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Prof. Maria Jelenska, Polish Academy of Sciences, Poland.
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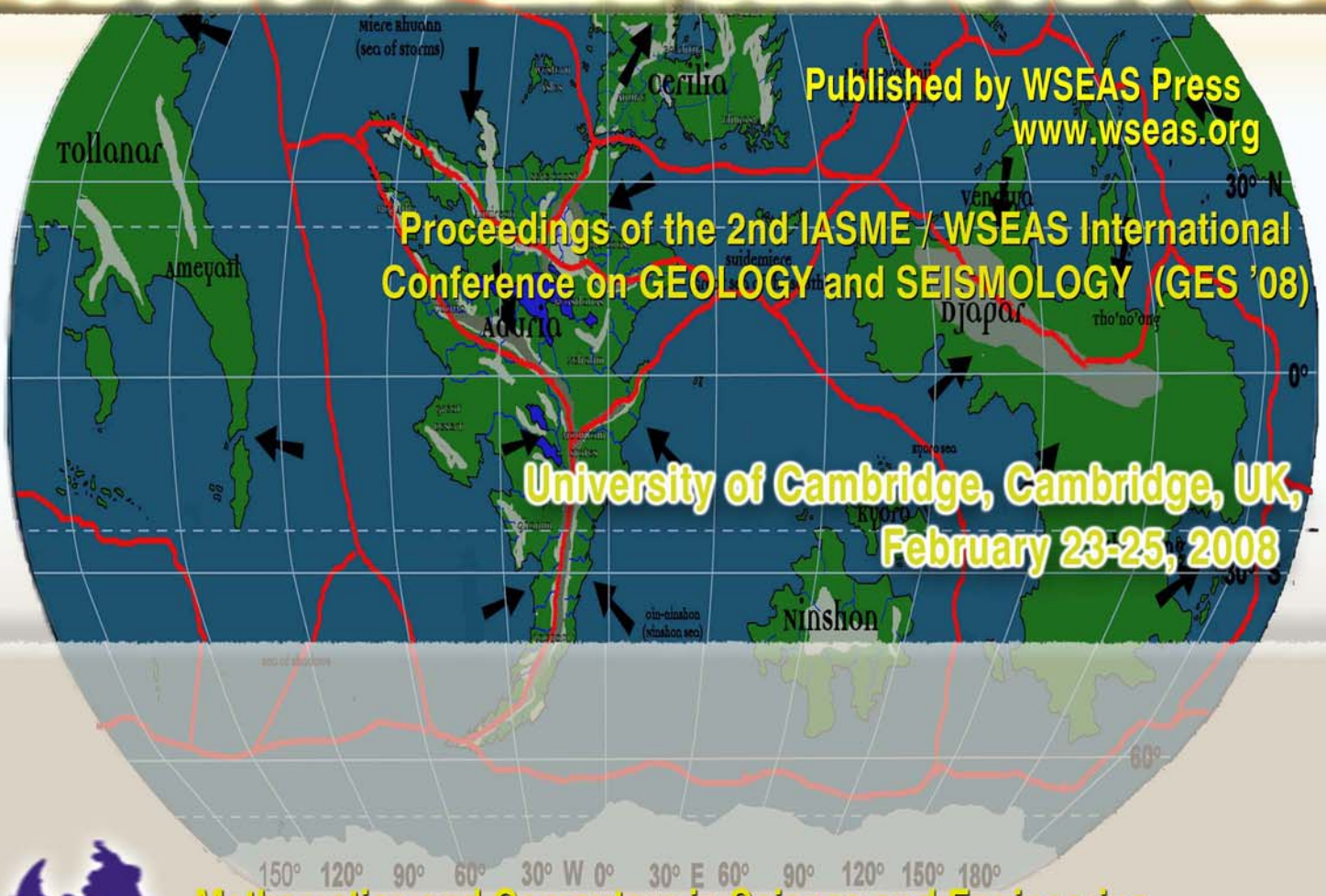
ADVANCED TOPICS on GEOLOGY and SEISMOLOGY



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Preface

This book contains proceedings of the **2nd** IASME / WSEAS International Conference on GEOLOGY and SEISMOLOGY (GES'08) which was held in University of Cambridge, Cambridge, UK, February 23-25, 2008. The first WSEAS Geology and Seismology Conference was held in Portoroz, Slovenia, February 2007. And this year, it will be held in the University of Cambridge, Cambridge, UK. The World Conference of IASME and WSEAS on GEOLOGY & SEISMOLOGY is the internationally recognized Forum for the dissemination of the latest advances on Geology and Seismology, as well as their impact and their interaction with other areas of Geoscience, Environmental Engineering, Civil Engineering and Applied Physics. The various WSEAS conferences on Geosciences has been successfully held each year since 2007 and has produced 2 volumes of Proceedings while the best papers and the invited papers after extension and after peer review from 4 international referees, are published in WSEAS Journals covered by all the major scientific indices.

The 2nd IASME/WSEAS International Conference on GEOLOGY & SEISMOLOGY aims to disseminate the latest research and applications in various related fields. The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers.

The IASME/WSEAS International Conference on GEOLOGY & SEISMOLOGY attracts each year a large number of well-established and leading researchers in the aforementioned areas as well as Modern and Advanced Applications in our Real Life.

The meetings have always had a special appeal to young researchers and are characterized by a friendly atmosphere in which delegates at different stages of their careers can talk to each other. Scientists within all the areas of Geology and Seismology will benefit from attending the meeting. As a conclusion, the conference offers to the engineers and scientists a unique forum for establishing new collaborations within present or upcoming research projects, exchanging useful ideas, presenting recent research results, participating in discussions and establishing new academic collaborations, linking university with the industry.

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The Editors

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Plenary Lecture I

Environmental magnetism: the roots and the bloom

Professor Maria Jelenska
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Abstract: Environmental magnetism was born not far ago from several interdisciplinary studies starting from deposits in British lakes and soon expanded to marine sediments, Chinese loess and finally to soil pollution, and magnetic characteristics of soil itself. Environmental magnetism involves the application of magnetic techniques used in paleomagnetism and rock-magnetism to situations in which various environmental settings were influenced by transport, deposition and transformation of magnetic grains. Magnetic minerals, particularly iron compounds, are present everywhere, iron being one of the most common elements in the earth crust. Important advantage of techniques used in environmental magnetism is that they are relatively rapid, simple and nondestructive. The scope of subjects is so broad that it is not possible to address all problems. I would like to focus on pedosphere where interaction of chemical, physical and biological processes leads to creation of complex magnetic structure. Magnetic characteristics of soil are examined in two main aspects – study of loess-paleosol sequences in connection with paleoclimate changes and monitoring of anthropogenic pollution. Recently, new aspect has emerged – magnetic characteristics of soil in connection with soil classification and pedogenesis. One of the most commonly used mineral parameters is a magnetic susceptibility which is the ratio of magnetization induced by a weak magnetic field to the applied field itself. The observation of susceptibility records in loess-paleosol sequences in the Chinese Loess Plateau dated by magnetostratigraphy and correlated with O record of marine sediments provided magnetic proxy of paleoclimate changes. Human impact on the environment can be also detected. Mapping of susceptibility of topsoil horizons in industrialized districts demonstrates anthropogenic pollution by coal-burning power plants and steel industry as magnetic susceptibility correlates well with heavy metal content in fly ashes. Study of soil profiles shows differentiation of magnetic susceptibility often accompanied by an enhancement in the topsoil horizon. This enhancement has been related to creation of new pedogenic magnetic minerals by soil forming processes.

Brief Biography of the speaker: Jeleñska Maria has received a M.Sc degree in physics at the Warsaw University, Faculty of Physics and Mathematics. Since 1966 she has been working in the Institute of Geophysics, Polish Academy of Sciences in Warsaw where she received Ph.D, the degree of assistant professor and the title of full professor. She has been invited as visiting professor to the Department of Earth and Atmospheric Sciences, St. Louis University (USA), Institut de Physique du r Allgemeineη Louis Pasteur, Strasbourg (France), Institut fϑGlobe, Universit nchen, Germany andηt, M≅und Angewandte Geophysik, Ludwig-Maximilian Universit de Rennes 1 (France).ϑosciences-Rennes, UniversitϑG. Main topics of her research are paleomagnetism of Paleozoic rocks from Spitsbergen, Sudetes (Poland), France, Ukraine and Slovakia, rock-magnetic study, especially magnetic anisotropy and influence of stress on magnetization of rocks and recently, environmental magnetism.Prof. Jelenska won Awards of the Scientific Secretary of Polish Academy of Sciences in 1979, 1980 and 1987, Medal of 40th Anniversary of RP in 1984 and Golden Cross of RP in 1990. She has been Scientific Secretary of the Committee of Geophysics of Polish Academy of Sciences since 1990.

Plenary Lecture II

Towards the understanding of mega-thrust earthquake occurrence system around southwestern Japan
-Developing and utilization of the dense ocean floor observatory-

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Abstract: In Japanese seismogenic zone, the Nankai Trough around southwestern Japan is well known as the mega thrust earthquake generating large tsunamis, with the interval of 100-150 years. In the 1944 Tonankai and the 1946 Nankai earthquakes, each hypocenter was located off the Kii peninsula, southwestern Japan. Furthermore, according to the results of recurrence cycle simulation of mega- thrust earthquakes using precise crustal structure model, ruptures are starting from the Tonankai seismogenic zone ahead of the Nankai seismogenic zone. These results are consistent with past two earth quakes such as 1954 Ansei earthquake, 1944/1946 Showa earthquakes. Therefore, the observation and research of the Tonankai seismogenic zone located in the center Nankai trough is very important and significant to understand the Nankai trough seismogenic zone system. Especially, real-time monitoring of this seimogeniz zone is very important and powerful tool to understand the mega thrust earthquake occurrence system. Therefore, we proposed and have been starting to deploy the dense ocean floor observatory network system around the Tonankai seismogenic zone since 2006. This advanced dense ocean floor observatory network system has useful functions and purposes as follows, Redundancy, extendable and advanced maintenance system using the looped cable system, junction boxes and the ROV/AUV etc for long term observatory.

1. Provide observed data such as ocean floor deformation derived from pressure gauges to improve the simulation and modeling researches about the mega-thrust earthquakes, this means the data assimilation, will be quite important to improve the simulation research. These long term observatory data will give us valuable information about mega thrust earthquake seismogenic zone, such as ocean floor deformation, low frequency tremor and very low frequency earthquake.
2. Speedy evaluation and notification for earthquakes and tsunamis for disaster mitigation.
3. Understanding of the interaction between the crust and upper mantle around subduction zone using long term observation data.
4. Developing advanced technology such as advanced ocean floor network system.

This system is equipped with 20 precise pressure gauges and 20 broad band seismometers and accelerometers. Therefore, reliable estimation of earthquakes and tsunamis will be expected.

In this paper, we will explain the advanced dense ocean floor observatory network system in detail. and future collaboration with international network observatory groups.

Brief Biography of the speaker: Yoshiyuki Kaneda has received a M.Sc degree in geophysics at Tokyo University, As researchers of Physics geophysical exploration, Since 1979 he has been working in the Institute of Japan National Oil Corporation (JNOC: JOGMEC in now). He received Ph.D in 1995 at Tokyo

University.
Since 1997, He has been invited as a program director of earthquake research program to Japan Agency for Marine-Earth Science and Technology (JAMSTEC).

Now he has been developing the ocean floor network system for earthquakes and tsunamis. Main topics of his research are seismological structure and mega-thrust earthquake recurrence simulation. Prof. Kaneda won Awards of society exploration geophysics of Japan in 2001.

He has been a member of earthquake research committee of Japanese government and evaluation committee of ESONET.

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