) Diachronous beginnings of the Anthropocene: The lower bounding surface of anthropogenic deposits: Matt Edgeworth, Daniel deB. Richter, Colin N. Waters, Peter Haff, Cath Neal and Simon J. Price. *Anthropocene Review* 2 (1), 1-26 DOI: [10.1177/2053019614565394](https://doi.org/10.1177/2053019614565394).
- 3) Colonization of the Americas, 'Little Ice Age' climate, and bomb-produced carbon: Their role in defining the Anthropocene (2015): Jan Zalasiewicz, Colin Waters, Anthony D Barnosky, Alejandro Cearreta, Matt Edgeworth, Erle C Ellis, Agnieszka Gałuszka, Philip L Gibbard, Jacques Grinevald, Irka Hajdas, Juliana Ivar do Sul, Catherine Jeandel, Reinhold Leinfelder, John R McNeill, Clément Poirier, Andrew Revkin, Daniel deB Richter, Will Steffen, Colin Summerhayes, James PM Syvitski, Davor Vidas, Michael Wagemann, Mark Williams and Alexander P Wolfe. *Anthropocene Review*, 2(2) 117-127.
- 4) . Can nuclear weapons fallout mark the beginning of the Anthropocene Epoch? (2015) Waters, C.N., Syvitski, J.P.M., Gałuszka, A., Hancock, G.J., Zalasiewicz, J., Cearreta, A., Grinevald, J., McNeill, J.R., Summerhayes, C. and Barnosky, A. *Bulletin of the Atomic Scientists*, 71(3), 46-57.
- 5) The Anthropocene is functionally and stratigraphically distinct from the Holocene (2016). Colin N. Waters, Jan Zalasiewicz, Colin Summerhayes, Anthony D. Barnosky, Clément Poirier, Agnieszka Gałuszka, Alejandro Cearreta, Matt Edgeworth, Erle C. Ellis, Michael Ellis, Catherine Jeandel,

- Reinhold Leinfelder, J.R. McNeill, Daniel deB. Richter, Will Steffen, James Syvitski, Davor Vidas, Michael Wagreich, Mark Williams, An Zhisheng, Jacques Grinevald, Eric Odada, Naomi Oreskes and Alexander P. Wolfe. *Science* 351 issue 6269, 137. <http://dx.doi.org/10.1126/science.aad2622>
- 6) The geological cycle of plastics and their use as a stratigraphic indicator of the Anthropocene. (2016). Jan Zalasiewicz; Colin N Waters; Juliana Ivar do Sul; Patricia L Corcoran; Anthony D Barnosky; Alejandro Cearreta; Matt Edgeworth; Agnieszka Galuszka; Catherine Jeandel; Reinhold Leinfelder; John R McNeill; Will Steffen; Colin Summerhayes; Michael Wagreich; Mark Williams; Alexander P Wolfe; Yasmin Yonan. *Anthropocene*. <http://dx.doi.org/10.1016/j.ancene.2016.01.002>
- 7) The Anthropocene: a conspicuous stratigraphical signal of anthropogenic changes in production and consumption across the biosphere (2016). Mark Williams, Jan Zalasiewicz, Colin N Waters, Matt Edgeworth, Carys Bennett, Anthony D Barnosky, Erle C Ellis, Michael A Ellis, Alejandro Cearreta, PK Haff, Juliana A Ivar do Sul, Reinhold Leinfelder, JR McNeill, Eric Odada, Naomi Oreskes, Daniel deB Richter, Will Steffen, Colin Summerhayes, James P Syvitski, Davor Vidas, Michael Wagreich, Scott L Wing, Alexander Wolfe, An Zhisheng. *Earth's Future*.

Additional relevant publications by members of the working group include:

- Benito, X.; Trobajo, R.; Ibáñez, C.; **Cearreta, A.** & Brunet, M. (2015). Benthic foraminifera as indicators of habitat change in anthropogenically impacted coastal wetlands of the Ebro Delta (NE Iberian Peninsula). *Marine Pollution Bulletin*, 101: 163-173.
- **Cearreta, A.** (2015). La definición geológica del Antropoceno según el Anthropocene Working Group (AWG) (Geological definition of the Anthropocene based on the Anthropocene Working Group publications). *Enseñanza de las Ciencias de la Tierra*, 23.
- **Cearreta, A.** (2015). Los depósitos cuaternarios del (propuesto) Global Geosite Uribe Kosta (Bizkaia) y la cuestión del límite Holoceno-Antropoceno (Quaternary deposits of the proposed Global Geosite Uribe Kosta (Bizkaia) and the question of the Holocene-Anthropocene boundary). In: Hilario, A.; Mendia, M.; Monge, M.; Vegas, J. & Belmonte, A. (Eds.), *Patrimonio Geológico y Geoparques, avances de un camino para todos. Cuadernos del Museo Geominero*, 18: 37-42, Instituto Geológico y Minero de España, Madrid.
- García-Artola, A.; **Cearreta, A.** & Leorri, E. (2015). Relative sea-level changes in the Basque coast (northern Spain, Bay of Biscay) during the Holocene and Anthropocene: the Urdaibai estuary case. *Quaternary International*, 364: 172-180.
- Irabien, M.J.; García-Artola, A.; **Cearreta, A.** & Leorri, E. (2015). Chemostratigraphic and lithostratigraphic signatures of the Anthropocene in estuarine areas from the eastern Cantabrian coast (N. Spain). *Quaternary International*, 364: 196-205.
- **A Galuszka** and ZM Migaszewski (2015). Sediments of the Anthropocene. Reference Module in Earth Systems and Environmental Sciences <http://dx.doi.org/10.1016/B978-0-12-409548-9.09476-8>

- **Daniel deB Richter**, Allan R Bacon, Zachary Brecheisen and Megan L Mobley. Soil in the Anthropocene. IOP Conf. Series: Earth and Environmental Science 25 (2015) 012010 doi:10.1088/1755-1315/25/1/012010.
- **Edgeworth, M., Waters, C., Zalasiewicz, J.** and Stoddart, S. 2016. Second Anthropocene Working Group Meeting (Conference Report). *The European Archaeologist* 47, Winter 2015/2016. Available online at: [http://e-a-a.org/TEA/cr2\\_47.pdf](http://e-a-a.org/TEA/cr2_47.pdf)
- **C. P. Summerhayes**, *Earth's Climate Evolution* (Wiley/Blackwell, 2015) 390pp.
- **Davor Vidas**, Ole Kristian Fauchald, Øystein Jensen, Morten Walløe Tvedt 2015. International Law for the Anthropocene? Shifting perspectives in regulation of the oceans, environment and genetic resources. *Anthropocene*, 9, 1-15. doi:10.1016/j.ancene.2015.06.003
- **Williams, M., Zalasiewicz, J., Haff, P.K.**, Schwägerl, C., **Barnosky, A.D.** and **Ellis, E.C.** 2015. The Anthropocene biosphere. *The Anthropocene Review* doi: 10.1177/2053019615591020.
- **Williams, M., Zalasiewicz, J.**, Davies, N., Mazzini, I., Goiran, J-P, Kane, S. 2015. Humans as the third evolutionary stage of biosphere engineering of rivers. *Anthropocene* <http://dx.doi.org/10.1016/j.ancene.2015.03.003>
- **Zalasiewicz, J., Williams, M., Waters, C.N., Barnosky, A.D. and Haff, P.** 2014. The technofossil records of humans. *Anthropocene Review*, Vol. 1 (1), 34-43.
- **Zalasiewicz, J., Waters, C.N., and Williams, M. 2014.** Human bioturbation, and the subterranean landscape of the Anthropocene. *Anthropocene*, Vol. 6, 3-9. DOI: 10.1016/j.ancene.2014.07.002. Available online 24 July 2014.
- **J. Zalasiewicz, and M. Williams**, Climate Change through Earth's History, in: T.M. Letcher (Ed.), *Climate Change: Observed Impacts on Planet Earth*, Elsevier, 2016, pp. 3–17.
- **Mark Williams, Jan Zalasiewicz and Colin Waters** (submitted). The Anthropocene: a geological perspective. In: *Preconditions for Peaceful Coexistence in the Anthropocene*.
- **Williams, M., Zalasiewicz, J. and Waters, C.N.** (submitted). The Anthropocene: a geological perspective. Book part of *Routledge Series on Transnational Law and Governance*.
- **Zalasiewicz, J, Williams, M, Waters, C N., Barnosky, A.D. and Haff, P.** In press. *Anthropocene. Origins.* (OUP).
- **Zalasiewicz, J and Waters, C N.** *The Anthropocene.* In press. Oxford Research Encyclopedia of Environmental Science.
- **Zalasiewicz, J., Williams, M. and Waters, C N.** In press. *Anthropocene.* Keywords in the Study of Environment and Culture (edited by Joni Adamson, William A. Gleason, and David N. Pellow). NYU Press.
- **Jan Zalasiewicz, Mark Williams, Colin N. Waters, Antony D. Barnosky, Peter Haff, John Palmesino, Ann-Sofi Rönnskog, Matt Edgeworth & Cath Neal** (submitted). Scale and diversity of the physical Technosphere: a geological perspective.

Cambridge University Press have agreed to publish a book on the Anthropocene (Editors/compiler are Jan Zalasiewicz, Colin Waters, Mark Williams). This book

will be written and compiled by members of the Anthropocene Working Group. The book will provide a summary of the evidence of the Anthropocene assembled to date, much published or research underway by members of the Working Group, but summarizing also the growing body of wider Anthropocene literature. In effect, it will form the basis for the AWG's submission to the ICS, together with its recommendations regarding whether or not the Anthropocene is geologically 'real', whether or not it should be formalized, and how it might be characterized and defined.

Given this very broad interest in and concern about the topic, this book, while rigorously laying out technical geological evidence, will not be a collection of separate, individually- to multi-authored papers on the different aspects of the Anthropocene. Rather, it is designed also to be coherent and accessible to the anticipated wide audience.

Therefore, the rigorously presented stratigraphic evidence will be presented in a manner accessible to people from a broad range of educated backgrounds. The level will be generally that of the more journalistic or general review sections of *Nature* or *Science* (i.e. the sections preceding the detailed technical papers), and the introductory parts of the book will provide any necessary introductions to stratigraphical principles and methodology (such as how older units in the Geological Time Scale are analysed and assessed).

The wide readership we expect will include teachers seeking material to put into their courses (there are now an increasing numbers of university modules, across the disciplines, that include – or even focus on – the Anthropocene), and it will be accessible to students taking those courses too.

We estimate a length of the order of 250 pages, including diagrams and photographs.

## CONFERENCES

- Presentations at the STRATI 2015 meeting at Graz on 20<sup>th</sup> July 2015; a). on the evidence for epoch status of the Anthropocene by *Colin Waters* and b) an Early Anthropocene mining stratigraphic marker by *Michael Wagreich*.
- Session at XIX INQUA Congress: Quaternary Perspectives on Climate Change, Natural Hazards and Civilization 27 July - 2 August, 2015, in Nagoya, Japan.
- Anthropozän Ein Neues Erdzeitalter? 7 December 2015, Vienna. Presentation by *Michael Wagreich*.
- AGU sessions on 14<sup>th</sup> December 2015 a) "Nature and humans, economics and law, micromotivators and macrobehaviors, the Anthropocene and the technosphere: How are we doing at putting it all together?" b) GC14B: Dating the Anthropocene: Early Land Use and Earth System Change II. Erle Ellis has a blog post describing the early land use session at AGU: <http://ecotope.org/blog/what-time-is-it-early-anthropocene-research-straw-poll-theagu/>

- The 15<sup>th</sup> Congress of French sedimentologists held on 13-15 October 2015 with a special Anthropocene symposium <http://asf2015.sciencesconf.org/resource/page/id/44#symposium2> .
- “Strata: art and science collaborations in the Anthropocene” is a symposium held at Aberystwyth University Arts Centre on Friday 15th January.

*Specific presentations:*

- Benito, X.; Cearreta, A.; Trobajo, R. & Ibáñez, C., Natural and anthropogenic changes in a Mediterranean delta as reconstructed from benthic foraminiferal assemblages, 2015 Aquatic Sciences Meeting, Granada (E), 22-27 February 2015.
- Benito, X.; Cearreta, A.; Trobajo, R.; Brunet, M. & Ibáñez, C., Natural and anthropogenic changes in a Mediterranean delta as reconstructed from benthic foraminiferal assemblages, International Symposium CLIMATE-ES 2015, Tortosa (E), 11-13 March 2015.
- García-Artola, A., Cearreta, A., Horton, B.P., Salt marshes and sea-level rise adaptation in N. Spain, 2015 Amtrak Club Meeting, Newark (USA), 14-16 May 2015.
- Cearreta, A., El Anthropocene Working Group y la definición geológica del Antropoceno (The Anthropocene Working Group and the geological definition of the Anthropocene), 14th Spanish Meeting on Quaternary, Granada (E), 30 June-02 July 2015.
- Irabien, M.J.; Cearreta, A. & García-Artola, A., El Antropoceno en el Cantábrico oriental: Quimioestratigrafía isotópica del plomo en sedimentos estuarinos (The Anthropocene in the Eastern Cantabrian coast: Pb isotopic chemostratigraphy in estuarine sediments), 14th Spanish Meeting on Quaternary, Granada (E), 30 June-02 July 2015.
- Benito, X.; Cearreta, A.; Trobajo, R.; Brunet, M. & Ibáñez, C., Natural and anthropogenic changes in a Mediterranean delta using benthic foraminifera, ECSA 55-Estuarines and coastal areas in a rapidly changing world, Londres (UK), 06-09 September 2015.
- Cearreta, A.; Irabien, M.J. & López, I., Regeneración ambiental durante el Antropoceno: ¿Una nueva página en la historia de la Ría de Bilbao? (Environmental regeneration during the Anthropocene: A new page in the history of the Bilbao estuary?), 8th Symposium on the Iberian Atlantic Margin, Málaga (E), 21-23 September 2015.
- Cearreta, A., Registro del nivel marino desde hace décadas, siglos y milenios: el archivo geológico de la costa vasca (Sea-level record at decades, centuries and millennia: the geological archive of the Basque coast), Uhinak-I Spanish-French Meeting on Climate Change and the Coastal Area, Irun (E), 6-7 October 2015.
- A thematic session devoted to the Anthropocene geological record was included in the 14th Spanish Meeting on Quaternary held in Granada (E), 30 June-02 July 2015. This session organised by A. Cearreta and J. Remondo had place on 2 July and 6 different oral communications were presented:
- El Anthropocene Working Group y la Definición Geológica del Antropoceno (The Anthropocene Working Group and the geological definition of the Anthropocene), by Cearreta, A.

- The Great Acceleration, Intensification of Geomorphic Hazards and the Starting Point of the Anthropocene, by Forte, L.M.; Hurtado, M.A.; Bruschi, V.; Bonachea, J.; Remondo, J.; Gomez-Arozamena, J.; da Silva, M.; Cavallotto, J.L.; Dantas-Ferreira, M.; Pejon, O.J.; Zuquette, L.V. & Cendrero, A.
- El Antropoceno en el Cantabrico Oriental: Quimioestratigrafía Isotópica del Plomo en Sedimentos Estuarinos (The Anthropocene in the Eastern Cantabrian coast: Pb isotopic chemostratigraphy in estuarine sediments), by Irabien, M.J.; Cearreta, A. & Garcia-Artola, A.
- Evidencias del Antropoceno en el Cantábrico Oriental (Anthropocene evidences in the eastern Cantabrian area), by Remondo, J.; Bonachea, J.; Rivas, V.; Bruschi, V.; Gomez-Arozamena, J.; Gonzalez-Diez, A.; Diaz De Teran, J.R. & Cendrero, A.
- Datación e Interpretación de la Sedimentación Reciente en Estuarios mediante la Técnica de  $^{210}\text{Pb}$  en exceso (Dating and interpretation of the recent estuarine sedimentation using excess  $\text{Pb}^{210}$ ), by Alonso, M.; Remondo, J.; Bonachea, J.; Fuffa, E.; Mananes, A. & Cendrero, A.
- The Anthropocene in the Humid Pampa, Argentina. Acceleration of Geomorphic Processes and Generation of Renewable Geologic Resources?, by Forte, L.M.; Hurtado, M.A.; Dangvas, N.V.; Couyoupetrou, L.; Bruschi, V. & Cendrero, A.
- El Antropoceno ¿Estamos en un nuevo tiempo geológico? (Anthropocene: Are we in a new geological time?), organized by Zientziateka-Cátedra de Cultura Científica of the UPV/EHU, Bilbao (E), 14 April 2015. ([www.eitb.eus/es/divulgacion/detalle/3128934/zientziateka--el-antropoceno-estamos-nuevo-tiempo-geologico/](http://www.eitb.eus/es/divulgacion/detalle/3128934/zientziateka--el-antropoceno-estamos-nuevo-tiempo-geologico/)).
- El Antropoceno ¿Nuevo tiempo geológico o cultura pop? (Anthropocene: A new geological time or pop culture?), organized by Alavesia-Asociación de Amigos del Museo de Ciencias Naturales de Álava, Vitoria-Gasteiz (E), 16 April 2015.
- El Antropoceno: ¿Hemos sacado al planeta de su funcionamiento geológico natural? (Anthropocene: Have we moved the planet outside its natural geological functioning?), organized by Geoparkea-Geoparque de la Costa Vasca, Zumaia (E), 28 May 2015.
- Antropoceno: ¿Vivimos en un nuevo tiempo geológico? (Anthropocene: Are we living in a new geological time?), organized by Ekologistak Martxan Bizkaia, Bilbao (E), 21 October 2015.
- El Antropoceno: ¿Vivimos en un nuevo tiempo geológico? (Anthropocene: Are we living in a new geological time?), organized by Museo de Dinosaurios/Fundación para el Estudio de los Dinosaurios en Castilla y León, Salas de los Infantes (E), 7 November 2015.
- Dan Richter and Gary Sposito presented at the 2015 Annual Soil Science Society of America Meetings on the relevance of Virgil and especially his amazing "Georgics."
- Colin Summerhayes presented a talk on the "The Anthropocene" to the students of the Post-graduate Certificate in Antarctic Studies (PCAS) in the Gateway Antarctica programme of the University of Canterbury, Christchurch, NZ, on 23 Nov 2015.

- On Jan 15 Colin Summerhayes gave a lecture on "The Anthropocene - A New Geological Epoch Driven by Human Impacts" to the School of Geography, Environment and Earth Sciences at Victoria University, Wellington, NZ.
- Colin Summerhayes gave an extended version of the talk, entitled "The Anthropocene - a New Geological Epoch Driven by Human Impacts" on 15th Jan 2016, at Victoria University Earth Science Department, Wellington, NZ.
- Jacques Grinevald presentation to Aleandre Koyré is "De l'Année Géophysique Internationale au Global Change : socio-épistémologie et histoire des sciences du système climatique et du Système Terre".

Future conferences:

- A thematic session devoted to the Anthropocene geological record will be included in the 14th Spanish Meeting on Quaternary was held in Granada, June-July 2015.
- 35th International Geological Congress 27 August - 4 September 2016 | Cape Town, South Africa <http://www.35igc.org/>

## MEDIA

The Zalasiewicz et al. paper on anthroturbation is a lead story in the biggest online news magazine in Germany:

<http://www.spiegel.de/wissenschaft/natur/anthropozaen-debatte-um-neues-geologisches-zeitalter-durch-menschen-a-987349.html>

From Andrew Revkin: Two Climate Analysts Weigh the Notion of a 'Good' Path in the Anthropocene [http://dotearth.blogs.nytimes.com/2014/06/22/two-climate-researchers-weigh-the-notion-of-a-good-path-in-the-anthropocene/?\\_php=true&\\_type=blogs&module=BlogPost-ReadMore&version=Blog%20Main&action=Click&contentCollection=Anthropocene&pgtype=Blogs&region=Body&r=0](http://dotearth.blogs.nytimes.com/2014/06/22/two-climate-researchers-weigh-the-notion-of-a-good-path-in-the-anthropocene/?_php=true&_type=blogs&module=BlogPost-ReadMore&version=Blog%20Main&action=Click&contentCollection=Anthropocene&pgtype=Blogs&region=Body&r=0)

Guardian article published at the time of the inaugural AWG meeting [needs link].

Report on the AWG inaugural meeting in an article called "The Anthropocene".

In: GeoQ, the quarterly newsletter of the European Geosciences Union (EGU)

<http://www.egu.eu/newsletter/geoq/12/>

MediaPart 30 January 2015 by Michel de Pracontal with interviews with Jan Zalasiewicz, Colin Waters and Matt Edgeworth.

Article for the Economist's Intelligent Life magazine by Helen Gordon. Interviews with Jan Zalasiewicz, Colin Waters and Phil Gibbard.

PBS NOVA documentary series - The Anthropocene by Pioneer Productions.

'Anthropocene', the documentary filmed by Steve Bradshaw and produced by Jenny Richards received first public screening in Denmark, on November 7th - where it's been invited to launch at the Copenhagen Documentary Film Festival

(CPH:DOX 2015). Will Steffen, Erle Ellis, Jan Zalasiewicz, Andrew Revkin, John McNeil, Eric Odada and Davor Vidas all appear as interviewees. Information on the film is available at <http://www.anthropocenethemovie.com/>

Filming for a feature documentary by Jennifer Baichwal and Nick de Pencier (Mercury Films) with interviews of Jan Zalasiewicz, Colin Waters, Alex Cearreta, James Syvitski.

Jan Zalasiewicz and Phil Gibbard did an interview with Helen Gordon for the Economist's Intelligent Life, appearing in the Nov/Dec issue available online here: <https://www.intelligentlifemagazine.com/features/the-human-layer>

Article in Le Monde France 2<sup>nd</sup> January 2016 on Prospective 2016 Planète including interviews with comments by Jacques Grinevald, Catherine Jeandel and Jan Zalasiewicz.

La Croix article “Sommes-nous entrés dans une nouvelle ère géologiques?” and Jacques Grinevald was interviewed in an article shown on TéléJournal <http://www.rts.ch/play/tv/19h30/video/les-avis-des-specialistes-divergent-sur-la-nouvelle-ere-geologique-lanthropocene?id=7446863>

The publication in Science generated much media interest. A selection of interviews carried out by AWG are included below:

### **Colin Waters**

The Bloomberg Carbon Clock

<http://www.bloomberg.com/news/articles/2016-01-07/welcome-to-the-anthropocene-five-signs-earth-is-in-a-man-made-epoch>

Discovery Channel News

<http://news.discovery.com/earth/rocks-fossils/the-human-epoch-what-well-leave-behind-photos-160107.htm#mkcpgn=rssnws1?&tc=eml>

International Business Times

<http://www.ibtimes.co.uk/anthropocene-epoch-5-reasons-why-scientists-suggest-we-should-make-new-chapter-earth-1536869>

The Hindu

[http://www.thehindu.com/opinion/the-new-epoch-brought-on-by-humans/article8086190.ece?utm\\_source=RSS\\_Feed&utm\\_medium=RSS&utm\\_campaign=RSS\\_Syndication&tc=eml](http://www.thehindu.com/opinion/the-new-epoch-brought-on-by-humans/article8086190.ece?utm_source=RSS_Feed&utm_medium=RSS&utm_campaign=RSS_Syndication&tc=eml)

BBC World Service and BBC website

<http://www.bbc.co.uk/news/science-environment-35259194>

Reuters

<http://www.trust.org/item/20160107190210-wn2dg/>

Smithsonian Magazine <http://www.smithsonianmag.com/science-nature/scientists-anthropocene-officially-thing-180957742/>

Think Progress Washington DC

<http://thinkprogress.org/climate/2016/01/07/3736892/humans-caused-a-new-planet-epoch/>

Scientific American

<http://www.scientificamerican.com/article/humans-leave-a-telltale-residue-on-earth/>



Guardian Newspaper

<http://www.theguardian.com/environment/2016/jan/07/human-impact-has-pushed-earth-into-the-anthropocene-scientists-say>

Washington Post

<https://www.washingtonpost.com/news/energy-environment/wp/2016/01/07/scientists-say-humans-have-now-brought-on-an-entirely-new-geologic-epoch/>

Justin Hayward CBC National Radio Canada

<http://www.cbc.ca/news/technology/anthropocene-paper-1.3393823>

El Mundo Newspaper Spain (in Spanish)

<http://www.elmundo.es/ciencia/2016/01/07/568e7685e2704ee97b8b459c.html>

Folha de S.Paulo Newspaper Brazil

ClimateWire Washington DC

El Confidencial Spain

Live radio interview with John Maytham Radio 702 and CapeTalk (South Africa)

Atlas Obscura website

Ars Technica website

Huffington Post web production

Muy Interesante

H-Alter.org website

<http://www.h-alter.org/vijesti/zaboravite-holocen-dobrodošli-u-antropocen>

John Batchelor Show, radio across New York to Washington DC

TV interview for Brazilian GloboNews.

### **Alex Cearreta**

Elhuyar science journal <http://aldizkaria.elhuyar.eus/albisteak/giza-garai-geologiko-berri-baten-atarian-gaude/> (in Basque)

La Vanguardia newspaper <http://www.pressreader.com/spain/la-vanguardia-1a-edicion/20160109> (in Spanish)

Catalunya Vanguardista magazine

<http://www.catalunyavanguardista.com/catvan/el-antropoceno-una-realidad-demostrable/> (in Spanish)

Radio Euskadi, Basque public radio station La Mecánica del Caracol

[http://audios.ak.cdn.eitb.com/multimedia/audios/2016/01/15/1854892/20160115\\_181507\\_03\\_0008187715\\_002\\_001\\_MECANICA\\_PRO.mp3?\\_ga=1.263457359.2141214524.1422096728](http://audios.ak.cdn.eitb.com/multimedia/audios/2016/01/15/1854892/20160115_181507_03_0008187715_002_001_MECANICA_PRO.mp3?_ga=1.263457359.2141214524.1422096728) (in Spanish)

Radio Euskadi, Basque public radio station Más que Palabras

<http://www.eitb.eus/es/radio/radio-euskadi/programas/masquepalabras/ciencia/audios/detalle/3817902/el-antropoceno-alejandro-cearretaradio-euskadi/> (in Spanish)

### **Erle Ellis**

CBS in Washington DC

UMBC website news item <http://news.umbc.edu/science-article-argues-earth-has-entered-a-new-epoch-defined-by-human-impacts-on-the-planet/>

Climate Progress website

<http://thinkprogress.org/climate/2016/01/07/3736892/humans-caused-a-new-planet-epoch/>

Reuters

<http://www.reuters.com/article/us-environment-anthropocene-idUSKBN0UL29O20160107>

### **Agnieszka Gałuszka**

Live radio interview with Karolina Głowacka, Radio TOK FM

<http://audycje.tokfm.pl/odcinek/Zyjemy-w-antropocenie-Odpowiadala-prof-Agnieszka-Galuszka/33218>

Ludwika Tomala from the Polish Press Agency for website

<http://naukawpolsce.pap.pl/aktualnosci/news,407939,badacze-zbieraja-dowody-na-to-ze-trwa-antropocen.html>

### **Phil Gibbard**

Finnish TV (YLE News).

[http://yle.fi/uutiset/ihmisen\\_mukaan\\_nimetty\\_aikakausi\\_on\\_ehka\\_alkanut\\_maap\\_allolla\\_suurin\\_muutos\\_sitten\\_jaakauden/8585291](http://yle.fi/uutiset/ihmisen_mukaan_nimetty_aikakausi_on_ehka_alkanut_maap_allolla_suurin_muutos_sitten_jaakauden/8585291)

### **Clement Poirier**

French newspaper La Croix (should be published on January 19th)

### **Colin Summerhayes**

Interview on "The Anthropocene" (same topic) to journalist Allison Ballance, Radio NZ, in Wellington.

Radio interview in NZ. See <http://www.radionz.co.nz/ourchangingworld>

Interview with another Radio NZ reporter, in Christchurch

<http://www.radionz.co.nz/national/programmes/ninetonoon/audio/201787115/changed-planet-the-dawning-of-the-anthropocene> .

### **Will Steffen**

Australian media coverage:

ABC (Australian Broadcasting Corporation) Radio National breakfast show, Macquarie radio, Sydney – short “grabs”

“It’s life, but not as we knew it: scientists hail a new epoch”, Sydney Morning Herald, Saturday-Sunday, (Author: Sydney Pead, with Peter Hannam).

<http://www.smh.com.au/environment/humanitys-impact-on-earth-opens-anthropocene-epoch-scientists-say-20160107-gm1nwt.html>

Same article appeared in the Canberra Times, Saturday 9 January

Australasian Science magazine

Policy Forum, Crawford School of Public Policy, The Australian National University

### **Michael Wagreich**

APA (the Austria Presse Agentur)

Interviews with:

Neue Zürcher Zeitung (Switzerland)

Standard (Austria) - they will probably include a longer article in a science supplement end of January

Kurier (Austria) - a longer article sometimes in the future to appear and I will take part on a face-to-face confrontation about the Anthropocene for the Austrian radio broadcasting OE1.

**Scott Wing**

Smithsonian Magazine

<http://www.smithsonianmag.com/science-nature/scientists-anthropocene-officially-thing-180957742/>

**Alex Wolfe**

CBC World at 6 Radio interview

<http://www.cbc.ca/news/technology/anthropocene-paper-1.3393823>

Radio Canada (in French) [http://ici.radio-](http://ici.radio-canada.ca/emissions/la_croisee/2015-2016/index.asp)

[canada.ca/emissions/la\\_croisee/2015-2016/index.asp](http://ici.radio-canada.ca/emissions/la_croisee/2015-2016/index.asp)

[http://edmontonjournal.com/business/new-geological-era-embargo-2-pm-jan-7?\\_lsa=f71f-144a](http://edmontonjournal.com/business/new-geological-era-embargo-2-pm-jan-7?_lsa=f71f-144a)

<http://www.rcinet.ca/en/2016/01/07/from-the-holocene-epoch-to-the-anthropocene-and-human-dominance/>

<http://www.calgarysun.com/2016/01/07/scientists-pitch-anthropocene-epoch-to-recognize-earths-new-era-our-own>

<http://www.alaskahighwaynews.ca/changed-our-world-scientists-say-new-era-in-earth-s-history-needs-recognition-1.2146105>

<http://cnews.canoe.com/CNEWS/Science/2016/01/07/22590775.html>

[http://www.huffingtonpost.ca/2016/01/08/anthropocene-new-geological-era\\_n\\_8940336.html](http://www.huffingtonpost.ca/2016/01/08/anthropocene-new-geological-era_n_8940336.html)

<https://soundcloud.com/am1150/alex-wolfe-new-geological-epoch>

<https://thegatewayonline.ca/2016/01/u-of-a-researcher-co-authors-anthropocene/>

**Jan Zalasiewicz**

Radio Five Live Drive Time Friday 8<sup>th</sup> Jan

**OTHER NEWS**

Professor Jacques Grinevald was awarded the Nicholas Georgescu-Roegen Awards for 2015 for Unconventional thinking.

**MEMBERSHIP TO DATE**

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## ANTHROPOCENE WORKING GROUP: PROGRAMME FOR 2016

A third Working Group meeting will be held under the auspices and financial support of the Fridtjof Nansen Institute, Oslo, Norway on the 22-23 April 2016. This is planned as an internal meeting to discuss content of the CUP book and work related to the upcoming IGC meeting.

35th International Geological Congress (Cape Town, South Africa, 27 Aug – 4 Sept 2016) where we would hope to present an interim statement on our deliberations.

A few other possibilities are:

- A synthesis of numerical dating techniques relevant to dating the Anthropocene, building on the paper by Hancock focussing on plutonium on sediments; this would include related 'bomb spike' phenomena such as radiocarbon, annual varves, and the use of other stratigraphic signals (e.g. different types of technofossils) that we can interpret through the existence of a dated historical context.
- Possible manuscript on the Utility of the Anthropocene as a formal name – Geological arguments

Jan Zalasiewicz (Chair)  
Colin Waters (Secretary)