Self-Funded Concept Note - A.C.E.S. – APEC Cooperation for Earthquake Simulation

Purpose: Information
Submitted by: United States
### Project Title:
APEC Cooperation for Earthquake Simulations (ACES)

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<tr>
<th><strong>Project Number (Assigned by Secretariat):</strong></th>
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<tr>
<td><strong>Committee / WG / Sub-fora / Task-force:</strong></td>
<td>PPSTI</td>
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<td><strong>Proposing APEC economy:</strong></td>
<td>USA</td>
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<td><strong>Co-sponsoring economies:</strong></td>
<td>To be updated from PPSTI committee April 2014. (Founding members of ACES include China, US, Australia and Japan)</td>
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<td><strong>Date approved by fora:</strong></td>
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<td><strong>Expected start date:</strong></td>
<td>July 1, 2014</td>
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<td><strong>Expected completion date:</strong></td>
<td>June 30, 2018</td>
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<td><strong>Project summary:</strong></td>
<td>This project will be a continuation of the project first approved by APEC IWGST in 1997 (proposed then by Australia with support from USA, China, Japan). ACES was approved as a multi-lateral grand challenge science research cooperation of APEC. The project is sponsored by Australia, China, Japan and USA and involves leading international earthquake simulation and prediction research groups. ACES aims to develop realistic supercomputer simulation models for the complete earthquake generation process, thus providing a &quot;virtual laboratory&quot; to probe earthquake/tsunami and in fact multihazard behavior. The project represents a grand scientific challenge because of the complexity of phenomena and range of scales from microscopic to global involved in the earthquake generation process. It is a coordinated international effort linking complementary nationally based programs, centers and research teams. We plan to continue our major meetings every 18 months with smaller meetings every 9 months. The economy to host the next meeting is scheduled to be China in 2014/2015. Products have been in the form of peer-reviewed publications and conference proceedings, and we will continue this practice. Publication references available on request.</td>
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<td><strong>Total cost of project (USD):</strong></td>
<td>Self-funded by participating economies.</td>
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Further information at: http://quakes.earth.uq.edu.au/

As Project Overseer and on behalf of the above said Organization, I will ensure that all Project outputs (Project reports, proceedings, slides, presentations, CDs, etc.), will comply with the APEC Publications, APEC Logo and Copyrights Guidelines before being published. The guidelines are at:

http://www.apec.org/About-Us/About-APEC/Policies-and-Procedures.aspx

John B Rundle
Name of Project Overseer

Name of Fora Chair/Lead Sheppard

Date: January 26, 2014
APEC Cooperation for Earthquake Simulations: 
Researching Natural Hazards around the Pacific Rim

http://quakes.earth.uq.edu.au/

Executive Summary

We propose this project as a continuation of the project first approved by APEC IWGST in 1997 (proposed then by Australia with support from USA, China, Japan). ACES was approved as a multi-lateral grand challenge science research cooperation of APEC.

The project is sponsored by Australia, China, Japan and USA and involves leading international earthquake simulation and prediction research groups. ACES aims to develop realistic supercomputer simulation models for the complete earthquake generation process, thus providing a "virtual laboratory" to probe earthquake/tsunami and in fact multihazard behavior.

The project represents a grand scientific challenge because of the complexity of phenomena and range of scales from microscopic to global involved in the earthquake generation process. It is a coordinated international effort linking complementary nationally based programs, centers and research teams.

We plan to continue our major meetings every 18 months with smaller meetings every 9 months. The economy to host the next meeting is scheduled to be China in 2014/2015.

Products have been in the form of peer-reviewed publications and conference proceedings, and we will continue this practice. Publication references available on request.

Introduction

Earthquakes, along with tsunamis, volcanic eruptions, landslides, wildfires, floods, typhoons and other natural hazards are costly and deadly natural disasters. APEC member economies are struck by the vast majority of the world’s earthquakes and other events and have a particularly high earthquake risk. This has resulted in more than 800,000 deaths in APEC member economies during the last decade.

The scientific method relies on development of a theoretical framework or simulation model describing nature. While no such model exists for the complete earthquake generation process, conceptual developments in understanding earthquake physics, numerical simulation methodology and advances in High Performance Computing offer the possibility to develop such models. The APEC Cooperation for Earthquake Simulation (ACES) would capitalize on this new opportunity and the complementary strengths of the earthquake research programs of individual APEC member economies.
While ACES began with a singular focus on earthquakes, studies have since broadened to include a variety of other hazards, including tsunamis, volcanoes, wildfires, and floods.

ACES aims to develop numerical simulation models for hazards, particularly the complete earthquake generation, to assimilate new earthquake observations into such models, to foster collaboration between the relevant programs of participating member economies, and to foster development of required research infrastructure and research programs. A major objective is to develop the science and technology to allow accurate forecasting of these catastrophic events, and to aid in the mitigation and response to disasters.

Development of such simulation models represents a grand scientific challenge because of the complexity of phenomena and range of scales involved from microscopic to global. The models would provide powerful new tools for studying earthquake precursory phenomena and the earthquake cycle. They would have direct application to earthquake hazard studies, forecasting, and earthquake engineering.

History of ACES Meetings

ACES economies have been meeting regularly since 1999. Details can be found at: [http://quakes.earth.uq.edu.au/](http://quakes.earth.uq.edu.au/).

Products to Date

Products of the ACES meetings consist primarily of research publications in the peer reviewed literature. A list of the primary publications is included here in the Appendix.

Proposal

We propose to continue these ACES meetings through at least June 30, 2018. As before, workshops and symposia venues will rotate among the member economies as appropriate. Smaller meetings will take place typically as special sessions at international organization meetings such as the Asia Oceania Geoscience Society (AOGS), etc.

Products will be primarily publications in the peer reviewed literature, software programs, web sites, and other intellectual products.
Appendix I

Publications Arising from Previous Workshops and Symposia


