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1304th Conference

October 2017 | Volume 8 | Issue 9 | ISSN: 2157-7617
Journal of Earth Science & Climatic Change

Proceedings of

3rd World Congress on

Climate Change and Global Warming

October 16-17, 2017 Dubai, UAE

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Keynote Forum

(Day 1)

Peter Hoeppe, J Earth Sci Clim Change 2017, 8:9 (Suppl)
DOI: 10.4172/2157-7617-C1-032

3rd World Congress on
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Peter Hoeppe

Munich Re, Germany

Increasing losses caused by extreme weather events: What are the drivers and what is the role of climate change?

Losses caused by natural disasters are a major factor influencing the balance sheet of insurers, especially reinsurers. Such events have a high potential of creating extreme accumulation losses. This is why the insurance industry has built up a lot of expertise in analyses and assess-ment of trends of losses caused by natural perils. Such losses have increased tremendously worldwide in the last decades. In order to detect the drivers of this trend the losses have to be adjusted for changes in exposed values. Munich Re just recently has developed a very sophisticated method for such a normalization of losses. After this normalization a still residual loss trend can be either driven by changes in the vulnerability of assets or on the hazard side. The results of such analyses with data of the Munich Re Nat Cat SERVICE database clearly show that in the last decades the main drivers of the loss trend have been changes in the exposure of values, i.e., growth of population and wealth in affected regions. Also a shift of population into more hazardous regions, especially to the coasts is increasing the losses. On the other side a clear signal of prevention measures, e.g., investment into flood protection, already can be detected in decreasing normalized losses caused by river floods, even though the number of intense precipitation events has increased. For thunderstorm related loss events the number of events as well as the normalized losses has increased significantly in North America and Europe. There is a suggestion that these increases are driven by an increase in the humidity of the lower atmosphere and thus, that this is a secondary effect of climate change. As global warming will continue in the coming decades, its contribution to increasing natural catastrophe losses will become more prominent, a projection also given by the 5th assessment report of the Intergovernmental Panel on Climate Change.

Biography

Peter Hoeppe is the Chairman of the Munich Climate Insurance Initiative, which he founded in 2005 and had been appointed as Climate Change Advisor of the Bavarian State Government. He has completed his Masters and PhD in Meteorology and Human Biology.

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Ji Whan Ahn, J Earth Sci Clim Change 2017, 8:9 (Suppl)
DOI: 10.4172/2157-7617-C1-032

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CLIMATE CHANGE AND GLOBAL WARMING
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Ji Whan Ahn

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Feasibility study of *in situ* precipitated calcium carbonates (PCC) synthesis technology for paper recycling by the capture and direct utilization of low concentration CO_2

Feasibility study of *in situ* PCC synthesis technology for paper recycling in the Phong Khe Paper Craft Village of Vietnam has a green manufacture model and solution for environmental remediation. *In situ* PCC synthesis technology is a recycling technique of waste paper and capture and direct utilization of low concentration of CO_2 with PCC filler which improves whiteness and machinery lifetime of paper. This paper recycling with *in situ* PCC synthesis has been developed and popularized in other countries. It is featured by a process of mixing waste pulp with PCC formed by quick lime (CaO) and CO_2 in an in situ PCC Reactor. In general, PCC synthesis processes are divided into the two following steps in paper recycling process: (1) CaO is turned into slaked lime (calcium hydroxide, $Ca(OH)_2$) through its reaction with water, which is called hydraulic process and (2) PCC is synthesized by the reaction between $Ca(OH)_2$ and carbonate ions (CO_3^{2-}). The technology has several advantages. It reduces overall manufacture costs and needs fewer corrosive chemicals, thus extending machinery lifetime. Most of all, the process is more environmentally friendly due to following reasons: Easier recycling CO_2 generated from paper industry, wood consumption reduction, less wastewater and byproduct production from the process and less energy consumption owing to shorter refining and drying times. It is calculated that recycling one ton of waste paper can reduce 937 kg CO_2, 3.22 KWh energy, 42,465 L water and 340 kg waste. In order to apply the paper recycling technology, an action plan which collects waste papers is required as a climate change adaptation. To spread the collection of waste papers, the system which transfers the collected waste papers to cashable mileage needs to be introduced in Phong Khe village and extend to entire of Vietnam. The system needs to be started with students and citizens as an education to sustainable paper recycling.

Biography

Ji Whan Ahn has completed her BS, MS and PhD degree in Mining and Minerals Engineering from Inha University and she has completed Master's degree in Resources Environmental Economics from Yonsei University. Currently she is working as an Executive Director in Carbon Resource Recycling Appropriate Technology Center, Korea Institute of Geosciences and Mineral Resources, President for Korea Institute of Limestone & Advanced Materials, Chairperson and Vice President of Korea Institute of Resources and Recycling. She has published more than 175 papers, 716 proceedings papers/conference presentations and 71 patents. She has received many awards for her research excellence.

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Jean Sciare, J Earth Sci Clim Change 2017, 8:9 (Suppl)
DOI: 10.4172/2157-7617-C1-032

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Climate Change and Global Warming

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Jean Sciare

The Cyprus Institute, Cyprus

Monitoring air pollution and climate change in the Eastern Mediterranean Middle East (EMME) region: Challenges and opportunities

Almost 400 million people live in the Eastern Mediterranean Middle East (EMME); a region where climate change is already evident (the number of extremely hot days has doubled in the region since 1970). In the near future, this region could become so hot that human habitability is compromised. The goal of limiting global warming to less than 2 °C, agreed at the 2015 Conference of Parties (COP21) of the United Nations Framework Convention on Climate Change in Paris will not be sufficient to prevent this scenario. In combination with increasing air pollution and windblown desert dust, the environmental conditions could become intolerable and may force people to migrate. The lack of constrains by accurate in-situ atmospheric data of key climate forcers has been identified as a major limitation for the validation/performance of climate models over the EMME. This may have a strong impact in the design of efficient regional/national Climate Change Mitigation and Adaptation strategies, which are usually fed by high-resolution regional climate projections. In this context, the rapid implementation of a regional atmospheric network with high quality data following international standards appears as a high priority for the entire EMME region. With the support of the ACTRIS pan-European Research Infrastructure, the Cyprus Institute is currently putting unprecedented efforts to establish the first ever long-term observations of climate forcers (greenhouse gases, aerosols, clouds, reactive gases) in the EMME region. This infrastructure gathers a ground-based supersite and a fleet of Unmanned Aerial Vehicles equipped with miniaturized sensors to scrutinize the vertical distribution of air pollutants in the first 5 km of the atmosphere. This infrastructure is seen as the first step towards a regional coordinated atmospheric network that is still missing in the Middle East.

Biography

Jean Sciare is the Director of the Energy Environment and Water Research Center of the Cyprus Institute, Cyprus. His main expertise covers the experimental characterization of atmospheric pollutants; addressing issues related their impacts on air quality, health and climate. He is currently leading the development of several major research infrastructures in Cyprus, contributing to the long-term observation of key climate forcers in the Eastern Mediterranean Middle East region. He has co-authored more than 100 international refereed publications and more than 200 presentations at international conferences devoted to atmospheric chemistry and physics.

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Keynote Forum

(Day 2)

Wendy Lynne Lee, J Earth Sci Clim Change 2017, 8:9 (Suppl)
DOI: 10.4172/2157-7617-C1-032

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Wendy Lynne Lee

Bloomsburg University of Pennsylvania, USA

Climate catastrophe refugees and the political value of terrorism to climate change denial in the United States

The aim of this study is to show how legislative processes ostensibly aimed at drafting laws that embody justice and equality have become systemically co-opted and corrupted through the machinations of legislators beholden to a donor class whose profit-objectives depend on the unfettered extraction of hydrocarbons. It's thus no surprise that the denial of anthropogenic climate change has come to inform not only energy-legislation, but potentially all law-making insofar it has become imperative to insure against profit-suffocating regulation. Senator James Inhofe offers an apt example. In 2015, he sponsored two bills, one acknowledging that climate change is real, but denying that it's anthropogenic; another to make English the official language of the US, the English Unity Act of 2015. While the first attempts to circumvent the debate concerning climate change, the second aims to discourage border crossings are two apparently different issues until we realize that many migrants are climate change refugees. Inhofe denies climate change but tacitly recognizes that it produces conditions for migration. He calls human-made global warming a hoax, but sponsors a bill to deter migrants seeking to flee its consequences. Throughout Inhofe's defense of the two bills, he refers to illegal immigrants as drug-runners and terrorists, a narrative that offers just what he needs: it detracts from the facts about climate change refugees and provides justification for policies like President Trump's wall. It provides apparent substance to the American president's references to radical Islamic terrorists alleged to cross from the South and helps to justify US withdrawal from the Paris Climate Accord. In the world, according to climate change denial, drafting law is less about social or environmental justice and more about insuring the hegemony of multinational energy interests. There are no winners. But there are losers: A planet that can no longer support human life makes refugees of us all.

Biography

Wendy Lynne Lee is a Professor of Philosophy at Bloomsburg University of Pennsylvania where she taught for over 25 years. She has published about 40 scholarly essays in her areas of expertise which include philosophy of language, philosophy of mind/brain, feminist theory, theory of sexual identity, post-Marxian theory, nonhuman animal welfare, ecological aesthetics, aesthetic phenomenology and philosophy of ecology. Her most recent book is *Eco-Nihilism: The Philosophical Geopolitics of the Climate Change Apocalypse.*

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Hans J Mueller, J Earth Sci Clim Change 2017, 8:9 (Suppl)
DOI: 10.4172/2157-7617-C1-032

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Hans J Mueller

Karlsruhe Institute of Technology, Germany

Negative greenhouse gas emissions: Options to make that real

Among many other information in my understanding the most important result of the United Nations framework convention on climate change is that limiting further greenhouse gas emissions is simply insufficient to make the survival of mankind possible. In near future, i.e., starting at about 2050, we need negative emissions and the time frame for developing the corresponding technologies is closing rapidly. Unfortunately since fall 2016, the melting process of both polar ice caps accelerated dramatically. If this continues, the nightmare of an ice-free arctic ocean anticipated for about 2050 could become real already during the next 3 years, i.e., 30 years earlier, which means, it could be the beginning of a dominating positive feedback process. Published models show planet earth will reach something between +5 and +7 degrees above the global mean temperature of the preindustrial era, i.e., about 1750, latest 1815 at the next turn of the century. Similar conditions already existed in geological history. There were 5 mass extinction events. Last time it happened at the Permian-Triassic-extinction event, 252 Mio years ago, as a result 98.5% of all species became extinct. Unfortunately all our recent technological tools, as e.g., replacing elder combustion techniques by higher developed new ones, extended use of renewable energies etc., are completely insufficient to reach that goal. The 6th mass extinction event is nothing which we can prevent to start. It is already running. Following recent studies the loss of species per time is already about factor 2 or higher than at the Permian-Triassic-extinction-event. During the last 200 years we have simply used our atmosphere as a waste disposal site. We simply need removing and save underground storage of greenhouse gasses. Therefore it is time to switch the anti-global warming strategy from technologies for limiting further continued positive emissions to techniques for real negative emissions. We have to realize man made global warming is so fast that it is much outside any equilibrium. That means we have only a chance for a further sustainable development if we restore our atmosphere as fast as possible back to its stage of 1815, best much earlier than 2050, if possible. It is time to concentrate on our resources to face this challenge. The fastest and cheapest way for reaching negative emissions is massive reforestration. Unfortunately this is not enough because only about the half of the amount of atmospheric greenhouse gases are the result of deforestration and human land use. Technological sequestration means washing out greenhouse gases, chemical reduction to long-term stable compounds and elements and its reliable storage. But there is a powerful opponent, the entropy. Any concentration process is accompanied by reducing the entropy, i.e., it is energy consuming. That means first of all it requires a lot of energy in addition to that part which our society is consuming right now and in future.

Biography

Hans J Mueller has completed his PhD in Geophysics at the Academy of Sciences, Berlin, Germany in 1988. During the last 30 years, he published multiple papers in reputed journals about high pressure geophysics, mineral physics and the deep interior of terrestrial planets.

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Mohammad R M Abu Zahra, J Earth Sci Clim Change 2017, 8:9 (Suppl)
DOI: 10.4172/2157-7617-C1-032

Mohammad R M Abu Zahra

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Amino-functionalized mesoporous silica-based adsorbent for CO_2 post-combustion capture

Conventional method capturing CO_2 using amine solution has been well-known and practiced in natural gas purification for long time, but it involves high energy demand, corrosion and degradation and not suitable to capture CO_2 from industrial sources like power plant flue gas. Amino-functionalized mesoporous silica adsorbent has emerged as a promising material for CO_2 post-combustion capture due to its possible reduction in regeneration energy, cheap price and ease to produce at large scale. Different types of adsorbents have been prepared by impregnating amines or grafting amino functional groups on inexpensive mesoporous silica and tested for CO_2 capture. Polyethyleneimine impregnated mesoporous silica (PEI-MPS) possesses high CO_2 loading (above 11 mg/g), it is easy to be produced at large scale and stable for multiple adsorption/regeneration cycles operating in a packed bed reactor. It lost only 16.6% CO_2 loading after 335 adsorption/regeneration cycles at 65/120°C, respectively. At high temperature, PEI-MPS encounters the vaporization of PEI causing a quick degradation, particularly in fluidized bed reactor. Amino-functionalized mesoporous silica (APTES-MPS) is synthesized by grafting method, in which, amino-functional groups form a chemical bond to silica substrate through Si-O-Si bridges. Thanks to the chemical bonding, APTES-MPS is more thermally and mechanically stable; it starts degradation at 205°C. Even though, the CO_2 loading of this adsorbent (~80 mg/g) is lower than that of PEI-MPS, it may be suitable for CO_2 capture using fluidized bed reactor. Recent study indicated that the use of PEI-MPS for CO_2 capture reduced ~46% regeneration energy in comparison with conventional 30% ethanolamine solution. This is due to the low heat capacity of solid adsorbent (~2.2 J/°C) and the avoidance of water vaporization. Mesoporous silica is produced using sodium silicate; cheap silica precursor therefore resulting amino-functionalized mesoporous silica could be inexpensive and suitable CO_2 capture. Highly stable adsorbent with significant reduction in energy consumption is a basis for an advanced CO_2 capture process.

Biography

Mohammad R M Abu Zahra is an Associate Professor and Department Head of Chemical and Environmental Engineering at Masdar Institute. His current research focuses on the development of CO_2 capture technologies including the development of advanced solvents, solid sorbents and novel processes. He is currently the Coordinator of the CCS research activities within Masdar Institute and he is leading major related projects.

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Queena K Qian, J Earth Sci Clim Change 2017, 8:9 (Suppl)
DOI: 10.4172/2157-7617-C1-032

Queena K Qian

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Green building promotion: Barriers and incentives from transaction costs perspective

Buildings are responsible for at least 40% of energy use in most countries. The absolute figure is rising fast, as construction booms and the rise of living standard. Urgent solution is needed to reduce buildings' energy use, thus addressing climate change. Reports show that with currently available technology, the energy-efficiency level could be increased by 30%, yet this does not happen. Affordability, i.e., higher capital investment is considered as the focal concern. The affordability study often ignores the hidden costs, i.e., transaction costs, including costs in the form of time delay, risk, stress due to the lack sufficient information, etc. The hidden costs to different stakeholders during the green building (GB) transaction are often ignored. Understanding these hidden transaction costs (TCs) helps appraise the costs and benefits of GB and policy effectiveness. The example of a gross floor area (GFA) concession scheme is used systematically to explore and understand the fundamental issues of TCs' typology and chronology in the GB development process. The GFA concession scheme is a popular incentive due to its indirect compensation to developers by allowing additional floor area without expenditure by government to implement GBs. A TCs' framework is used critically to review and evaluate the costs and benefits of the GFA concession scheme. Its particular implementation in both Hong Kong and Singapore is explored. Hong Kong is used as a case study, complemented with in-depth expert interviews on GFA concession in Hong Kong. The key contribution is to establish the parameters for estimating the optimum GFA bonus that could both motivate various stakeholders and minimize the negative impacts on the built environment in future.

Biography

Queena K Qian is tenure-tracked Assistant Professor at OTB Department, Faculty of Architecture and the Built Environment with the award of Delft Technology Fellowship (2014). She has also received Fulbright award (2010) and Endeavour Australia Cheung Kong Fellowship (2013). She has carried out research related to sustainable housing development including green building, building energy efficiency and energy retrofits, transaction costs analysis and age friendly urban development issues. She has published over 20 international referred journal papers and currently serves as an Editor and Board Member of *Journal of Housing and the Built Environment*.

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