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GEOLOGICAL FACTORS IN CONCEPTS OF ENVIRONMENTAL PROTECTION AND SUSTAINABILITY

1. Unexpected intensity of recent natural disasters

On June 12 the prestigious Czech newspaper LIDOVÉ NOVINY has published my article (written on June 9) about the necessity to classify the recent floods as a part of mega-floods regularly appearing after a period beyond any memory of the human kind. The article remembers also the text included in the official IUGS standpoint to Rio+20 (and repeated by Professor Alberto Riccardi in his inaugural speech in Brisbane):
The future of our planet is determined not only by anthropogenic influences but also by long term exogenous and endogenous natural processes, often accompanied by natural disasters beyond human control. The most significant of these events are often beyond the reach of human memory. Only Earth and Space sciences are able to serve as mediators for any research needed in detecting the behaviour and predictability of such phenomena. In the light of this knowledge, it seems necessary to modify the mostly oversimplified ideas about the environment sustainability, by an appropriate geoeducation and by a geoethical approach. It is necessary to realize that the so-called 'abiotic nature' has its own dynamic evolution and that its regularities and laws need to be known and understood in order to improve any forecasting and mitigation of important catastrophes and climate changes.

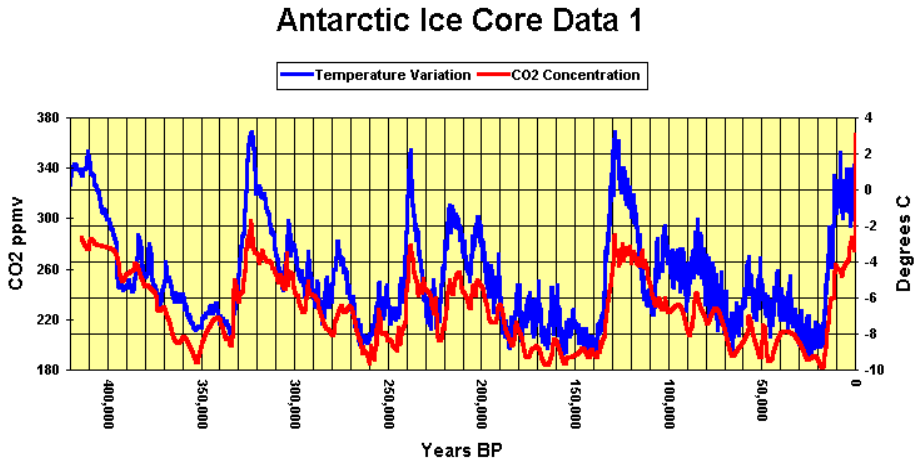
This text has been initiated by myself and based on ideas I was sharing and publishing for many decades of years in my research activities. Recently I happened to discover a similar statement:
http://www.eurogeologists.de/images/content/panels_of_experts/natural_hazard_climate_change/Final_Resolution_Rome_Conference2007.pdf where the following text appears:
Recognising that the growing number of hydrogeological disasters associated with more intense rainfalls, even in countries which have so far been spared (e.g. Sardinia recently recorded 500 mm of rainfall in a single day, a value comparable to the precipitation of a whole year), and that the increase in drought periods at given latitudes require the adoption of adjustment strategies at worldwide and local level, ***because even an immediate and unlikely reduction in greenhouse gas emissions will not stop ongoing processes, whose impact will last for at least 60 years.***

Environmentalists mostly try not to admit other than human influences on the climate changes, misusing peer reviews for excluding articles emphasizing any factor of the Nature. In this way important results of both latest International Geological Congresses 2008 (Oslo) and 2012 (Brisbane) emphasizing periodicity of climatic changes in many past geological periods are not taken into consideration. I have published information about that at the virtual 2nd World Sustainability Forum (2012) and later at the April EGU GA 2013 in Vienna.

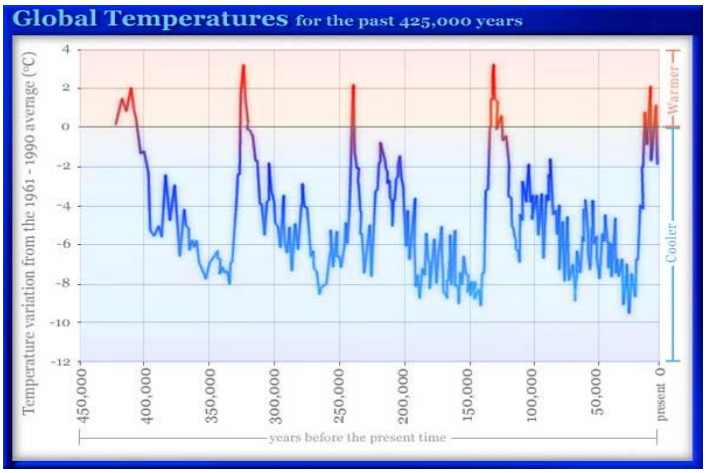
Various natural disasters with extremely destructive effects (earthquakes, tsunamis, landslides, extreme floods etc.) - resulting from or connected with unavoidable geodynamical processes in the Earth crust with their possible hierarchical periodicity - have been occurring in the geological history mostly in distant past times without any possibility to be registered in the memory of human kind.

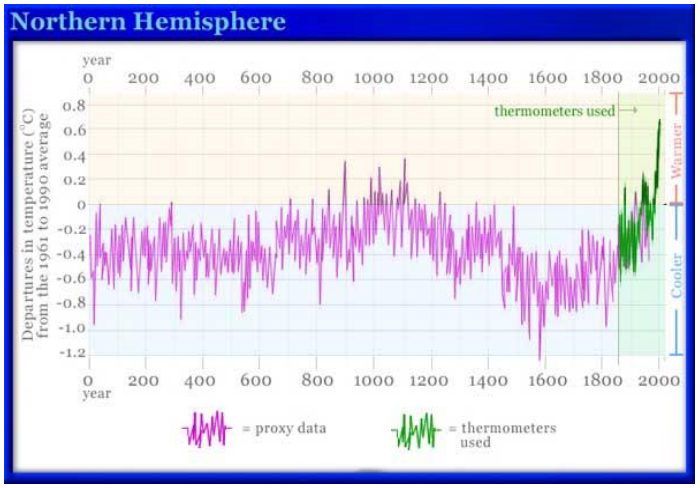
2. Results from the 33rd IGC in Oslo

Many of substantial changes occur in liaison with climatic changes. Let us remember that the Earth crust is a superb archive of past climates which documents repeated periods of global warming and cooling throughout Earth's history as demonstrated in the 33rd International Geological Congresses (Oslo – 2008).



The present is at the right. ***The horizontal 0 line represents the 1961–1990 average global temperature.*** *The numbers on the right show the variation from that baseline in °C.*



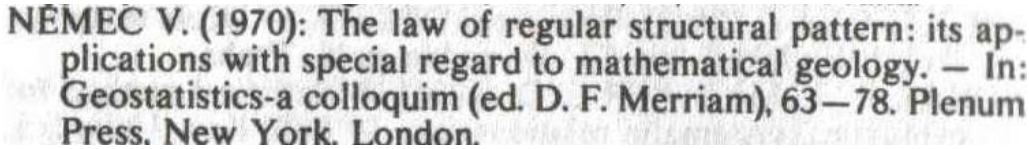


3. Regular structural patterns

Many natural phenomena both in space and in time have a periodical and hierarchical character. Many tectonic phenomena are controlled by special laws and they have their own characteristic features. They occur in regular structural patterns, i. e. in systems of zones which may repeat themselves at equal distances. A hierarchical character of the spacing is also evident. Many geological phenomena connected with inundations in the geological history can be further studied and evaluated in order to make more precise prediction of possible occurrences of such potential dangers in the future.

The author started to develop an original model of regular structural patterns in 1970. The improved version assumes that in the course of geological time the earth crust conserves at any point a tendency to its decomposition into hierarchically organized blocks separated by disjunctive boundaries (sutures, lineaments, joints etc.) corresponding to critical latitudes, meridians and diagonals. These decomposed systems should be always related to the respective successive palaeopoles. Any further positive progress of learning regular structural patterns may help to decipher the algorithms of the Nature. Many specific features are to be taken into account: changes of the poles position, inherited structures, transformations of crustal blocks (tectonic plates), etc. Geometric regularities are probably of the equal importance as various other geological criteria used for deciphering the tectonic history of the earth crust. They have to be taken into consideration in any serious effort to construct appropriate reliable models of basement tectonics. Their practical importance for improving reliability of any prediction of natural hazards like earthquakes or volcanic activities is evident. The changes of palaeopoles may coincide with temporary climate changes.

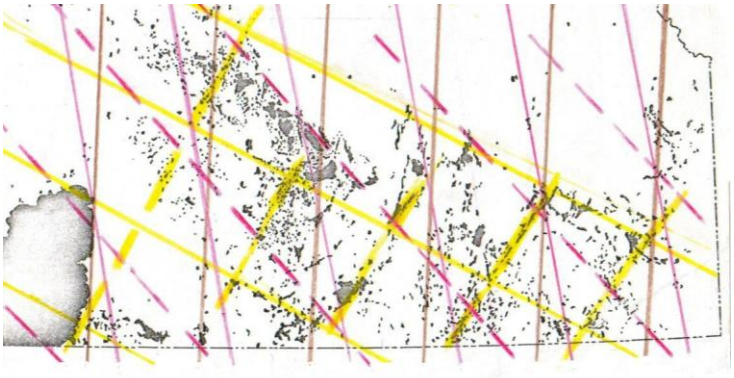
From the original research of the author in Kansas (1970)


NĚMEC V. (1970): The law of regular structural pattern: its applications with special regard to mathematical geology. — In: Geostatistics-a colloquim (ed. D. F. Merriam), 63—78. Plenum Press. New York. London.

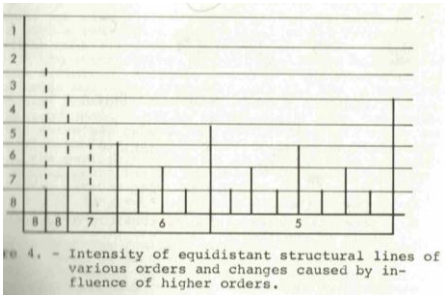
The article as presented among the selected literature in the Encyclopaedic Dictionary of Geological Sciences (Encyklopedický slovník geologických věd, vol. 2, p. 821, ACADEMIA Praha 1983); the „regularity of structural patterns" is presented with the original formula at the p. 234.

Precursors in ideas of equidistances

1855 Phillips: constancy of direction
1879 Daubrée: regular geomorphology
1911 Hobbs: repeating structures
1965 Jung, Kutina et al.: equidistances
1968 Serra: les structures gigognes
(1970 Vasilev, Bogatskii: similar issues)



Oil and gas fields in Kansas – examples of possible equidistances as interpreted by V. Němec in 1970



e 4. - Intensity of equidistant structural lines of various orders and changes caused by influence of higher orders.

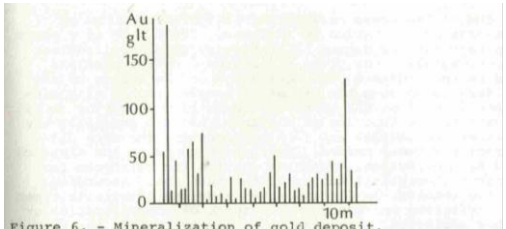
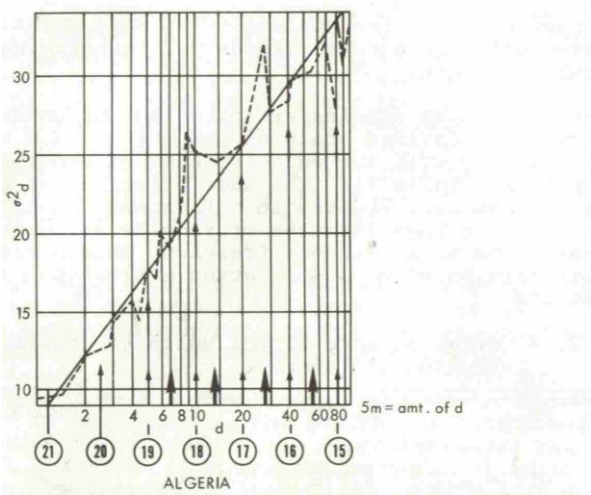
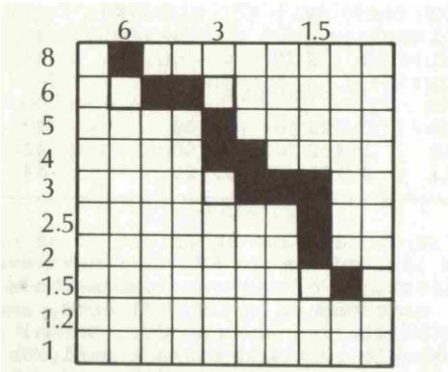


Figure 6. - Mineralization of gold deposit.

explained generally by difficulties and errors in analyzing the samples. A general agreement of Figures 4 and 6 is evident.



Variogram showing mineralization grades in deposit (after Matheron, 1968).



Results of granulometric studies

New formula in 1981:

The equidistances of critical latitudes can be expressed by the formula

$$y_x = 1/3 \; 2^{-x} \pi D$$

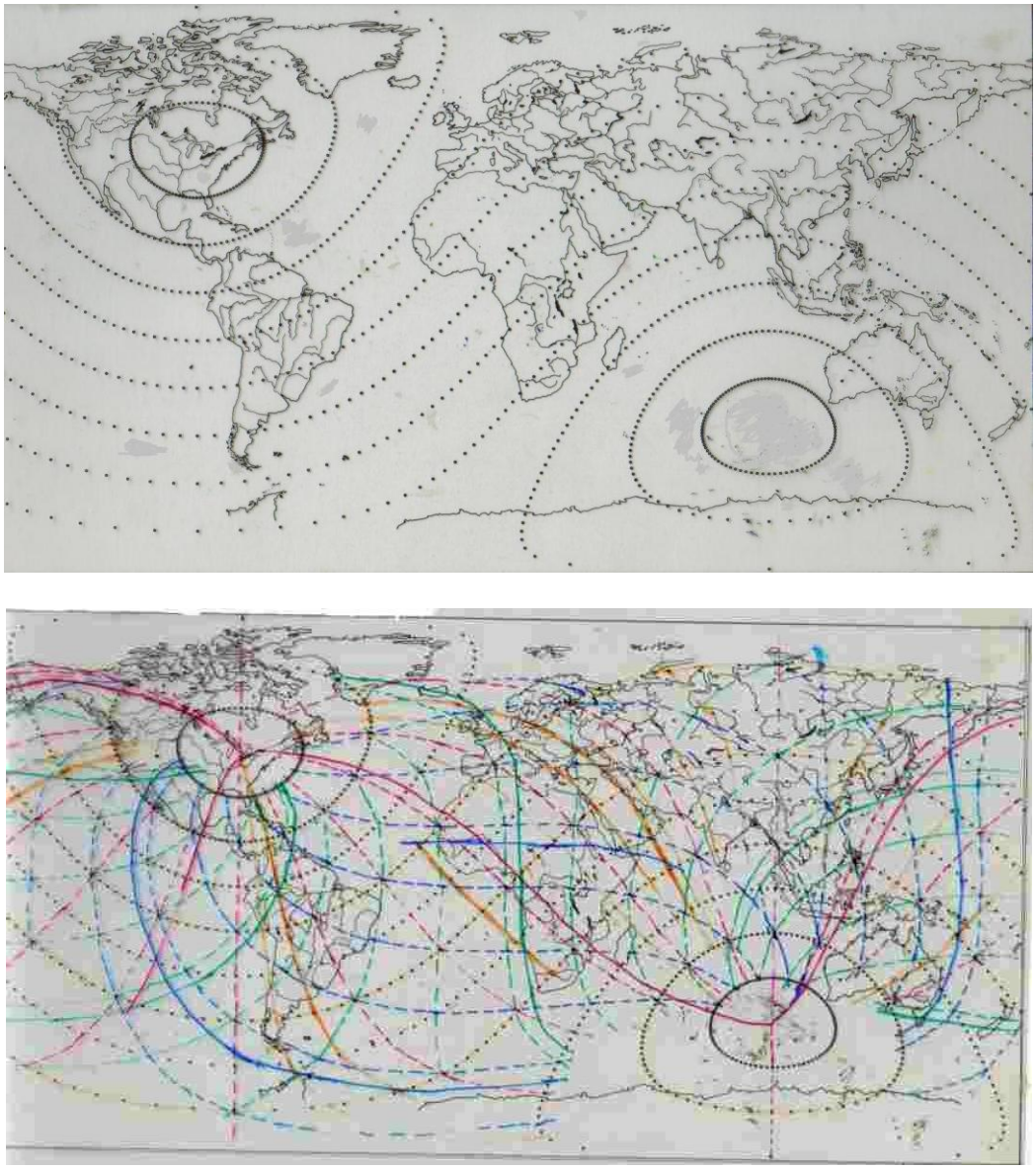
where y_x = equidistance for order *x*, D = diameter of the Earth.

Basic examples of equidistances:

Order:	Y (km)	Order	Y (km)
1	6678	6	209
2	3339	7	104
3	1669	8	52
4	834	9	26
5	417	10	13

The equidistances of critical meridians depend also on the palaeolatitude *j*, i. e.

$$y_x = 1/3 \quad 2^{-x} \quad \pi \, D \cos j$$



Example of a palaeogrid with the « north » pole near from Detroit

4. Climate changes as planned for discussions in Brisbane (34th IGC, 2012)

Theme 3. Climate Change: Lessons from the Past; Implications for the Future

Coordinators: Michael BIRD michael.bird@jcu.edu.au (Australia) and Giuseppe Cortese (New Zealand)

The geological record offers unique insights into understanding the multiple drivers and diverse consequences of climate change. Abrupt and rapid climatic changes in the past provide valuable analogues for future potential changes, and can be used to explore the veracity of climate models. We are interested in contributions addressing climate model-paleoclimate data comparisons, climate sensitivity, ocean acidification, carbon cycle dynamics, geosphere-biosphere feedbacks, climate variability in a warmer world, multi-proxy approaches to climate-temperature-hydrology reconstructions, and polar ice sheets and sea-level change. Contributions from other important areas of paleoclimate research such as climate and tectonics are also welcome.

Symposia

3.1 Climate variability in the Holocene

Gert J. DE LANGE gdelange@geo.uu.nl (Netherlands) and Francis JIMENEZ-ESPEJO (Spain)

High-resolution Holocene climate records are invaluable for assessing how Earth is likely to respond to projected temperature and related environmental changes during the next few centuries to millennia. In this Symposium, we seek to place the impact of anthropogenic climate change into the context of natural climate variability over the last 10,000 years. We particularly encourage contributions that utilise multiple proxy, high-resolution approaches to the study of ice core, terrestrial and marine sediment archives.

Keynote speaker: Edouard BARD (France)

3.2 Geology and Archaeology: submerged landscapes of the continental shelf

Jan HARFF jan.harff@io-warnemuende.de (Germany), Geoff BAILEY (United Kingdom) and Friedrich LÜTH (Germany)

Climatically controlled sea level dynamics has influenced human population globally since prehistoric times. Global marine regression during glacial periods converted former marine environments of the continental shelf to prime territory for human settlement during 90% of human existence on the planet, until the postglacial transgression re-submerged these paleolandscapes. This shelf region provides the key to understanding earliest human dispersal out of Africa, and subsequent dispersals to all the major land masses as well as earliest developments in seafaring and marine exploitation. Marine geologists, archaeologists and climatologists are invited to present and discuss results in this field of underwater paleoenvironmental investigation.

Keynote speakers: Nicholas FLEMMING (UK) and Jon ERLANDSON (USA)

3.3 Monsoons, droughts and extreme weather events: deciphering climate variability from the geological record

Jonathan NOTT jonathan.nott@jcu.edu.au (Australia), James SHULMEISTER (Australia) and Mohammed Rafi G. SAYYED (India)

The role of extreme weather events and enhanced climate variability is rapidly becoming a focus of concern for future climate change. Climate variability and the role of extreme events is, however, difficult to model and possible changes in climate state mean that modern climate records may be of limited use in predicting future variability. Geological archives provide a unique opportunity to investigate climate variability and extreme events under altered climate regimes. We seek novel contributions that address all areas of climate variability and extreme weather events.

3.4 Climate in a warmer world: Late Quaternary evidence from land, sea and ice records

Lionel CARTER lionel.carter@vuw.ac.nz (New Zealand), Giuseppe CORTESE (New Zealand), Rewi NEWNHAM (New Zealand) and Nancy BERTLER (New Zealand)

Palaeoenvironmental records of Late Quaternary interglacial periods are windows into a warmer world. Despite differences in temporal and spatial resolution, ice, terrestrial and marine archives of past change are invaluable for depicting how Earth is likely to respond to temperature changes projected for the next few centuries. Papers centred on environmental change during interglacial periods of the last 400,000 years are particularly welcome.

Keynote speakers: Marcus VANDERGOES (New Zealand) and Dorthe DAHL-JENSEN (Denmark)

3.5 The silent majority: Cenozoic (Paleocene-Pliocene) records of climatic warmth

David GREENWOOD greenwoodd@brandonu.ca (Canada), Matthew HUBER (USA) and Patrick MOSS (Australia)

The silent majority: pre-Quaternary records of climatic warmth. Ninety five percent of the Cenozoic exhibited little to no bi-polar glaciation, in part due to high CO2. Yet the lessons gleaned from this pre-icehouse climate archive have not informed discussions of the future as much as they should. Contributions are sought that identify key patterns and processes that caused, maintained, perturbed, and modulated pre-Quaternary greenhouse climate conditions.

Keynote speakers: Gabriel BOWEN (USA), Scott HUCKNELL (Australia) and Matthew HUBER (USA)

3.6 Greenhouse world and rapid climate change during the Mesozoic [International Geoscience Program (IGCP) 555, IGCP 507 and International Continental Drilling Program (ICDP) Songliao Project]

Chengshan WANG chshwang@cugb.edu.cn (China), Michael WAGREICH (Austria) and Xiaoqiao WAN (China)

As atmospheric CO2 concentrations rise during the 21st century, the Mesozoic-Paleogene “greenhouse climate” will

serve as a relevant model. For example, during the mid-Cretaceous atmospheric CO2 contents were 4-8 times greater than the modern pre-industrial level. An understanding of how CO2 influenced the ocean/climate interaction will aid predictions of modern climate changes. Information on the Mesozoic-Paleogene greenhouse world comes from numerous studies of marine sediments both from continents and numerous ODP/DSDP sites. IGCP 555 examined the rapid environmental/climate change in the Cretaceous world (the so-called paradigm of greenhouse climate) and ocean-land interactions. A unique terrestrial record, extending from the Turonian to the Maastrichtian and forming the basis for the marine/terrestrial correlation and modelling data to test the climate/ocean interaction, comes from the Cretaceous lacustrine record in a 2600 m composite core in the Songliao Basin in NE China (SK-1 drilling program). The Continental Scientific Drilling Project of the Cretaceous Songliao Basin (drilling in August 2011) proposes to obtain about 4500 m of cores which, combined with the existing SK-I, and -II cores, will form the first nearly complete Cretaceous terrestrial sedimentary record in the world and provide high-resolution climate records of the terrestrial environment from the latest Jurassic to early Paleogene. This topical Symposium will address the causes, processes, and consequences of rapid environmental changes in the Mesozoic-Paleogene greenhouse world, from both marine and terrestrial records.

Keynote speakers: Chengshan WANG (China), Michael WAGREICH (Austria),Yong Il LEE (Korea) and Helmut WEISSERT (Switzerland)

3.7 Pre-Mesozoic climates and global change [IGCP 591]

Kathleen HISTON catherine.histon@unimore.it (Italy), Vinod TEWARI (India) and Michael MELCHIN (Canada)

The Earth's severe global palaeoclimatic cycles, from global icehouse to greenhouse conditions, witnessed in the Neoproterozoic recur also throughout the Palaeozoic Era. The proposed session will explore integrated approaches to palaeoclimate reconstructions (fossils, proxies, models), correlation of the stratigraphic record of climate change, and cause-effect relationships within the ocean- atmosphere-biosphere Earth System during the Palaeozoic and Neoproterozoic.

Keynote speakers: David HARPER (Denmark) Alain PREAT (Belgium) and David RAY (UK)

3.8. Climate change and biodiversity patterns in the Mid Paleozoic [IGCP 596, IGCP 580 and SDS]

Peter KÖNIGSHOF peter.koenigshof@senckenberg.de (Germany) and Thomas SUTTNER (Austria)

The Mid-Paleozoic conforms to a time interval of dynamic long-term climate change. A rapid rise of land plants during the Middle Devonian which was coupled with strongly decreasing atmospheric CO2 values during the latest Devonian was followed by a complete reorganisation of ecosystems with tremendous consequences for marine communities at global scales. We are interested in contributions related to refinement of taxomomic identification and the increase in documentation of all fossil groups indicating terrestrial, neritic and pelagic marine environments during the Mid-Paleozoic for a better understanding of evolutionary trends in biodiversity during that time interval.

Keynote speakers: Wolfgang KIESSLING (Germany), Anne-Christine da SILVA (Belgium) and Carlton BRETT (USA)

5. Interesting fresh news (September 2013)

The Value of Geoinformation for Disaster and Risk Management (VALID)

Benefit Analysis and Stakeholder Assessment

This publication is the result of the collaboration of many scientists who are dedicated to the implementation of geospatial information for Disaster and Risk Management.

Editors: Orhan Altan, Robert Backhaus, Piero Boccardo, Fabio Giulio Tonolo, John Trinder, Niels van Manen, Sisi Zlatanova
Published by: Joint Board of Geospatial Information Societies (JB GIS)

Launched at the United Nations Office for Outer Space Affairs (OOSA), Vienna, Austria, on 3 September 2013.

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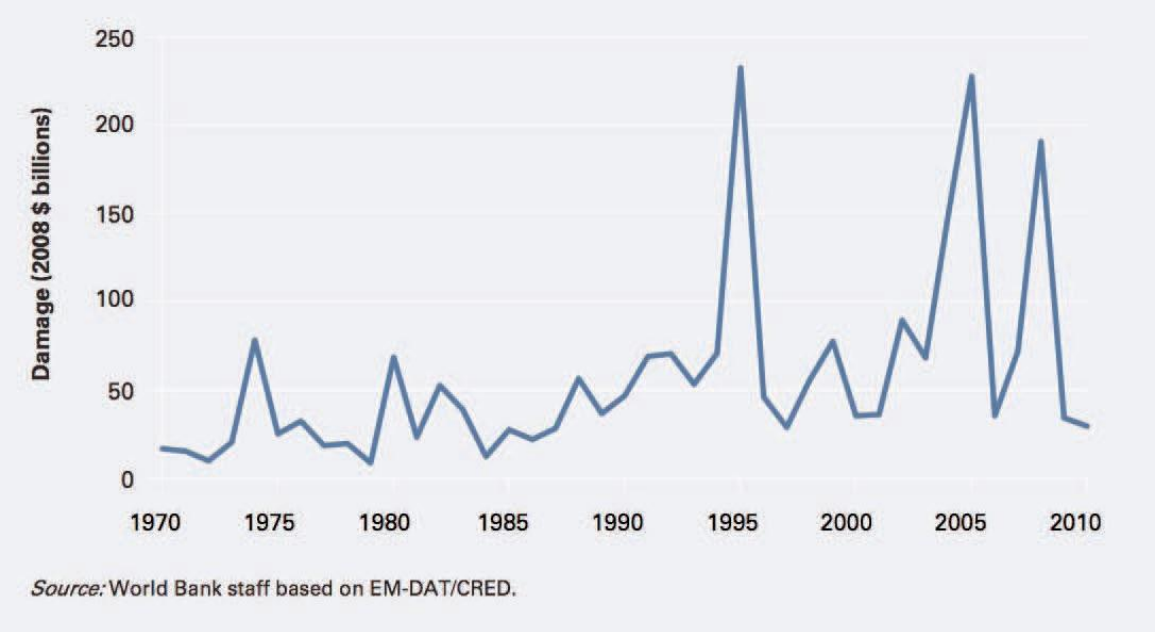

Figure 2.1: Damage on the rise in the last two decades (global damage from hazards, 1970-2010) (The World Bank/ United Nations 2010)

6. Comments to the recent reports of the Intergovernmental Panel on Climate Change (IPCC)

The recent results of the IPCC can be used for indicating an incorrect strategy of work and failure of scientific results of this institution. Let us remember just the Press Release http://climatechange2013.org/images/uploads/WGI-AR5_SPMPressRelease.pdf and present the first part of it:

STOCKHOLM, 27 September - ***Human influence on the climate system is clear. This is evident in most regions of the globe, a new assessment by the Intergovernmental Panel on Climate Change (IPCC) concludes.***

It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century. The evidence for this has grown, thanks to more and better observations, an improved understanding of the climate system response and improved climate models.

Warming in the climate system is unequivocal *and since 1950 many changes have been observed throughout the climate system that are unprecedented over decades to millennia. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850, reports the Summary for Policymakers of the IPCC Working Group I assessment report, Climate Change 2013: the Physical*

Science Basis, approved on Friday by member governments of the IPCC in Stockholm, Sweden.

"Observations of changes in the climate system are based on multiple lines of independent evidence. Our assessment of the science finds that the atmosphere and ocean have warmed, the amount of snow and ice has diminished, the global mean sea level has risen and the concentrations of greenhouse gases have increased," said Qin Dahe, Co-Chair of IPCC Working Group I.

Thomas Stocker, the other Co-Chair of Working Group I said: "Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require ***substantial and sustained reductions*** *of greenhouse gas emissions."*

"Global surface temperature change for the end of the 21st century is projected to be likely to exceed 1.5°C relative to 1850 to 1900 in all but the lowest scenario considered, and likely to exceed 2°C for the two high scenarios," said Co-Chair Thomas Stocker. "Heat waves are very likely to occur more frequently and last longer. As the Earth warms, we expect to see currently wet regions receiving more rainfall, and dry regions receiving less, although there will be exceptions," he added.

Projections of climate change are based on a new set of four scenarios of future greenhouse gas concentrations and aerosols, spanning a wide range of possible futures. The Working Group I report assessed global and regional-scale climate change for the early, mid-, and later 21st century.

"As the ocean warms, and glaciers and ice sheets reduce, global mean sea level will continue to rise, but at a faster rate than we have experienced over the past 40 years," said Co-Chair Qin Dahe. The report finds with high confidence that ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010.

It is necessary NOT TO OVERLOOK one simple sentence: … ***many changes have been observed throughout the climate system that are unprecedented over decades to millennia.*** Here is just the basic error of the whole work of the IPCC. The Earth sciences know with the absolute certainty about the periodical changes of the climate **in the geological history.** What can represent for the Earth crust history changes which occurred just in several millennia? We start to live in a period similar to another one which occurred AT LEAST 5 – 10 thousand years ago (but maybe even much more!). Moreover, the real geological "history" taken into consideration in the IPCC models does not exceed 150 years (i.e. a very very short "moment" of the Earth life)!

In such a situation **GEOLOGICAL FACTORS NEED TO BE TAKEN AS INDISPUTABLE DECISION MAKERS OF SUCH CLIMATE CHANGES** – even when admitting some additional anthropogenic effect!

The only ADVANTAGE of the present situation can be seen in the fact that a falsely motivated "alarm" of the IPCC coincides with the real alarm of the Earth sciences. Lot of work should be done to be prepared for mitigating the natural hazards which should be really expected in a very near future.

In fact it is a tragedy that the IPCC is operating among the world population with peer reviews as a significant verification of such a very problematic "truth".

7. Conclusions (including the needed role of geoethics)

Present changes should be seen in the context with billions of years of natural changes. Mostly only Earth scientists (geologists of many specialities) are competent and responsible for progress in studying these phenomena in order to solve possible forecasting and prediction of future returns of considerable changes. They should be supported by all competent authorities and players in the market.

Geoethics as a new discipline at junction of Earth sciences and ethics tries to emphasize various contexts of facing extraordinary intensive natural hazards and disasters. Numerous examples in the course of recent years can be presented in various parts of the world. Moreover fresh experiences give a serious warning that also some relatively "small" disasters may appear as dangerous in continental and global scales. Geoethical issues are to be preferentially applied for assuring a fair co-existence of mankind with the abiotic Nature and for trying to minimize potential damages with a high level of responsibility. From this point of view some oversimplified "sustainable development" ideas can finally appear as unsustainable because of not taking into consideration all possible disasters caused exclusively by the ABSOLUTELY UNAVOIDABLE PROCESSES IN THE EARTH CRUST.

Geological factors need to be reflected and respected in any concept of environmental sustainability. People have to improve permanently by an appropriate up-to-date geoeducation any knowledge of the behaviour of the Nature (including its predictability). The needed geoethical way of thinking and acting should be based on generally accepted moral and ethical principles achieved by the mankind by various ways and experiences (in spite of some current contrary trends). It is necessary to seek new priorities emphasizing more and more the solidarity of human kind.

Geoethical dilemmas for the coming century and millennium should be based on an appropriate evaluation of risks. Many new solutions are to be sought and found to make the world better.

Let me remember a recommendation expressed by Arun D. Ahluwalia (India): *„Global disaster management has to take priority over all expensive national egotist researches forever frozen in scientific reports or journals without ever touching humanity at the grassroots."*

Very similar ideas have been expressed by the famous Czech scientist, writer and artist F. X. Šalda more than one hundred years ago (when he criticized scientists preferring a "research" work not representing any real progress in the know how of the mankind).