Sesión especial

CONFERENCIAS PLENARIAS

Organizador:

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SE24-1

RECENT APPLICATIONS OF ATMOSPHERIC SCIENCE - MAKING A DIFFERENCE FOR SOCIETY

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The atmospheric environment impacts human endeavors in a wide variety of ways. Many commercial companies experience inefficiencies and safety concerns in their operations without knowing how to reduce or otherwise mitigate them. Society is increasingly aware that natural disasters associated with such things as tropical storms, heavy rain, flash floods, landslides, and coastal inundation are a major source of loss of life and property. An increase in the number of people moving to hazardous areas increases the exposure and exacerbates the problem. Global change is expected to increase the vulnerability to natural hazards for many regions even further. Research in the atmospheric sciences has led us to the point of having an understanding and a predictive skill enabling the provision of timely warnings of many kinds of hazards. The ability to mitigate hazards depends not only on predictive skill, but on the vulnerability and actual response of the economic sector involved, or the people at risk. Thus, social science is often a key player in helping to solve a practical problem. Decision support tools are needed that combine atmospheric prediction with operational practices (for example, for aviation, agriculture, water resources, civil protection, etc). In this talk examples will be shown of recent work from the author's laboratory in the areas of aviation safety, hydrologic prediction, wind and solar power forecasting, and climate and human health using a variety of approaches. Applications-oriented research has the potential to open non-traditional sources of funding for research (for example, from the private sector), and also offers exciting opportunities for scientists to see the fruits of their research benefit society.

SE24-2

ROCK-PROPERTY ESTIMATION FROM SEISMIC AND CSEM ATTRIBUTES USING A ROCK-PHYSICS FRAMEWORK

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Rock-property estimation (fluid saturation, porosity, and lithology) is the final goal of geologists, geophysicists, and reservoir engineers. We all try to combine well and surface measurements to generate a model of rock properties that can be used to generate an exploration, appraisal, or exploitation plan and quantify the hydrocarbon resources available. Since hydrocarbon exploration began in the 19th century, technology and innovation have driven the process of subsurface rock-property prediction, from exploration, solely based on surface geology, to the progressive inclusion of 2D seismic (early 1920s), gravity, magnetic, 3D seismic (late 1960s), AVO analysis (Ostrander, 1984) and, most recently, control source electromagnetic (CSEM) data (Ellingsrud et al., 2002). Nowadays, the integration of pre-stack seismic inversion attributes with CSEM attributes using a rockphysics framework constitutes one of the most modern and robust methodologies to carry out seismic reservoir characterization. Each method provides independent physical measurements of the subsurface that complement each other and can be validated by well-log measurements and forward-modeled at different reservoir conditions through the application of rock-physics principles. Seismic provides the structural framework and, from AVO information, the possibility to derive P- and S-wave impedance volumes, which are two valuable, independent measurements, that can be linked to porosity, lithology, geomechanical properties, and, under certain conditions, to fluid saturation prediction. On the other hand, CSEM data provide a lower resolution measure of resistivity, which, when constrained with the structural framework and seismically derived volumes of porosity and lithology, can be linked to fluid saturation and hydrocarbon reserves estimation, and overcome seismic ambiguity related to similar AVO responses in both low- and high-saturated hydrocarbon reservoirs. The lecture will cover different methodologies to estimate rock-property volumes from different types of seismic attributes, including AVO and inversion attributes using empirical and theoretical rock-physics principles calibrated with well-log data. Next, we will show how the results of quantitative seismic interpretation can be used to feed an integrated seismic-CSEM interpretation allowing us to create a geologic model of rock properties that honors both data sets and how it can be used to de-risk a prospect and spatially characterize the petrophysical properties of the reservoir.

SE24-3

FROM THE GROUND TO SPACE AND BACK – REMOTE SENSING OF HELIOSPHERIC STRUCTURES

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The ground-based interplanetary scintillation (IPS) technique used to explore the interplanetary medium began in the early 1960's with the advent of a large radio array constructed in Cambridge England. Within a few years, several groups around the world began studies using the IPS technique and built their own radio systems, and this included the University of California, San Diego (UCSD). However, many questions about the shapes of heliospheric structures remained from these early observations. Partly as practice for a space-based technique that could supplant IPS for heliospheric measurements, my colleagues and I began work on the Solar Mass Ejection Imager (SMEI), a space-based instrument that could view the whole sky around Earth like a coronagraph. The work to provide the best heliospheric information from this system culminated in an iterative 3-D tomographic reconstruction technique. With no space instrument to practice on before SMEI was launched, IPS data from Japanese scientists from Nagoya University ISEE (formerly STELab), Japan were available to be used in a similar way. Both SMEI, launched into space in 2003, and the Heliospheric Imagers on the STEREO spacecraft, launched in 2006, provided fine imagery of heliospheric structures in white-light. A variety of different tomographic techniques were developed to determine information from these data sets, and for SMEI this included a 3-D reconstruction analysis similar to that used for the IPS data. SMEI stopped operating in 2011. Since then, those involved in IPS have organized around a World Interplanetary Scintillation Systems (WIPSS) group to provide better ground-based analyses. The tomographic 3-D analysis, can now incorporate IPS data from different radio arrays around the world. When employing a world network of IPS data systems, not only can IPS predictions be made without observation dead times due to poor longitude coverage or system outages, but the program can itself be used to standardize IPS observations for use in other studies. These analyses promise great future advances in heliospheric research that includes world coverage from IPS, and from advanced radio arrays (LOFAR and MWA), new types of heliospheric IPS analyses, and potentially Faraday rotation measurements of interplanetary magnetic fields as they move outward from the Sun.

SE24-4

CAUSES AND CONSEQUENCES OF THE 2015-16 EL NIÑO

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An El Niño of surprising intensity developed in 2015-16, affecting patterns of weather variability worldwide. The event rivaled the 1997-98 El Niño, the strongest on record, in its magnitude and impacts. It was preceded in early 2014 by basin scale warming that was widely expected to develop into a full-fledged El Niño, but which unexpectedly died; and it has been followed by the onset of La Niña-like cold conditions in mid-2016. This presentation will describe the oceanic and atmospheric processes that gave rise to the El Niño, how well the event was predicted by various forecasting centers, and how the evolution of conditions in the tropical Pacific during 2014-16 challenge current understanding of the El Niño/Southern Oscillation (ENSO) cycle.