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World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Posters (Day 2)



World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Variations of geoid undulations from satellite data of GRACE for Israel and surrounding countries

Jaroslav Klokocnik<sup>1</sup>, Jan Kostecký<sup>2,3</sup> and Ales Bezděk<sup>1</sup><sup>1</sup>Czech Academy of Sciences, Czech Republic<sup>2</sup>Research Institute of Geodesy, Topography and Cartography, Czech Republic<sup>3</sup>Technical University of Ostrava, Czech Republic

Since 2002, the US-German GRACE satellite mission (Gravity Recovery and Climate Experiment) has been providing a precise survey of the Earth's time-variable gravity field, with unprecedented temporal and spatial sampling. GRACE time-variable gravity field is a tool for measuring temporal and spatial variations of the mass redistribution within the Earth system. Time variability of the gravity field is presented here as “monthly gravity field models” of the geoid undulations. We show their regional variations in Israel and surrounding countries which have seasonal and secular character, connected with desiccation of underground water in the area. During 13 year interval of the data from GRACE, the secular decrease of the level of the waters in this area became evident. This result supports warnings coming from other data and points to the existence of a great danger not only for this area.

### Biography

Jaroslav Klokocnik is a University Professor of Geodesy at the Czech Technical University in Prague and Emeritus research worker in Astronomical Institute of the Czech Academy of Sciences, Prague-Ondřejov. His specialization is Satellite Dynamics and the Earth's gravity field studies. He published more than 200 research papers. He worked in Germany, USA, Egypt and other countries.

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World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Improving techniques for watershed water cycle to adapt climate change and variation

**Cheolhee Jang, Hyeonjun Kim and Sung Kim**

Korea Institute of Civil Engineering and Building Technology, Korea

Since South Korea is heavily populated and has very small land area, the country is more reliant on territorial resources, such as land and water, than other countries. Therefore, Korea faces a greater possibility of serious water resource problems caused by even small climate changes. To address the issue of restricted water resource caused by climate change, a system that predicts and evaluates climate change and the hydrologic cycle at local scales should be established. In addition, for establishing a long-term national water resource plan, predicting and evaluating the influence of climate change on water resources is very important. The aim of this study is to understand the changes in hydrological components such as runoff and evapotranspiration caused by future climate change using the CAT (Catchment hydrologic cycle Assessment Tool), which is a hydrological model developed by the KICT (Korea Institute of Civil engineering and building Technology) (Kim et al., 2012), and to provide a method to better manage climate change by evaluating water cycle improvement facilities in areas that require improvement. The water cycle improvement facilities were considered in this study, and these structures positively affect the water cycle as they enable retention (by absorbing rainwater), and reduce the impervious area (by securing green areas), while decreasing runoff. The CAT model used in this study provide a tool for evaluating the impact of such water cycle improvement facilities.

### Biography

Cheolhee Jang is currently working at Korea Institute of Civil Engineering and Building Technology, Korea. Cheolhee Jang research interests are Oceans and Climate Change, hydrologic & water cycle etc.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Precipitation over Zhejiang, Fujian and Jiangxi of China in June: Climatology

**Guoqing Zhai**

Zhejiang University, China

Precipitation climatology over southern Zhejiang, northern Fujian and eastern Jiangxi (ZFJ) of China is documented through the analysis of observational precipitation data and NCEP Reanalysis data from 1971 to 2013. Annual precipitation amount in ZFJ is similar to that over Jiang-Huai (JH), where Meiyu front torrential rainfall usually occurs. The analysis of monthly mean data reveals maximum rainfall amount in June over ZFJ. The analysis of 3 ten-day mean data in June shows the maximum rainfall over ZFJ in the 2<sup>nd</sup> ten days associated with transport of water vapor by southwesterly winds in the lower troposphere. The 2<sup>nd</sup> ten days are the transition from cyclonic circulation anomaly at the east of ZFJ in the 1<sup>st</sup> ten days to anticyclonic circulation anomaly in the 3<sup>rd</sup> ten days in the lower troposphere and from westerly anomaly across ZFJ in the 1<sup>st</sup> ten days to easterly anomaly in the 3<sup>rd</sup> ten days in the upper troposphere. The time series of rainfall amount averaged over ZFJ in the 2<sup>nd</sup> ten days reveals the 7 strong rainfall years (over the mean plus standard deviation). The strong rainfall years show an increasing decadal trend. The rainfall in the 2<sup>nd</sup> ten days over ZFJ for the strong rainfall years is associated with enhanced southwesterly winds in the lower troposphere and strengthened westerly winds in the upper troposphere. The rainfall in the 2<sup>nd</sup> ten days over ZFJ for the weak rainfall years is related to the suppressed southwesterly winds in the lower troposphere.

### Biography

Guoqing is currently working as a Professor in School of Earth Sciences, Zhejiang University, China. He has published over 50 papers in reputed journals.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Trend and seasonality of land precipitation in observations and CMIP5 model simulations

**Xiaofan Li**

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In this study, we examined the annual precipitation amounts, the seasonality over global land and their linear trends, and the uncertainties in observations and then compared them with historical runs by multiple models. Overall, the large-scale patterns of both the climatology of the annual precipitation amount and the seasonality are consistent between the observations. Nevertheless, some noticeable differences existed, particularly in the regions with fewer gauge observations, such as northern Africa and the Tibetan Plateau. For long-term changes, significant drying trends during 1948–2005 were observed in the tropical areas of northern Africa, accompanied by significant wetting trends in the polar region of Canada. The seasonality change during the period was dominated by a decreasing trend in precipitation, especially in the western portion of Russia. The model simulations of the Coupled Model Intercomparison Project, Phase 5 (CMIP5) reproduced the climatological mean state of annual precipitation and its seasonality in the observations, and to some extent the zonal mean trends of precipitation amounts, but did not reproduce the zonal mean trends of seasonality. The two-dimensional distribution of linear trends of annual precipitation and seasonality simulated by CMIP5 models showed little consistency with their observational counterparts. One possibility for the inconsistencies was that they were largely determined by internal variations of the climate system. In contrast, it might also suggest a challenge for state-of-the-art climate models to correctly simulate the spatial distribution of responses of annual precipitation amounts and seasonality to the evolution of external forcings.

### Biography

Xiaofan Li has completed his PhD from University of Hawaii, USA. He is working as a Professor at School of Earth Sciences, Zhejiang University, China. He has published over 100 papers in reputed journals.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Evolutions of the circulation anomalies and the quasi-biweekly oscillations associated with extreme heat events in South China

**Ruidan Chen**

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South China, located in the tropical-subtropical East Asian monsoonal region, presents a unique anticyclonic-cyclonic circulation pattern during extreme heat (EH), obviously different from the typical anticyclone responsible for EH in many other regions. Associated with the evolution of EH in South China, the anticyclonic-cyclonic anomalies propagate northwestwards over the Philippines and South China. Before the EH onsets, the anticyclonic anomaly dominates South China, and results in stronger subsidence over South China and stronger southerly/southwesterly over the western/northern margins of South China. The southerly/southwesterly transports more water vapor to the north of South China, and together with the local stronger subsidence result in dry air condition and accordingly favor the EH occurrence. Conversely, after the EH onsets, the cyclonic component approaches South China and offsets the high temperature. The oscillations of temperature and circulation anomalies over South China exhibit a periodicity of ~10 days and indicate the influence of quasi-biweekly oscillation (QBWO), which originates from the tropical western Pacific and propagates northwestwards. Therefore, the 5–25-day filtered data are extracted to further analyze QBWO. It turns out that the evolutions of the filtered circulation remarkably resemble the original anomalies with comparable amplitudes, indicating the QBWO is critical for EH occurrence. The QBWO could explain for 50% of the intra-seasonal variance of  $T_{\max}$  and vorticity over South China, and 70% of the warming amplitude on EH onsets. The close relationship between the circulations of QBWO and the EH occurrence indicates the possibility of medium-range forecast for high temperature in South China.

### Biography

Ruidan Chen has completed her PhD from the Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China. She is a lecturer in Sun Yat-sen University School of Atmospheric Sciences, Guangzhou, China. She has published 7 papers in reputed journals.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Impact of global warming on aquifer-river interactions under groundwater intensive use: Mancha Oriental Aquifer, Spain

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University of Castilla – La Mancha, Spain

The Mancha Oriental System (MOS) is one of the largest aquifer within Spain (7,260 km<sup>2</sup>). MOS is located in the SE of Spain and belongs to the Júcar River Basin. Since the 80's, the exploitation of groundwater resources have become a key driver for the socioeconomic development of the Castilla-La Mancha Region. Irrigation agriculture area currently exceeds 1,000 km<sup>2</sup>, and groundwater abstraction reached 314 Mm<sup>3</sup>/yr, from which 98% is used for irrigation. This figure contrasts with the available groundwater resources estimated (265 Mm<sup>3</sup>) in the Júcar Hydrological Plan. Global warming effects on groundwater resources have been masked by intensive use of groundwater. Coinciding with the launch expansion of the irrigated area, regional temperature increased 2°C, not being able to establish a definite trend in relation to precipitation. However, the temperature rise has caused a decline in aquifer recharge -18.9 Mm<sup>3</sup>/yr (compared to the full 1940-2010 period), which has generated a loss in the aquifer storage and a reduction in the Júcar river base flow of about 1.1 Mm<sup>3</sup>/yr. So far these data have not been taken into account in groundwater management measures tasks but should be crucial for a new hydrological planning policy taking into account that global warming continues its current trend.

### Biography

Iordanka Dountcheva has completed her master degree studies in 1997 from Technical University – Sofia, Bulgaria in Industrial Automation Engineering and obtained the corresponding Spanish diploma from the Spanish Ministry of Education, Culture and Sports after complementary courses at the Polytechnical University – Valencia, Spain in 2013. Before starting her PhD studies in Hydrological Modelling with joint supervision from Technical University Sofia and the University of Castilla-La Mancha, she has worked for the last 9 years in the private sector on Town Planning and Infrastructural Projects Consultancy. She is member of the College of Graduate and Industrial Technical Engineers of Albacete.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Inter-annual variability of wintertime monthly surface air temperature in China

Maoqiu Jian and Dan Jia  
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Based on observed and reanalysis data, this study analyzes the spatiotemporal variations of monthly surface temperature in winter in China, their interrelationship and the related anomalous circulation on the inter-annual timescale. The atmospheric internal mechanisms for the inter-annual variation of surface temperature are also discussed. The dominant inter-annual mode is uniform across China, except in the Tibetan Plateau, for all winter months, while the second mode is a north-south dipole mode with opposite sign. The dominant inter-annual modes of surface temperature in January and February are closely correlated to each other in phase, but are to some extent negatively correlated with that in the prior December. The dominant inter-annual modes of monthly surface temperature in winter are also linked to the opposite-sign dipole anomalous patterns of surface temperature in the Eurasian continent. The anomalous temperature signals associated with the nationwide winter surface temperature anomalies may extend up to high levels in the troposphere, with the most intense signals at the surface. The surface temperature anomalies may induce the air temperature anomalies from the near surface to the upper troposphere via the upward long wave radiation flux anomalies emitted from the underlying surface. In all winter months, the intensified westerly over the northern Eurasian continent hinders the southward intrusion of cold air from high latitudes, and then results in a deep warm anomaly over winter in China, and an even larger part of the Eurasian continent.

### Biography

Maoqiu Jian has completed his PhD from Sun Yat-sen University of China. He is a Professor of school of Atmospheric Sciences, Sun Yat-sen University, a top ten university in China. He has published more than 60 papers in reputed journals.

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### Notes:



World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Run-up of solitary waves on variable slopes

**Yong-Sik Cho**

Hanyang University, Korea

Behaviors of tsunamis in the coastal area should be very carefully analyzed and predicted. In special, an accurate analysis of incident tsunamis around coastal structures is directly related to the safety of coastal communities. Thus, a proper and accurate numerical model should be used to analyze tsunami behaviors near coastal communities. In this study, the maximum run-up heights of solitary waves on variable beach slopes are investigated. The solitary waves are probably most suitable incident wave representing behaviors of tsunamis and they can propagate a long distance without transformation. The existing popular numerical model is first employed to investigate run-up heights of solitary waves acting on variable slopes. The series of laboratory experiments are also conducted to analyze run-up heights of solitary waves. The maximum run-up heights of solitary waves are measured in hydraulic laboratory and the accuracy of the numerical model is analyzed by comparing the laboratory measurements related to maximum run-up heights of solitary waves. Various conditions such as variable beach slopes, heights of incident solitary waves, and existence of submerged breakwater are tested in laboratory experiments.

### Biography

Yong-Sik Cho got his PhD from Cornell University in 1995. The title of his thesis is Numerical Simulations of Tsunami Propagation and Run-up (Advisor: Professor Philip L.-F. Liu). From March 1997, he had been employed as an Assistant Professor at the Department of Civil and Environmental Engineering at Sejong University, Korea and then moved to the Department of Civil and Environmental Engineering, Hanyang University on March 2000. He has published 84 papers in peer-reviewed international journals.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Sustainable energy used in wastewater treatment. Removal of dyes

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Contamination of rivers with industrial dyes has a strong impact over their flora and fauna by reducing the amount of solar radiation that reaches the surface of plant leaves, due to its absorption. Also, dyes can be absorbed by the flora, fauna and aquatic sediments. Due to decreasing amount of available solar radiation photosynthesis is diminished affecting food chain and breathe of aquatic flora and fauna. Process waters of consumables for printers and copiers industry are contaminated, mainly with ink pigments from the washing of toners and toner cartridges. Decontamination is difficult due to increased solubility of the pigments. A decontamination method is the adsorption of the pigments on different materials but this leads to large amounts of solid waste and hence the problem of storage and handling. Electrocoagulation with soluble anode is, instead, an efficient treatment method, generating a relatively small amount of solid waste and reducing operating costs. In this paperwork, we have done studies on the effectiveness of using electrocoagulation with soluble anode in cleaning pigment contaminated wastewater. Electricity required this process is obtained from solar energy using more efficient photovoltaic panels and electric accumulators coupled with DC/AC and AC/DC converters.

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**Notes:**

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Effects of various ecological factors on process-based ecological model behavior uncertainty

Yin Ren

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Ecological forecasting predicts the effects of environmental changes on ecosystem state and activity. At present, technologically comprehensive forecasting estimates are estimated using process-based ecological models. However, it is difficult to isolate the ecological factors that cause models behavior uncertainty. To solve this problem, this study aimed to construct an ecoinformatic diagnostic framework to explain uncertainty in model behavior with respect to both the mechanisms and algorithms involved in ecological forecasting. We introduce a complicated ecological driving mechanism to the process-based ecological model using analytical software and algorithms. The ecological forecasting study involved three components: (1) model-observation validation, (2) diagnostic framework, and (3) temporal and spatial forecasting methods. Subsequently, as a case study, we apply the diagnostic framework to detect *Eucalyptus* biomass forest patches at a regional scale (196,158 ha) using the 3PG2 (Physiological Principles in Predicting Growth) model. Our results show that this technique improves the accuracy of ecological simulation for ecological forecasting and prevents new uncertainties from being produced by adding a new driving mechanism to the original model structure. We achieved the highest cost performance ratio between the accuracy requirement of model simulation and the availability of observation data. This result was supported by our *Eucalyptus* biomass simulation using the 3PG2 model, in which ecological factors caused 21.83% and 9.05% uncertainty in model behavior temporal and spatial forecasting, respectively. In conclusion, the systematic ecoinformatic diagnostic framework developed here provides a new method that could be applied to research requiring comprehensive ecological forecasting.

### Biography

Yin Ren has completed his PhD at the age of 29 years from Nanjing Forestry University and Postdoctoral studies from Institute of Urban Environment, Chinese Academy of Sciences. He is the Director of Urban Environmental Planning and Management. He has published more than 10 papers in reputed journals and has been serving as an Editorial Board Member of repute.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Impacts of climate change on the grape production in Tokaj wine region

Zoltán Bihari, Éles Sándorné, Balling Péter, Kneip Antal, Tóth János and Zsigrai György

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Changes in the climate of the past 100 years of measurements made in the Research Institute for Viticulture and Oenology, Tokaj is well demonstrated. Increase in temperature itself does not mean a big change, but weather changes related to it can basically determine the conditions of grape and wine production. Examining the extremes of the vintages since 2000 brought new records of temperature, rainfall, plant health, etc. One of the tasks of our institute is to prepare for the inevitable changes with selecting clones and rootstocks which are able to tolerate extreme circumstances; meanwhile they meet the quality requirements as well. We analyzed the air temperature conditions of the last 100 years in the Tokaj wine region. Drought tolerance of some rootstock varieties and Furmint clones, susceptibility to bunch rot contamination of Furmint clones in humid weather conditions were examined in field experiments. On the basis of these results we try to suggest application of Furmint clones and rootstocks varieties adapting to the changing climate.

### Biography

Zoltán Bihari has completed his PhD from Debrecen University, Hungary. He taught 15 years in the University of Debrecen. Currently, he is the Director of Research Institute for Viticulture and Oenology, Tokaj, Hungary.

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World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Close correlations of the air temperature with the earth length of day in the interdecadal time scale

**Wenjing Shi**

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The close relationship in interdecadal time scale is found between LOD and the tropospheric air temperature over the north of 30°N. The northern subtropical skin temperature will increase/decrease 0.28°C when LOD decrease/increase 1 ms. Also, the significant correlation between LOD and the air temperature only occurs in the middle summer and autumn (from July to November). According to the principle of the angular momentum conservation, the high relation of LOD with the air temperature may be associated with the atmospheric angular momentum (AAM) change. Therefore, correlations of LOD with AAM, the zonal wind and geopotential height are also analyzed. The result shows that the LOD change is only significantly related to the averaged AAM in northern hemisphere. When LOD increase, the westerly wind belt will expand toward the equator, and there are significant increases in the air mass over the northern tropical area (from the equator to 30°N) below the layer of 700 hPa, while decreases in the northern subtropical region (around 60°N) from 700 hPa to 30 hPa, and vice versa. The further analyses reveal that the significant correlations of LOD with the zonal wind and the geopotential height both start from April. That means the change of the air temperature lags 3 months compared with the change of atmospheric circulation. Therefore, the change of LOD results in the change of atmospheric circulation to satisfy the principle of the angular momentum conservation, then causes the change of air temperature.

### Biography

Wenjing Shi has completed her PhD at the age of 29 years from Nanjing University of Information Science & Technology and Postdoctoral studies from Institute of Atmospheric Physics/Chinese Academy of Sciences. She has published more than 14 papers in reputed journals. She mainly studies monsoon, climate change, and air-ocean interaction.

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World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Destruction of removal efficiency measuring methodology of POU scrubber for semiconductor and electronics industries

Woo Chan Lee<sup>1</sup>, Kyoong Duk Yoon<sup>1</sup> and Byung Chul Shin<sup>2</sup><sup>1</sup>Korea Testing Laboratory, Korea<sup>2</sup>GreenConTech, Korea

One objective of this paper is to develop the more reliable measuring method of the fluorinated greenhouse gas (F-GHG) abatement system. F-GHG from etching and CVD process of semiconductor or electronic industries can be decomposed by point-of-use (POU) scrubber such as heat-wet, burn-wet, catalyst-wet, plasma-wet type scrubber and so on. The reduction amount of F-GHG can be calculated exactly by the continuous on-line monitoring systems at inlet and outlet of the abatement facility. However, the direct measuring methods of gas flow rate and F-GHG concentration require an expensive monitoring system and high operation cost. It is possible to calculate the reduction amount of F-GHG more accurately based on Tier 2 if we measure the reliable destruction efficiency of F-GHG with high accuracy. The current guidelines as a practical and reliable method for measuring DREs of the abatement systems of PFC gases during the manufacturing of electronic products are based on steady state condition. The steady state cannot be attained actually in most electronic manufacturing process because of the cyclic operation of F-GHG emitting lines such as etching or CVD process. The typical pattern of gas flow rate and F-GHG concentration from semiconductor industry is studied. It is advisable to determine the destruction efficiency of the abatement system based on total inlet and outlet amount of F-GHG during repeated representative cyclic operation.

### Biography

Woo Chan Lee has completed his PhD in Environmental Engineering from University of Seoul. Currently, he is carrying out the performance evaluation of the air pollution control process and waste management system at Korea Testing Laboratory. He has published more than 5 papers in reputed journals.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Temperature effects on larval growth and survival in five species of *Caribbean echinoids*

Valentina Perricone<sup>1,2</sup> and Rachel Collin<sup>1</sup><sup>1</sup>Smithsonian Tropical Research Institute,<sup>2</sup>University of Bologna, Italy

Under the climate change scenario, the possible effects of ocean warming were investigated on the larvae of five species of *Caribbean echinoids*: *Echinometra lucunter*, *Echinometra viridis*, *Clypeaster rosaceus*, *Tripneustes ventricosus* and *Lytechinus williamsi*. Their thermal tolerance was evaluated rearing them for six days under different temperature regimes (26, 28, 30, 32, 34, 36°C). The larval sensitivity to the treatments was evaluated on the base of survival and growth. The rearing at higher temperatures has revealed a great suffering state of the larvae by inducing both reduction of live larvae and abnormality in their development. Higher temperature treatments have shown a general lethal threshold at about 34°C for most of the species. As an exception, the lethal threshold of *Echinometra* species was 36°C, few larvae of which being still capable of survival at the temperature of 34°C. The studies have also analyzed the effect of water warming on the larvae development in terms of size and symmetry. The results put in evidence the presence of a critical upper temperature (about 32°C) at which the larvae of all species reveal a great suffering state that translates in the reduction of size (*i.e.*, body, stomach and postero-dorsal arm) and abnormalities (*i.e.*, strong difference in the lengths of the two postero-dorsal arms). As sea surface temperatures are predicted to increase of 4-5°C by 2100, the high percentage of abnormal larvae and their scarce survival observed at 32- 34°C treatments indicate that the early stages of these species could be affected by future global warming.

### Biography

Valentina Perricone has completed with honors her Master degree in Marine Biology at the age of 25 years from Alma Mater Studiorum University of Bologna. Previously, she had completed with honors the Bachelor's degree in Natural Science at the Federico II University of Naples in Italy. In 2015, thanks to a fellowship of University of Bologna, she spent six months at the Bocas del Toro Research Station of the Smithsonian Tropical Research Institute (Panama) working on her Master thesis, studying the temperature effects on larval growth and survival of Caribbean Echinoids.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Effects of acute temperature increase on performance and survival of *Caribbean Echinoids*

Francesco Rendina<sup>1,2</sup> and Rachel Collin<sup>1</sup><sup>1</sup>Smithsonian Tropical Research Institute, Panama<sup>2</sup>Alma Mater Studiorum University of Bologna, Italy

An increase of mean sea surface temperatures up to 4.8°C because of climate change is expected by the end of this century. The actual capabilities of marine invertebrates to adapt to these rapid changes have still to be understood. Adult echinoids play a crucial role in the tropical ecosystems where they live. Despite their role, few studies about the effect of temperature increase on their viability have been reported in literature. In this communication, we report a first systematic study on several Caribbean echinoids of the Bocas Del Toro Archipelago in Panama about their tolerance to temperature rise in the context of global warming. The research focalized on the 6 sea urchins *Lytechinus variegatus*, *L. williamsi*, *Echinometra lucunter*, *E. viridis*, *Tripneustes ventricosus* and *Eucidaris tribuloides*, and the 2 sand dollars *Clypeaster rosaceus* and *C. subdepressus*. Mortality and neuromuscular well-being indicators - such as righting response, covering behavior, adhesion to the substrate, spine and tube feet movements - have been analyzed in the temperature range 28-38°C. The righting time measured in the 6 sea urchin species demonstrated a clearly dependence on the water temperature. The experiments allowed to determine the “thermal safety margin” (TSM) of each species. *Echinometra lucunter* and *E. viridis* has resulted the most tolerant species to high temperatures with a TSM of 5.5°C, while *T. ventricosus* was the most vulnerable with a TSM of only 3°C. The study assessed that all the species already live at temperatures close to their upper thermal limit.

### Biography

Francesco Rendina completed with Honors, his Master's degree in Marine Biology at the Alma Mater Studiorum of Bologna (Italy) in March 2016. In 2015, he won a fellowship of the same University to prepare his thesis work abroad and spent 6 months (from June to November 2015) at the Research Station of the Smithsonian Tropical Research Institute (STRI) in Bocas del Toro (Panama) studying the effect of global warming on adult Echinoids. Previously, in July 2013, he had completed “with Honors” the Bachelor's degree in Natural Science at the Federico II University of Naples (Italy).

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### Notes:



World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Less heating, but more cooling - How will European countries be affected by climate induced changes in the energy demand of buildings?

**Mady Olonscheck**

University of Potsdam, Germany

Climate change affects the energy demand for room conditioning of buildings. Rising temperatures will cause a reduction in the heating energy demand but could also lead to a strong increase in the cooling energy demand of residential buildings. We present a method to calculate the impact of climate change, retrofitting measures and population changes on the future energy demand of the residential building stock in more than 20 European countries. The aim is to create a final map that shows countries which will benefit from future temperature increases due to strong reductions in the heating energy demand of buildings and losers. In the latter type of countries the increase in the cooling energy demand will be stronger than the reductions in heating energy demand. Finally, there will be countries with a future balance between an increasing cooling energy demand and a decreasing heating energy demand. This European-wide study will be the first study that not only allows for the examination of the impact of climate change on the building energy demand of different countries, but also allow for the determination of the contribution that each country can make to reduce greenhouse gas emissions and to mitigate climate change. First results will be presented for selected countries. A sensitivity analysis shows the contribution of the different influencing factors on the energy demand for room conditioning of buildings by the middle of this century.

### Biography

Mady Olonscheck has submitted her PhD on "the impact of climate on the energy sector" at the University of Potsdam in May 2016 and will defend it in September 2016. She has been working as Research Associate at Potsdam Institute for Climate Impact Research, Germany for more than five years. She is the author of different peer-reviewed publications that deal with climate change effects and has both teaching and supervision experience. She also completed a correspondence course on technological impact assessment at Karlsruhe Institute for Technology, Germany and is interested in international co-operations regarding energy, climate and sustainability issues.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Capture of carbon dioxide by TiO<sub>2</sub> modified amines

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Carbon dioxide from flue gas removed using different types of solid sorbents, including porous zeolites, alumina, metal-organic frameworks, silica materials and titanium dioxide. But, most of these conventional physisorbents suffer from low CO<sub>2</sub> adsorption capacities at relatively low carbon dioxide partial pressure and lower selectivity toward CO<sub>2</sub>. Said issues might be resolved by applying modifications in the surface chemistry of the porous materials through impregnation with functional groups including alkaline carbonates and various amines such as TEPA, TETA, DEA, and TEA. Porous materials described above with high surface area and pore volume could accommodate larger amount of basic groups to capture CO<sub>2</sub>. TiO<sub>2</sub> nanotubes, exhibiting hydrothermally stable tubular structure, large pore system and specific surface area enabling good accessibility for functionalization and adsorption are ideal mesoporous support for potential sorption applications. In this work, the TiO<sub>2</sub> produced by sulphate technology in Grupa Azoty Zakłady Chemiczne Police S.A., a chemical plant in Poland. The preparation of titanate nanotubes carried out by hydrothermal method and functionalized with different kinds of amines. The prepared adsorbents characterized by X-ray diffraction (XRD) and N<sub>2</sub> adsorption-desorption at 77 K. The morphology of the samples was observed with a scanning electron microscope (SEM) equipped with an energy dispersive X-ray spectrometer (EDS). Textual properties defined by FTIR/DRS and Raman spectroscopy. CO<sub>2</sub> adsorption/desorption measurements for sample at 30 °C were carried using Netzsch STA 449 C thermobalance (Netzsch Company, Germany) on the basis of the weight gain and loss during the sorption and desorption process.

### Biography

Ewa Piróg has completed her Master's from West Pomeranian University of Technology, Szczecin in 2009. Currently, she is PhD student, in Institute of Chemical and Environmental Engineering. She has published one paper in reputed journal. She takes an active part in many conferences.

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### Notes:

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# Climate Change

October 24-26, 2016 Valencia, Spain

## CO<sub>2</sub> adsorption over ammonia treated zeolite 13X

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The emission of carbon dioxide into the atmosphere from the fossil fuels is considered as major sources of the greenhouse effect. Capture with solid sorbents followed by underground storage is one of the most appealing options to reduce of CO<sub>2</sub> emission. Zeolites are microporous, crystalline materials with well-defined structures. Due to highly porous and consistent matrix, aluminosilicate are a potential material for CO<sub>2</sub> capture. In this study commercial zeolite 13X was treated with gaseous ammonia at different temperatures from 200 to 700°C. 1 g of zeolite was placed in a ceramic boat and put into tube furnace. The sample was heated in argon flow. When the furnace reached the desired temperature, the atmosphere was changed from argon to ammonia and then held for 2h. After this time the sample was cooled down to 100 °C. Finally the flow was switched to argon. Under this atmosphere the furnace reached room temperature. The samples were characterized by powder X-ray diffraction, X-ray photoelectron spectroscopy and nitrogen adsorption-desorption isotherm measurements at 77 K. CO<sub>2</sub> uptake was evaluated by isotherm measurement carried out at 298 K and pressure up to 0.95 atm. The modified with ammonia samples indicated improvement of CO<sub>2</sub> adsorption capacity. The CO<sub>2</sub> uptake was the largest for ammonia treated sample at 600 °C.

### Biography

A Gęsikiewicz-Puchalska graduated from the Faculty of Chemical Technology, Adam Mickiewicz University in Poznan in 2013. Currently, she is a PhD student at the Institute of Chemical and Environmental Engineering, West Pomeranian University of Technology in Szczecin. Her specialty is in inorganic chemical technology. She works in the Polish-Norwegian research project.

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# Climate Change

October 24-26, 2016 Valencia, Spain

## Comparison of the temporal variability of summer temperatures, rainfall and streamflows in southern Quebec during the 1950-2010 period

Anthony Pothier-Champagne, Vincent Maloney-Dumont and Ali A Assani  
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We have analyzed the summer daily temperatures (maximum, minimum and mean), rainfalls and streamflows (from June to September) measured at 25 stations distributed regularly throughout southern Quebec (Canada) during the 1950-2010 period by means of the Mann-Kendall, Spearman's Rank Correlation Coefficient and Lombard methods. 60% of the stations analyzed are characterized by a significant increase in the daily minimum temperature. This proportion falls to 52% for the daily mean temperatures and 30% for the daily maximum temperatures. The Lombard method revealed that this increase mainly occurred during the 1990s. At most stations, this increase is gradual. However, this temperature rise had very little effect on rainfalls (increase of less than 20%) and streamflows (increase of less than 15%).

### Biography

Anthony Pothier-Champagne is currently a Master's level student in Environmental Sciences at the University of Quebec at Trois-Rivières. He is working on The Niño/La Niña impact on hydro-climatic variables of Québec (Canada). He has already presented a communication at an international conference. Vincent Maloney-Dumont is in its first year of Masters in Environmental Sciences at the University of Quebec at Trois-Rivières. He works on the temporal variability of hydro-climatic variables in the southern Quebec. Ali Assani has completed his PhD at the age of 35 years from Liège University (Belgium) and Postdoctoral studies from Montreal University (Canada). He has published more than 50 papers in reputed journals.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Diurnal sap flow measurements and climatic responses of a species growing in a Mediterranean shrub land

**Judith Lize Arnolds**

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The ecological distribution of vegetation types are regulated by climatic conditions and precipitation is one of the most significant components driving the occurrence and diversity of species. Long-term monitoring and understanding plant responses to rapid changing environmental conditions are crucial for exploring community dynamics and evaluating the exposure of species to changes in the climate. In an attempt to assess the resilience of the Mediterranean woody shrub, *P. repens* to drought and temperature, the result of changes in temperature and moisture regime on the photosynthetic capacity and transpiration dynamics (hydraulic response), by monitoring chlorophyll fluorescence and diurnal monthly sap flow rates, non-destructively of plants in situ over a climate gradient at different times of the year at Jonaskop, Western Cape. Temperature, vapor pressure, RH and soil moisture were monitored concomitantly. Changes in stem sap flow rates were measured at hourly intervals with relative rate sap flow sensors interfaced with loggers installed on the same terminal branches of *P. repens* at each site along the climate gradient. The sensors were mounted on woody stems ranging from 1-5 mm in diameter. A portable modulated fluorimeter calculated the effective quantum yields of PSII ( $\Delta F/F_m'$ ) in 30 minute dark-adapted *P. repens* leaves. *P. repens* L. displayed significantly negative correlations between their total daily amplitudes in sap flow and station maximum daily temperature both in winter, spring, summer and autumn. The leaves of *P. repens* L. displayed significantly negative correlations between their total daily amplitudes in sap flow and photosynthetic effective quantum yield ( $\Delta F/F_m'$ ) at the 5 stations along the gradient during the months of October and November.

### Biography

Judith Lize Arnolds holds an MSc degree in Environmental Science from the North West University, South Africa and has just submitted her PhD. She is a scientist at the South African National Biodiversity Institute in Cape Town, South Africa and is involved in climate change research.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Forecasting about variations of hydro-meteorological variables in the future using SVAT model and RCP scenarios

Daeun Kim<sup>1</sup> Kiyoun Kim<sup>1</sup> and Minha Choi<sup>2</sup><sup>1</sup>Hanyang University, Korea<sup>2</sup>Sungkyunkwan University, Korea

Climate change is one of the urgent problems in various fields such as politics, economy, society, and culture, which is what we have to conquer. The climate change also have influenced on water resources which was closely related with human life. Especially, the water management is mightily significant issue for maintenance of connection with climate system, human society and environment. Thus, the forecasting of climate change effect in water resources is important to prepare the various risks of it. For the forecasting about variations of hydro-meteorological variables in the future, the Soil-Vegetation-Atmospheric Transfers (SVAT) models have been widely used because of its accuracy. Among them, the Common Land Model (CLM) is advanced SVAT model that often utilized to estimate hydro-meteorological variables in water resources. In addition, the Representative Concentration Pathway (RCP) scenarios that were introduced by Intergovernmental Panel on Climate Change (IPCC) were employed to research the future variations. In this study, we identified the variations of major energy fluxes such as net radiation, sensible heat flux, and latent heat flux in the past and future in East Asia. The energy fluxes were estimated using CLM and historical data, RCP 4.5 and RCP 8.5 scenarios which were selected to represent the differences between each scenario. The estimated energy fluxes were analyzed according to climatic regions which were classified by Köppen and Geiger. The results using CLM and RCP scenarios were compared with in-situ data and each other's and were showed time series of estimated energy fluxes according to climatic regions.

### Biography

Daeun Kim has completed her PhD in 2016 from Hanyang University and Post-doctoral studies from Sungkyunkwan University. Her Director is Dr. Minha Choi in graduated school of water resources.

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### Notes:

World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Soil organic carbon in forest and non-forest land in Lithuania

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The Land Use Land Use Change and Forestry (LULUCF) reporting under UNFCCC require specific carbon values in forest floor and mineral or peat topsoil in the land of different use. By the support of Norwegian Financial Mechanisms for Lithuania “Norway grants” we have estimated soil organic carbon stocks in forest, arable land and grassland. The study mainly covered not fertile *Arenosols* and, in opposite, fertile *Luvisols* and *Retisols*. The study was performed in 2015 at National Forest Inventory (NFI) permanent sample plots grid (approximately 9x9 km, in total 764 plots) that covers the whole territory of Lithuania. Forest floor samples were collected for the mass and carbon content, where as mineral top soil samples (from 0-10 cm and 10-30 cm surface layers) - for bulk density and carbon stock determination. It was found that in fertile soils the carbon stocks were higher in forest land as compared with arable land, while in not fertile soil – vice versa. Our findings confirmed that land use could be important factor for the estimation of soil organic carbon stocks in different soil groups.

### Biography

Povilas Zemaitis is a researcher in Institute of Forestry, Lithuanian Research Centre for Agriculture and Forestry, Department of Ecology. He has completed PhD studies in 2014. In his PhD thesis he was focused on climate change impact on Norway spruce health and vulnerability. Now his research interest is forest ecology, forest health, climate change impact on forest ecosystems. Currently he is working on carbon stocks assessment in forest and non-forest land in soil; the impact of afforestation on soil organic carbon stock.

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## Oral Accepted Abstracts





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October 24-26, 2016 Valencia, Spain

## Can temperature extremes in East Antarctica be replicated from ERA interim reanalysis?

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Based on daily minimum, maximum and mean surface air temperature ( $T_{\min}$ ,  $T_{\max}$ ,  $T_{\text{mean}}$ ) from European Centre for Medium-Range Weather Forecasts (ECMWF) reanalysis from 1979 onwards (ERA Interim), the accuracy of daily 2-meter  $T_{\min}$  and  $T_{\max}$  from ERA Interim reanalysis is assessed against in-situ observations from four Automatic Weather Stations (AWS; Zhong shan, EAGLE, LGB69 and Dome A) in East Antarctica for 2005 to 2008. ERA Interim generally shows a warm bias for  $T_{\min}$  and a cool bias for  $T_{\max}$ , with an underestimation of the diurnal temperature range. The reanalysis explains more than 84% of the daily and annual variance, and has annual root mean square errors of 2.4 °C, 2.6 °C, 3.0 °C and 4.3 °C for daily  $T_{\min}$ , and 2.2 °C, 3.1 °C, 3.4 °C and 4.9 °C for daily  $T_{\max}$  at Zhong Shan, LGB69, Eagle and Dome A, respectively. ERA Interim shows little seasonal variability, except at Dome A with better performance in the austral spring and worse in winter and autumn. An analysis spatial distribution of temperature and wind field shows that ERA Interim can replicate the progress of temperature extremes developing, occurring and disappearing. The weather events extracted from ERA Interim occur on the same day as the observation with high cross-correlation coefficient ( $R \geq 0.287$ ,  $N \geq 1131$ ,  $P < 0.001$ ). Both in the daily and annual performance of  $T_{\min}$  and  $T_{\max}$  and in the ability of prediction, ERA Interim shows the obvious regional differences, with errors tending to increase from the coast to the interior of the East Antarctica ice sheet. ERA Interim is, despite its limitations and deficiencies, a powerful tool for weather and climate studies in the Antarctica region. However, more in situ observations and projections are required for both scientific and recreational purposes.

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# Climate Change

October 24-26, 2016 Valencia, Spain

## Does the climate warming hiatus exist over the Tibetan Plateau?

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The surface air temperature change over the Tibetan Plateau is determined based on historical observations from 1980 to 2013. In contrast to the cooling trend in the rest of China, and the global warming hiatus post-1990s, an accelerated warming trend has appeared over the Tibetan Plateau during 1998–2013 (0.25 °C decade<sup>-1</sup>), compared to that of 1980–1997 (0.21 °C decade<sup>-1</sup>). Further results indicate that, to some degree, such an accelerated warming trend might be attributable to cloud–radiation feedback. The increased nocturnal cloud over the northern Tibetan Plateau would warm the nighttime temperature via enhanced atmospheric back-radiation, while the decreased daytime cloud over the southern Tibetan Plateau would induce the daytime sunshine duration to increase, resulting in surface air temperature warming. Meanwhile, the in situ surface wind speed has recovered gradually since 1998, and thus the energy concentration cannot explain the accelerated warming trend over the Tibetan Plateau after the 1990s. It is suggested that cloud–radiation feedback may play an important role in modulating the recent accelerated warming trend over the Tibetan Plateau.

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## Negative emissions-Options to make that real

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Among many other information in my understanding the most important result of the United Nations Framework Convention on Climate Change, 21st Conference of the Parties, short form United Nations Framework Convention on Climate Change, 21st Conference of the Parties at Paris, short form COP 2015 is that limiting further greenhouse gas emissions is simply insufficient to make the survival of mankind possible. In near future we need negative emissions and the time frame for doing that is closing rapidly. If we continue in a way we do right now it looks like the global mean surface temperature of 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. Similar conditions already existed in geological history. Last time it happened at the Permian-Triassic-extinction event, 252 Mio years ago. As the result of this, 98.5% of all species became extinct. Most of them were much more robust than we are. Consequently the agreement to limit the temperature increases in a minimum to about +2 degrees, and if procurable even to +1.5 degrees is crucial. What that means in terms of land use and technology is widely not understood. Unfortunately all our recent tools, as replacing elder combustion techniques by higher developed new ones, extended use of renewable energies, i.e. wind turbines, photovoltaic panels and the use of sustainable vegetable products etc. are completely insufficient to reach that goal. All of them are only able to reduce future emissions to some degree. Unfortunately even this small positive effect is overcompensated by the global industrial growth and the standard of living improvement of a growing world population. The unpleasant truth is business as usual combined with a little more reasonable, i.e. more ecological behavior, is good, but much too less unfortunately. During the last 200 years we have used our atmosphere as a waste disposal site, as we also did in the countryside and in the rivers. Meantime many countries of the world have sanified the dump sites and the rivers. Now it's time to do that with the atmosphere too. I think we only have a chance for a further sustainable development if we restore our atmosphere as close as possible back to its stage of 1815. This has to be done latest during the seventies of this century. The paper attempts to interpret this with realistic scientific and technological options and techniques to make that reality.

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World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Heat wave's short term effects in vulnerable groups: Parkinson disease and pregnant

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People over 65 years and those with certain underlying health conditions are considered particularly susceptible to extreme temperatures, but heat has a particularly important effect in patients with Parkinson's disease (PD) and pregnant women, causing premature births (PTB). We analyzed and quantified the short-term effect of high temperatures during heat waves in Madrid on daily mortality and PD-related hospital admissions and PTB during 2001-2009. We used an ecological time-series design and fitted Poisson regression models. We analyzed the daily number of deaths due to PD and the number of daily PD-related emergency hospital admissions and PTB in Madrid, using maximum daily temperature ( $^{\circ}\text{C}$ ) and chemical air pollution as covariates. We controlled for trend, seasonalities, and autoregressive nature. There was a maximum daily temperature of  $30^{\circ}\text{C}$  at which PD-related admissions were at a minimum. Similarly, a temperature of  $34^{\circ}\text{C}$  coincides with an increase in the number of admissions. For PD-related admissions, the Relative Risk (RR) for every increase of  $1^{\circ}\text{C}$  above the threshold temperature was 1.13 IC95% (1.03-1.23) at lags 1 and 5; and for daily PD-related mortality, the RR was 1.14 IC95% (1.0-1.28) at lag 3. Furthermore, we observed evidence of a short term effect at Lag 1, RR: 1.055 IC95% (1.018 1.092) on preterm births during the studied period. Our results indicate that suffering from PD is a risk factor that contributes to the excess morbidity associated with high temperatures, so heat waves are associated with PTB and is relevant from the standpoint of public health prevention plans.

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## Drivers of carbon sequestration in grassland soils: Evidence from long-term experiments

**Dario Fornara**

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Human activities over the last century have greatly contributed to affect the structure and functioning of many terrestrial ecosystems worldwide. From a climate change perspective human-managed ecosystems often act as a net source (rather than a sink) of atmospheric  $\text{CO}_2$ . Thus, we need to improve ecosystems' ability to sequester carbon (C) and reduce the C-footprint of many human-production systems including agriculture. Across terrestrial ecosystems soils represent the largest stores of C and have the potential to accumulate more C under suitable management practices. Grassland soils across Europe remain important food production systems whose long-term sustainability is threatened by increasing management intensification. Here, I present results from multiple long-term grassland experiments which show how soil C sequestration can increase with greater plant species diversity and/or under common agricultural practices. These findings suggest that there are different significant drivers of soil C sequestration and that their relative contribution varies along a gradient a grassland management intensity. For example, greater biodiversity facilitate soil C sequestration in semi-natural (e.g. low nutrient input) grasslands whereas the addition of organic nutrients to soils or agricultural liming contribute to higher soil C sequestration in intensively-used grasslands. I finally discuss why it is important to measure soil C sequestration rates across several years and what biogeochemical mechanisms might be responsible for changes in soil C sequestration through time.

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October 24-26, 2016 Valencia, Spain

## Does the voluntary carbon market promote sustainable development in developing countries? A portfolio comparison of VCS, GS and CDM

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The Clean Development Mechanism (CDM) was set up under the Kyoto Protocol to enable cost efficient greenhouse gas (GHG) mitigation by Annex I (developed) countries and promote sustainable development (SD) in non-Annex I (developing) countries. However, the market-based mechanism has been widely criticized for failing to deliver its SD goal. Its failure is often in reference to the cheap large-scale mitigation projects that the market support, namely industrial gases destruction projects that deliver limited co-benefits beyond GHG abatement. In addition, CDM projects are mostly hosted in emerging economies that are already attracting large foreign direct investment, whilst the African region where carbon finance is most needed has largely been sidelined. The voluntary carbon market (VCM) on the other hand has been promoted for its contribution to poverty alleviation and biodiversity conservation, thanks to its unregulated nature that allows for flexibility and innovation. However, such claim is mostly based on anecdotal evidence such as the market's demand for offsets generated from charamastic projects such as clean cook stove dissemination and forest conservation projects. In this presentation, I will discuss the factors that contribute to the failure of the compliance market in delivering SD, which in turn are the advantages offered by the VCM. Then I will present the project portfolio developed within the VCM, mainly under the Voluntary Carbon Standard and Gold Standard, and compare to the CDM project portfolio to examine if the two markets are different in term of the projects they support and therefore their contribution to local SD.

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## Database of climate change hazards to marine ecosystems

**Camino F de la Hoz, Elvira Ramos, Araceli Puente, José A Juanes and Iñigo J Losada**

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The current rates of change in physical variables may exceed the tolerance thresholds of many marines organisms, and they are predicted to accelerate over the next several decades. Therefore, the assessment of these changes over these valuable resources is necessary in order to manage them properly. To accomplish this objective the projection of key physical and chemical variables for the ecosystem functioning is needed. With this aim, a database of projected met-oceanic variables was developed (e.g. sea surface temperature, salinity, wave height, nutrients). First, relevant variables for some engineering seagrasses and algae species in European coasts were selected. Data were obtained from the best sources available: Remote sensing, in situ measurements and reanalysis. The selection of descriptive parameters of each variable, representative both of average and extreme conditions, is a crucial step. To do that an objective procedure was applied. The selected parameters were projected under two different Representative Concentration Pathways, one optimistic and one pessimistic. Predictions were extracted from the best Global Climatic Models in the area, whose suitability for European coasts was previously assessed. This set of physical and chemical variables, consistent with species ecological requirements, can be used to create theoretical maps of the environmental conditions favouring or preventing the presence of key marine organisms. Therefore, they constitute a promising approach to be considered in the future regulatory framework.

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# Climate Change

October 24-26, 2016 Valencia, Spain

## Stars: Testing method for regime shifts detection

Luca Stirnimann<sup>1,2</sup>, Alessandra Conversi<sup>1,3</sup> and Simone Marini<sup>3</sup><sup>1</sup>Plymouth University, UK<sup>2</sup>Università Degli Studi di Genova, Italy<sup>3</sup>CNR - ISMAR - La Spezia, Italy

Research focusing on regime shift in marine time series has increased in the last decade. Last year alone, there were 140 published papers and 5500 citations within the literature. One commonly used method to detect shifts in physical and ecological time series is the sequential t-test analysis of regime shift (STARS). This method has a convenient Visual Basic Application (for Excel) and therefore is widely used by marine ecologists. In this work, we analyse, using simulated data, the limitations and accuracy of the STARS method for identifying threshold points in time series. We synthesized two groups of time series generated with the program R, each one consisting of 1000 different random series containing known change points and magnitude values. The two groups are as follows: 1) 1000 random time series without autocorrelation, and, 2) 1000 random time series with incorporated autocorrelation and seasonality. Then, all-time series are analysed using the STARS method, utilizing a CRAN-package in R that replicates Rodionov's program. The work is still in progress; however the first results indicate that there are inaccuracies in STARS in determining the exact timing of change points. The aim of this work is to provide researchers with useful indications on the limits this method for detecting regime shifts and to provide an R routine accessible for all researchers.

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## The diffusion of information and behavior in social networks: Renewable energy technology adoption in rural China

Marcella Veronesi

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Adopting renewable energy technologies has been seen as a promising way to reduce CO<sub>2</sub> emissions and address climate change. This paper investigates how social networks may affect renewable energy technology adoption. We distinguish two channels through which social networks may play a role: (i) the diffusion of information; and (ii) the diffusion of behavior. Most empirical studies fail to quantitatively separate the diffusion of information and behavior in social networks. We conduct a survey on biogas technology adoption in rural China to identify individuals' egocentric information networks. In egocentric social networks, the individual of interest is defined as "ego" and the people connected to the ego are defined as "alters". We find that both the diffusion of information and behavior drive farmers' technology adoption. Farmers with larger egocentric information networks and a larger fraction of known adopters are more likely to adopt the biogas technology. In addition, we collect data on several attributes of alters to explore the composition of social networks. We find heterogeneous social network effects across different types of alter. Alters who have close relationships with egos such as friends and relatives or that are trusted by egos affect egos' adoption through the diffusion of information, while less trusted alters such as government officials affect egos' adoption through their adoption behavior.

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October 24-26, 2016 Valencia, Spain

## The values and recovery progress of floating rice-based agro-ecological systems for adaptation to climate change in the Vietnamese Mekong Delta

Nguyen Van Kien<sup>1,2</sup><sup>1</sup>An Giang University, Vietnam<sup>2</sup>Australian National University, Australia

People have a long tradition of living with the floods in the Vietnamese Mekong Delta by harvesting the floating rice. This floating rice-based agro-ecological system exploited seasonal floods for rural livelihoods until 1980s. In 1974, there were 0.5 million hectares of the floating rice in the VMD, but by 2013, this dropped to 50 hectares (ha), found in Vinh Phuoc and Luong An Tra communes of Tri Ton district in An Giang province. Recognition of the important ecological, economic and cultural values of this floating rice-based agro-ecological system, Research Center for Rural Development (RCRD) of An Giang University has co-designed with local farmers, private sectors and local authorities to initiate a series of research and development outreach activities which aims to help rural communities to restore this valuable geneses as well as ecosystem services for improving rural livelihoods and adaptation to climate change. After operating these research and development activities for two years, we found that behaviours of different stakeholders have changed positively towards this recovery activity. Policy makers recognized the opportunity costs of this system in comparison with intensification of rice, from two to three crops, changed their attitudes toward profitability rather than production. Significantly, the market price of the floating rice was improved by double, giving incentives for farmers to return to the floating rice. More importantly, this system allow farmers to adapt well to floods and droughts because floating rice can elongate well with the flood condition, while farmers can save water for irrigating upland crops thank to the thick layers of rice remaining straws. This paper provides the quantitative economic and ecological values of the floating rice-based agro-ecological systems, describes the co-design participatory processes of floating rice recovery in the Mekong Delta, and suggests avenue for adaptation to climate change in the future.

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## Poster Accepted Abstracts





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October 24-26, 2016 Valencia, Spain

## An assessment of low flow and drought characteristics in the Barlad River catchment area

**Silvia Mihaela Chelcea**

National Institute of Hydrology and Water Management, Romania

The aim of this study is to assess and to analyze the seasonal and interannual variability of the low flow indices in the Barlad River catchment area. The low flows and droughts have an important role in the river flow regime because they are significantly connected with the basic water resources. This analyse might provide an efficient management of the resources during the hydrological extremes, as well as an assistance in prevention and risk management strategies. The study is based on the use of the software package LFSTAT that enables the standardized calculation of low flow statistics, in order to provide the low flow indices. The times series of daily discharges at the nine hydrometric stations situated in the Barlad River catchment area for the period 1970-2014 have been used for this analysis. Also, the calculation was made for a hydrological year beginning from December 1st to November 30th. A stream-flow deficit analysis was performed using the threshold level method, where the 70th percentile from the duration curve was used as the threshold level. Based on this analysis of the low flow and drought characteristics, an assessment of the stream-flow deficit in the Barlad River Basin was highlighted.

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## Solar activity and its influence on the variations of the precipitable water vapor- case study of central Arabian Peninsula

**Maghrabi A H**

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Water vapor is the most important greenhouse gas. It plays a major role in the dynamics of atmospheric circulation, radiation exchange within the atmosphere and climate variability. In this study, radiosonde data from 1985 to 2014 were used to examine the variaability of the precipitable water vapor (PWV) in central Saudi Arabia in the city of Riyadh (24° 43 'N; 46° 40'E, 764 m a. s. l.) over different time scales. The results revealed a clear seasonal cycle of PWV with a maximum during the summer months (June to August) and a minimum during the winter (December to February). This variation follows the mean monthly variation of air temperature. The PWV displays considerable variability at the inter-annual scale. We could not attribute the variations to the air temperature because no relationship was found between the two variables when the inter-annual variations were examined. Study of the annual variations of the PWV showed cyclic variations with a period of approximately 10 to 11 years. The two maximums and minimums were in 1996 and 2007 and 1989 and 2000, respectively. The results showed that the annual PWV values are anti-correlated with solar activity, represented by sunspot number, during solar cycles 22 and 23. The physical mechanism underlying this relationship remains unclear, in which future investigations are recommended.

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World Conference on

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October 24-26, 2016 Valencia, Spain

## Corresponding to climate change and its effects on public health by developing detection method of endocrine disrupting chemicals (EDCs)

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The objective of the study is to suggest a novel detection method in endocrine disrupting chemicals (EDCs) in accordance with climate change and its effects on public health. Substantial and uncertain channels of exposure routes of EDCs caused by climate change are regional and local levels of complication. The correlation between EDCs and climate change is currently an ongoing process of research, however, it is determined that their relation to the public health is a prolonged matter to develop and initiate the prevention strategies. Even a low level of EDCs concentration takes negative effects into hormone secretion, male and female reproduction, growth inhibition, cancer induction and immune system in human health. Therefore, this study is to develop a simple colorimetric sensor film that analyzes EDCs concentration induced by virus-based aerial detection method in regional and local levels. The colorimetric sensor film which is embedded with self-assembled bacteriophage detects concentration of EDCs based on a change of color. The peptide of the bacteriophage generates as a receptor with its reactivity to the targeted chemicals. In addition to the characteristics, specific DNA sequence determines selectivity and sensitivity of the sensor film. The swelling and de-swelling of the nano-structure according to the description of humidity, temperature and chemicals, diversify the reflection of visual light that results in color change. As a result, we can create the distinct nano-structure with specific arrays that can react to selective EDCs and visually assess the level by RGB analyzer. The core advantage of this colorimetric film is that genetic engineering of bacteriophage enables us to detect at low level of concentration considering the fact that EDCs concentration is usually very low at the airborne state. Previously developed methods to detect EDCs are not available in on-the-spot detection due to the necessity of preconditioning process that requires additional time and instruments, however, this film does not require those process. In addition, we were successful to develop software that automatically assesses RGB composition of the image taken by a smart phone. If we collect the data and set the Data Base with this RGB composition of specific temperature, humidity and chemical materials, more specific and valid correlation between climate change and EDCs shall be given shape to further research.

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## Carbon pools in a West African Savanna agro forestry parkland: Case study of Dassari catchment of Northwestern Benin

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Agro-forestry parkland represents the predominant farming system in West Africa. This is due to the multiple goods and services they provide at local as well as regional to global scales. In the Sudan Savanna of West Africa, these parklands provide food, wood, and various non-timber forest products. At the regional to global scales, they contribute to both carbon sequestration and nutrient cycling. With their power for carbon sequestration and cycling, parklands play a crucial role respectively for climate change mitigation by reducing greenhouse gas emissions and sustaining soil fertility through nutrients cycling. In fact, their regular monitoring and assessment along with reproducible methodologies for this purpose are needed. This study aims to contribute to filling this gap, by measuring carbon pools in West African Sudan savanna agro-forestry parkland. In the Dassari watershed in north western Benin, we measured the below and above ground carbon pools at farmer plot levels and extrapolated them to catchment level. The results suggest that agro-forestry parklands are valuable sources for carbon sequestration and cycling and therefore important for climate change mitigation and adaptation.

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World Conference on

# Climate Change

October 24-26, 2016 Valencia, Spain

## Effects of climate changes on hydrological extremes in Crisul Alb River Basin

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Deterministic mathematical rainfall-runoff model CONSUL was used for simulation of discharges on 42 river sub-basins, their routing and composition on the main river and tributaries and passing through the reservoirs, according to the schematic representation of how water flows and collects in Crisul Alb river basin. For each sub-basin, average values of precipitation and air temperature determined based on the measured values, with 6 hours time step, from meteorological stations, were the input data requirements of CONSUL model. For calibration of model parameters, corresponding to the hydrometric stations located in the closing sections of river sub-basins, a number of 25 rainfall-runoff events from the period 1975-2010, covering a wide range of floods formation, were used. The parameters, thus determined, allow getting some generalization relationships, according to the river sub-basins characteristics, used to estimation of the parameters for the uncontrolled sub-basins or river reaches. Based on the projected precipitation and air temperature resulted from the outputs of a statistical downscaling model on high spatial resolution (1 km x 1 km), the calibrated model allows hydrographs simulation for the future period (2021-2050). In order to estimate the effects of climate change on the hydrological extremes in the Crisul Alb River Basin, the results from two simulations were comparatively analyzed. Changes at the level of monthly and annual extreme discharges as well as at the level of instantaneous extreme discharges with different probabilities of exceedance, using theoretical curves of probability are emphasized.

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## Application of nitrogen as spikelet fertilizer reduces the deterioration of rice quality under elevated temperature during grain filling stage

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Global surface mean temperature is supposed to increase by 1.4-5.8°C by the end of 21<sup>st</sup> century according to IPCC 2014. Temperature rise would bring a deterioration of rice quality especially to chalk characteristic. In order to better cope with the challenges of global warming, effects of nitrogen spikelet fertilizer on rice quality under elevated temperature during grain filling stage were investigated. FATE facility was used to increase the rice canopy during grain filling stage and different growth regimes including CK (no warming with any nitrogen spikelet fertilizer application), ET (elevated temperature with no nitrogen spikelet fertilizer application), ET+N (elevated temperature with nitrogen spikelet fertilizer application), CK+N (no warming with nitrogen spikelet fertilizer application) were conducted. Results showed that elevated temperature decreased the performance quality and cooking quality, while nutritional quality and eating quality were relatively increased. Grain filling rate and amyloplast development for both superior and inferior grains were obviously accelerated during early grain filling stage by elevated temperature and application of nitrogen spikelet fertilizer sufficiently inhibited the deterioration of rice quality particularly for chalk performance without decreasing the grain weight. The above evidence indicates the application of nitrogen spikelet fertilizer is a proper method in mitigating the quality deterioration under global warming.

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