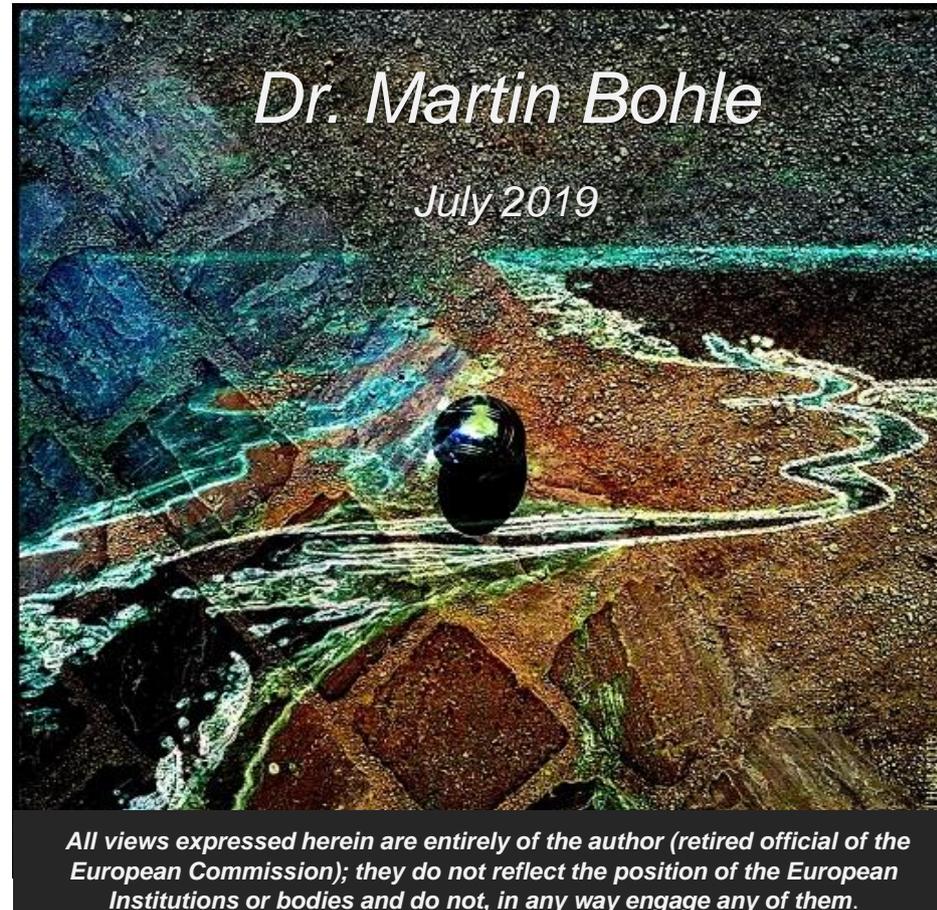


# Exploring Societal Frameworks of the Geosciences



*Dr Martin Bohle, [https://www.researchgate.net/profile/Martin\\_Bohle](https://www.researchgate.net/profile/Martin_Bohle)*

*(1) Ronin Institute, ([martin.bohle@ronininstiute.org](mailto:martin.bohle@ronininstiute.org)),*

*(2) Corresponding Citizen Scientist, International Association for Promoting Geoethics (<http://www.geoethics.org/>)*

# Avant Propos (1)

**Vulcanian eruption of Santiaguito, Guatemala**  
**Joel Gill, (IMAGEO, EGU)**

*Geoscience in action... ...a conventional view.*

# Avant Propos (2)



*Geosciences in action...*

**Terraced Fields, by Hongkai Gao  
Yunnan Province in China  
(imaggeo, EGU)**

# Avant Propos (3)

*“In the beginning there was the swamp, the  
hoe, and Jussi.”*

*“Täällä Pohjantähden alla”, Väinö Linna (1959)*

*Geosciences in action... ..a comprehensive view.*

# Let's talk 'people'



\* p.m.: see „**Semiotic Universes**“; **EU Project:**

**re.cri.re**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649436

Quarry "Piesberg"  
52:19:15 N, 8:1:33 O  
Osnabrück, Germany

A magmatic intrusion locally transformed sediments of the carboniferous period and lifted them. Erosion made the metamorphosed sediments – shales, coal and quartzite – accessible at the surface. The coal was mined from 15th to 19th century, quartzite is extracted still today.

Ukko El'Hob 2014

*"People consist of abstract information, including the distinctive ideas, theories, intentions, feelings and other states of mind that characterize [them]" \**

*[Daniel Deutsch, **The Beginning of Infinity – Explanations that Transform the World;** Allen Lane 2012, p.130]*

# Talking: Geoscience & People

*Art, history and environment provide many opportunities for people-centric narratives about geoscience, geoethics or geosophy.*

*They range from contemplating geomorphology to reference to the 'sacrum'.*



The obvious: Colorado River (USA)



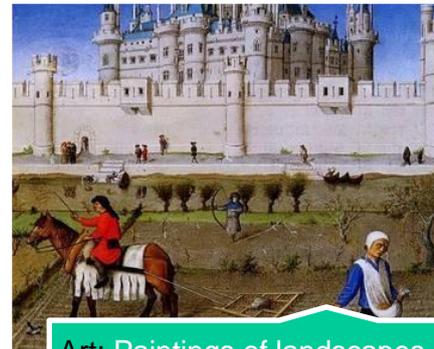
The pleasant: The Banyoles Lake (Spain)



The ordinary: The motorway stretching east from Brussels (Belgium)



History: landscapes marked with mining-sites (Arizona, USA)



Art: Paintings of landscapes. *Tres riches heures du Duc de Berry*, (Chantilly, France)



Sacrum: Crater Lake in Oregon (USA)

# Talking: Geosciences, Civil Engineering & Supply Chains (1)

## *What is 'civil-engineering' about?*

Purposefully relating human activities and planetary systems.  
Civil-engineering works imply *applied geosciences*.

Examples: Hydro-power plants, operating of urban dwellings, production systems & consumption patterns (= "*technosphere*").

Examples from your place: - river channel, - soil mechanics, - water supply, - weather forecast, - solar storms, - building code...

# Talking: Geosciences, Civil Engineering & Supply Chains (2)

*If properly scaled, it's 'anthropogenic global change'*

Examples: Anthropogenic Climate Change, atm. CO<sup>2</sup> >400 ppb; Nitrogen Cycle / Haber-Bosch Process, doubling reactive nitrogen; intensive use of >50% of the ice-free land surface; river damming, sedimentation & mean sea-level drop; human driven geomorphological change;

## >> **Geosciences:**

- *Geosciences address the functioning of planet Earth including the intersections of natural and human systems.*
- *Geosciences take the form of fundamental and applied research, engineering works and commercial undertakings.*

# Talking: Geosciences, Civil Engineering & Supply Chains (3)

- *Geosciences are instrumental for building the 'Human Niche'.*
  - *Building a 'Human Niche' also is an ethical question; a particular role for 'geoethical thinking'?*
- 
- *The 'Human Niche' is made of 'complex- adaptive Social-Ecological Systems'.*
  - *'Complex-adaptive Social-Ecological Systems' display a path-dependent development, emergent properties, and counter-intuitive system behaviours.*

# What is meant by 'Geoethics\*' ? – a primer

- *...research and reflection on the values which underpin appropriate behaviours and practices, wherever human activities interact with the Earth system;*
- *...ethical, social and cultural implications of geoscience education, research and practice;*
- *...social role and responsibility of geoscientists in conducting their activities;*

\* i) Peppoloni, S., & Di Capua, G. (2012). Geoethics and geological culture: Awareness, responsibility and challenges. *Annals of Geophysics*, 55(3), 335–341. doi:10.4401/ag-6099,

\* ii) Bohle, M., Preiser, R., Di Capua, G., Peppoloni, S., & Marone, E. (2019). *Exploring Geoethics - Ethical Implications, Societal Contexts, and Professional Obligations of the Geosciences*. (M. Bohle, Ed.). Cham: Springer International Publishing. doi:10.1007/978-3-030-12010-8

# What is meant by 'Human Niche\*'? – *a primer*

- ...the intersection of the [bio-]geosphere and the sphere of human activities of social, economic, cultural and political nature;
- ...the way how production systems and consumption patterns that embeds geoscience know-how;
- ...the mental frameworks of people that shape their sense-making and action (including governance);

\* i) Ellis, Erle C. 2015. *Ecology in an Anthropogenic Biosphere*. *Ecological Monographs* 85 (3): 287–331. doi:10.1890/14-2274.1.

\* ii) Fuentes, Agustin. 2016. *The Extended Evolutionary Synthesis, Ethnography, and the Human Niche: Toward an Integrated Anthropology*. *Current Anthropology* 57, S13 (June 2016): S13-S26 doi:10.1086/685684.

# *Niche Building - examples 'I' -*

***...civil engineering  
is about building a  
visible intersection  
of the geosphere  
and economic  
activities...***

- dredging a waterway
- building a shore defence
- operating a power plant

# *Niche Building - examples 'II'*

***...as technology evolves as more convoluted gets the application of geosciences...***

- renewable energy from winds, tides and the sun
- tide, ice and sea wave forecasts for shipping
- satellites in a solar storm

# *Niche Building - example 'III'*

***...urban dwellings  
are intersecting the  
local and global bio-  
geosphere through  
massive fluxes of  
matter and energy...***

- receiving drinking water and ejecting waste water
- receiving electric power or fuels and ejecting heat
- receiving food, minerals and ejecting manufactured goods

# Geosciences, Economy & Culture

## **I. Geosciences' know-how for economy:**

*e.g.: ...extraction of minerals, groundwater flow,  
stability of building foundations,...*

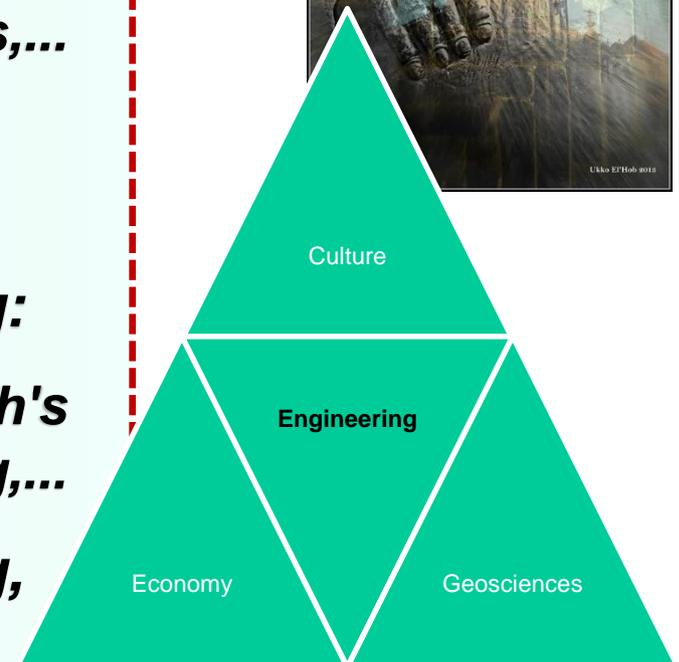
*...**engineering** to dovetail the economy with  
the geosphere...*

## **II. Geosciences' know-how for value setting:**

*e.g.: ...life-supporting functions of the Earth's  
systems, individual well-being,...*

*...**culture** to dovetail people's sense-making,  
values and action...*

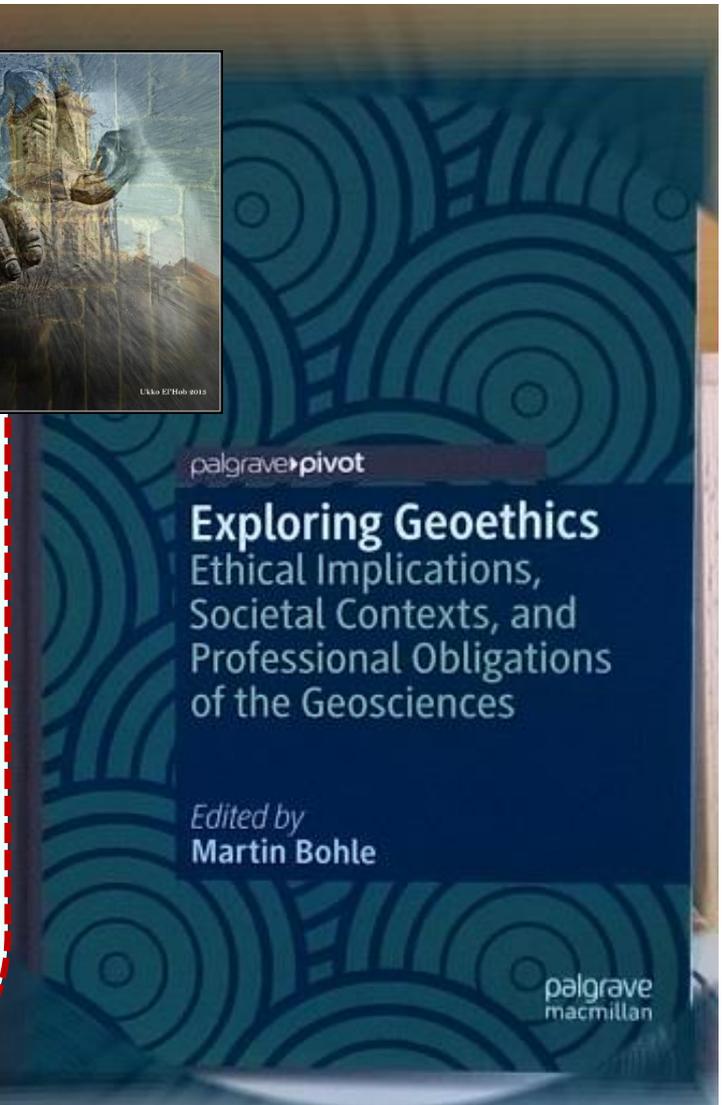
*e.g.: doomsday vision, denial of evidence,  
stewardship...*



# *Societal Geosciences*

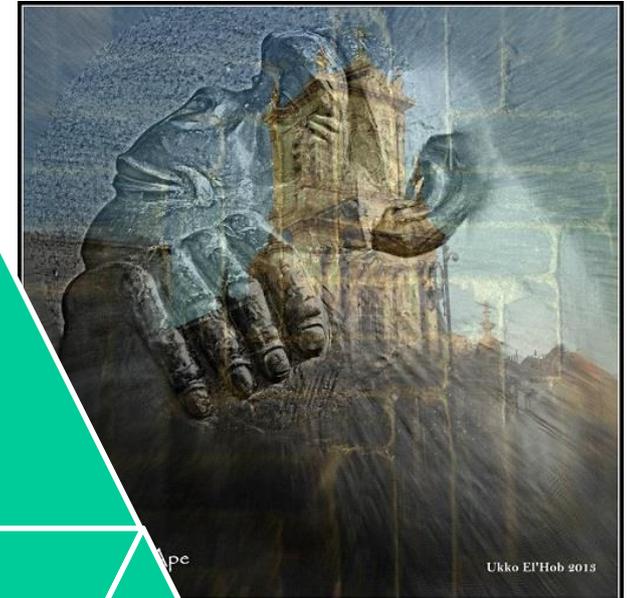
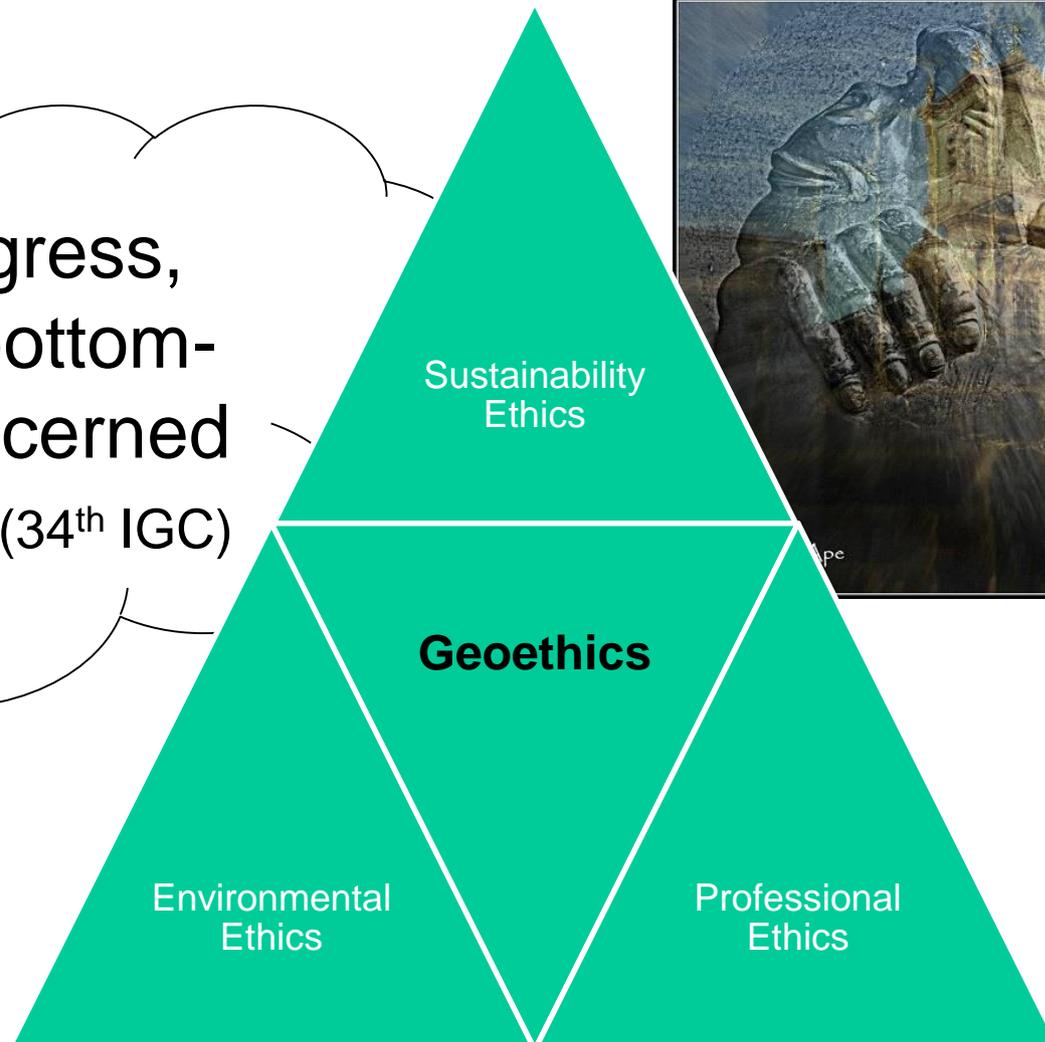
The Cape Town Statement on Geoethics (35<sup>th</sup> IGC, 2016):

*“Geoscientists have know-how that is essential to orientate societies towards more sustainable practices... When applying a wider knowledge-base than natural sciences, then geoscientists need to take multidisciplinary approaches to economic and environmental problems, embracing (geo)ethical and social perspectives.”*



# Situating 'Geoethics' ? – state of the art (1)

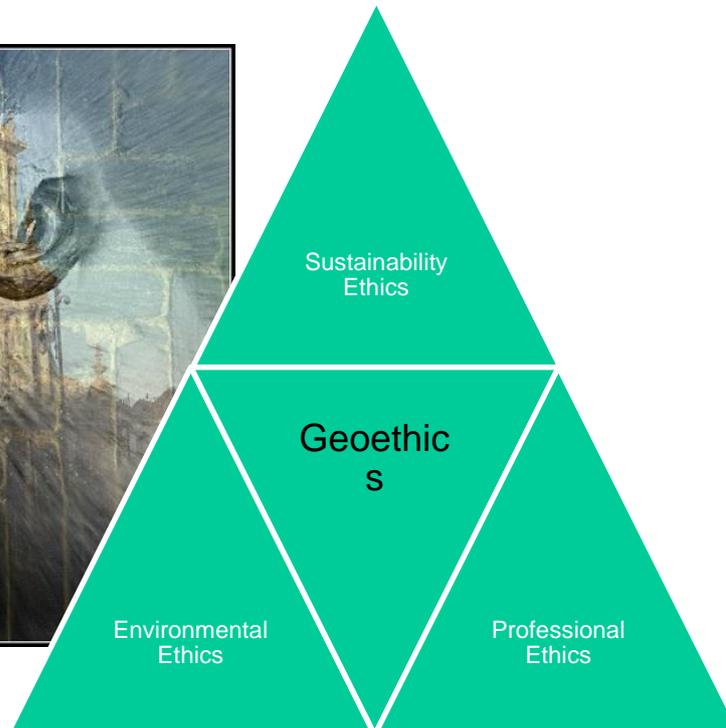
Work in progress,  
undertaken bottom-  
up by the concerned  
since ~ 2012 (34<sup>th</sup> IGC)



# Situating 'Geoethics' ? – state of the art (2)

## Geoethics:

- ✓ ***an actor-centric virtue-ethic***
- ✓ ***for Geoscientists & Citizens***
- ✓ ***acting responsibly & knowledge based in professional capacity.***



## Ongoing work:

*When Kohlberg's hierarchy of moral adequacy (Kohlberg 1981) and Jonas's imperative of responsibility (Jonas 1984) are combined with current geoethical thinking then a 'geoethical rational' for operating in the human-niche can be formulated, namely to be:*

***actor-centric, virtue-ethics based, responsibility focused, knowledge-based, all-actor inclusive, and universal rights-based***

# Applying 'Geoethics' ? – an example (1)



Gill, J., & Bullough, F. (2017). Geoscience Engagement in Global Development Frameworks. *Annals of Geophysics*, 60(0). <https://doi.org/10.4401/ag-7460>

# Applying 'Geoethics' ? – an example (2)

## Geoethical Promise

*I promise...*

*... I will practice geosciences being fully aware of the societal implications, and I will do my best for the protection of the Earth system for the benefit of humankind.*

*... I understand my responsibilities towards society, future generations and the Earth for sustainable development.*

*... I will put the interest of society foremost in my work.*

*... I will never misuse my geoscience knowledge, resisting constraint or coercion.*

*... I will always be ready to provide my professional assistance when needed, and will be impartial in making my expertise available to decision makers.*

*... I will continue lifelong development of my geoscientific knowledge.*

*... I will always maintain intellectual honesty in my work, being aware of the limits of my competencies and skills.*

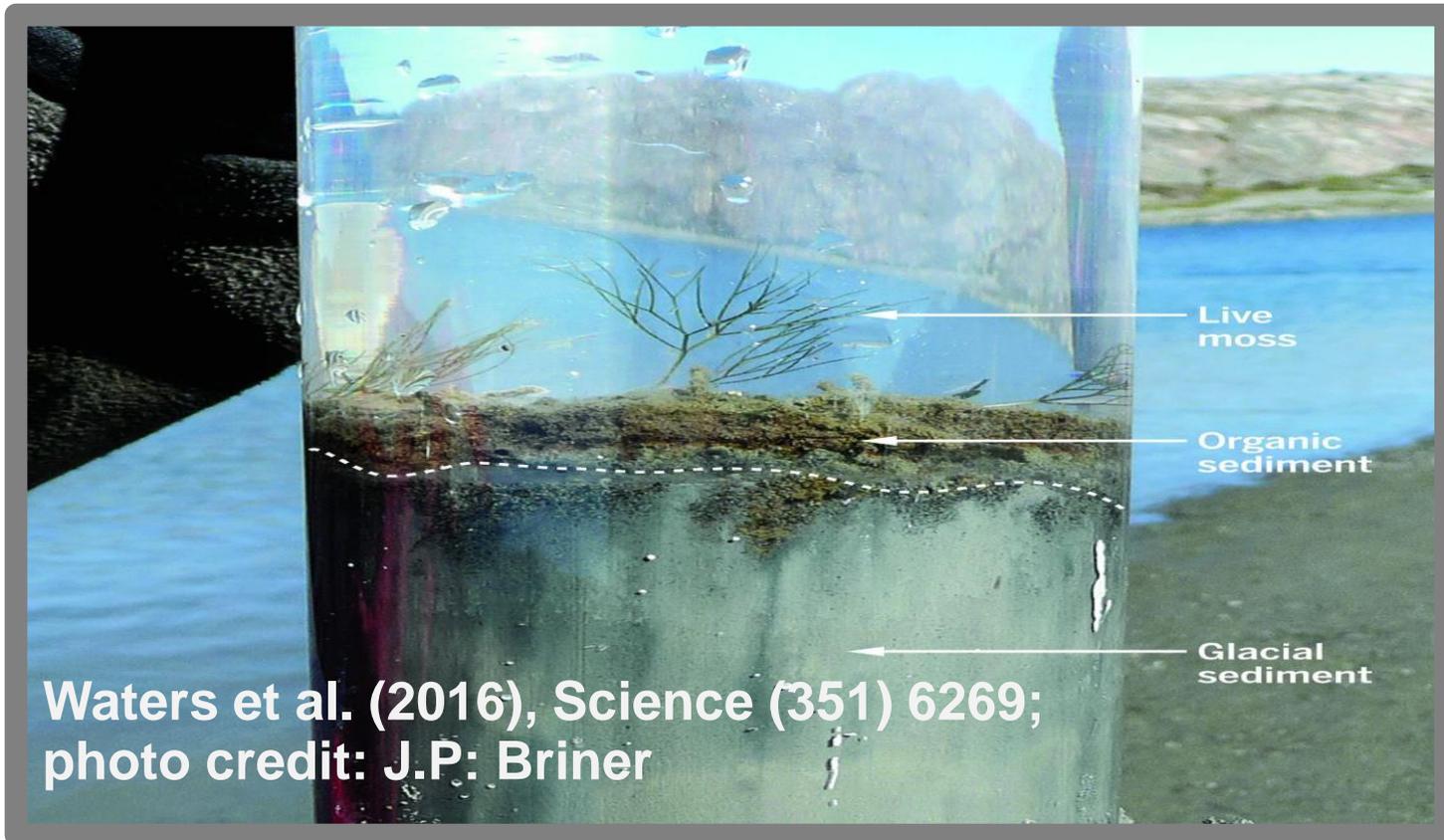
*... I will act to foster progress in the geosciences, the sharing of geoscientific knowledge, and the dissemination of the geoethical approach.*

*... I will always be fully respectful of Earth processes in my work as a geoscientist.*

*I promise!*

*Matteucci, R., Gosso, G., Peppoloni, S., Piacente, S., Wasowski, J., Matteucci, R., ...  
Wasowski, J. (2014). The "Geoethical Promise": A Proposal. Italian Federation of Earth  
Sciences, 37(3), 190–191.*

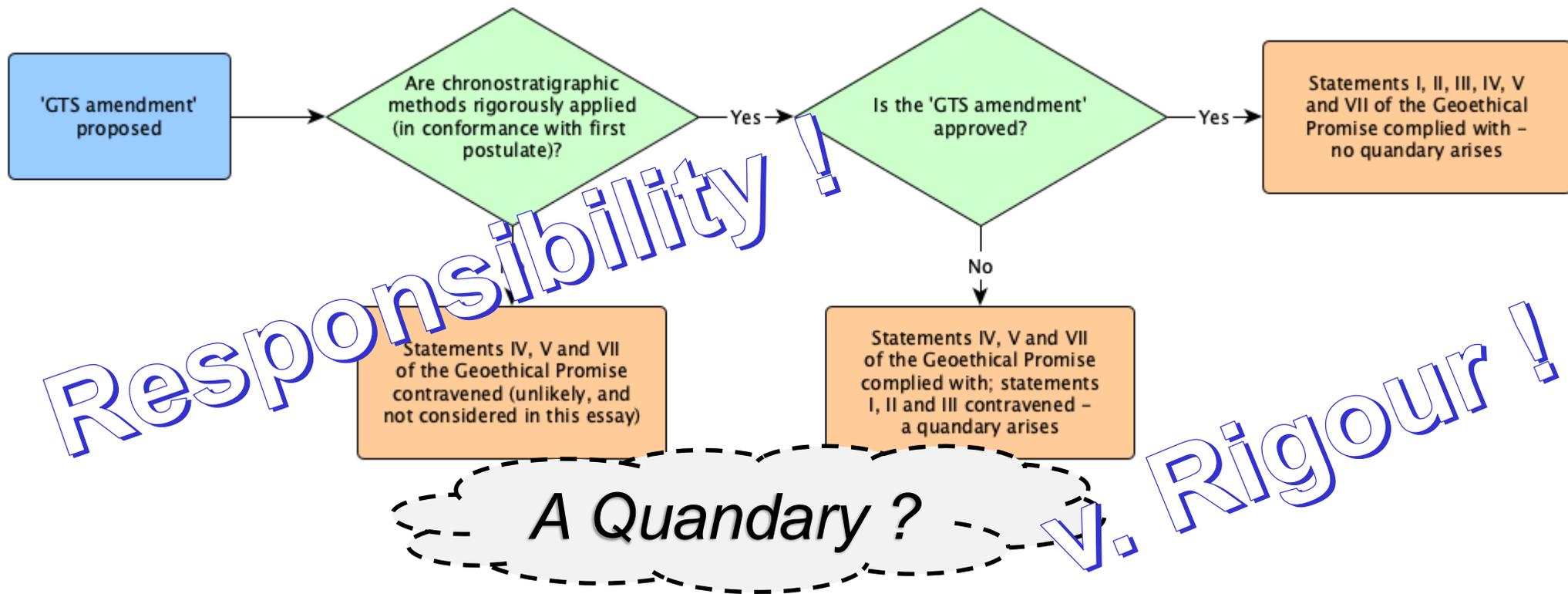
# Applying 'Geoethics' ? – an example (3.a)



*End of the Holocene? Now the [Anthropo][cene]?*

# Applying 'Geoethics' ? – an example (3.b)

A geological epoch: 'Anthropocene' ?



Bohle and Bilham (2019), The 'Anthropocene Proposal': A Possible Quandary and A Work-Around  
*Quaternary* 2019, 2(2), 19; <https://doi.org/10.3390/quat2020019>

# An Emerging Triptichon

*Geo -science, -ethics, -sophy*

**...to know  
how people  
intersect the  
geosphere.**

**...to weave  
geosciences into  
culturally rich  
'*narratives*'.**

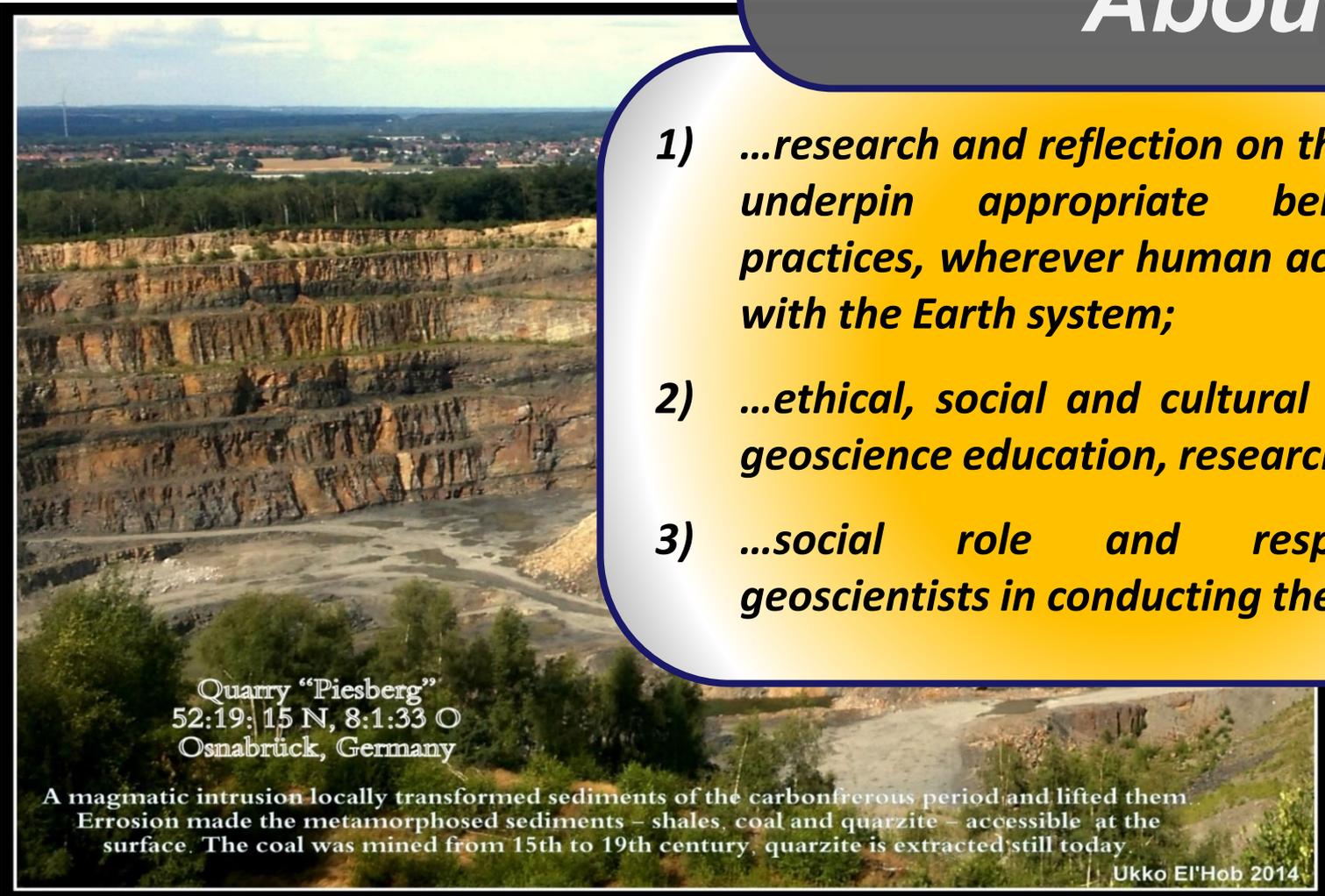
**...to care  
about  
citizens  
acting  
responsibly.**

***... how to valorise the  
past & how to build the  
future?***

# Summary: Thinking in Progress

## *About:*

- 1) *...research and reflection on the values which underpin appropriate behaviours and practices, wherever human activities interact with the Earth system;*
- 2) *...ethical, social and cultural implications of geoscience education, research and practice;*
- 3) *...social role and responsibility of geoscientists in conducting their activities;*



Quarry "Piesberg"  
52:19:15 N, 8:1:33 O  
Osnabrück, Germany

A magmatic intrusion locally transformed sediments of the carboniferous period and lifted them. Erosion made the metamorphosed sediments – shales, coal and quartzite – accessible at the surface. The coal was mined from 15th to 19th century, quartzite is extracted still today.

Ukko El'Hob 2014

# Upscaling, philosophically

*Humans are an engineering species, and nowadays people engineer Earth.*

*People's political and economic choices triggered anthropogenic global change.*

# Exploring Societal Frameworks of the Geosciences



Exploring Geoethics - Ethical Implications, Societal Contexts, and  
Professional Obligations of the Geosciences

<https://link.springer.com/book/10.1007/978-3-030-12010-8>