Mainstreaming Adaptation and Impacts Science into Solutions for Canada

Societal & Economic Research & Applications (SERA): International and Canadian Activities

Brian Mills
Adaptation and Impacts Research Division

Jeff Lazo
Institute for the Study of Society and Environment
National Center for Atmospheric Research
SERA Efforts in EC/Canada

• Participation in THORPEX SERA WG, NA and Canadian committees
• CANSEE special session on valuation of meteorological products and services
• Developing an EC Social and Economic Research/Application Agenda to Support Environmental Prediction
• Development of a database of Canadian experts/research projects/practitioners related to societal and economic aspects of weather
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• Demonstration projects (verification/TIGGE, PARC)
Societal and Economic Research and Applications (SERA) WG

Jeff Lazo
May 15, 2006
Geneva – EB2
SERA WG

• WG Members
  – Jeff Lazo, Chair
  – Frederic Atger
  – Gerald Fleming
  – CY Lam
  – Brian Mills
  – Peter Webster
  – Pu Xie
  – David Rogers
SERA WG

- Communicating uncertainty
  - Decision analysis
  - Risk analysis
- User relevant verification
  - Development of verification methods for ensembles
  - Survey instruments
- Marginal benefits of high impact forecasts
- Societal impacts (cost-benefit) of THORPEX forecast improvements
- International equity & GIFS
- Cost of THORPEX programmes
- Develop protocol for user engagement
- User requirements / engagement (trust)
- Beta-test products
- Use of current products

Capacity Building
- Database weather impacts / forecasts
- Developing country training
Relationship between SERA Working Group, THORPEX and others.

**SERA WG**
- Pure research
- Applied Research
- Applications
- Training and Research
- Capacity Building

**Regional Committees**
- Europe
- North America
- Asia
- Southern Hemisphere
- Africa

**Other WGs**
- Data Assimilation
- Predictability
- Obs. Systems
- TIGGE
- Data Policy

**Other WMO**
- AMMA
- IPY
- GEO
- PWS
- COPES
- CLIPS
- MEDEX

**Other Activities**
- SEB 2007

**Admin / Logistics**
- SAB
- TAB
- IPO
- Stakeholders
Other SERA Activities

- Health forecasting demonstration project
  - weather + climate meningitis & malaria forecasts in west Africa
- Food security demonstration project
  - locust outbreaks in west Africa
- North American SERA Workshop
- Second THORPEX International Science Symposium
- WMO Task Force on SEA
- WMO Task Force on Public Weather Services
- WMO SEB conference (March 2007)
## SERA - Action Items (1)

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
<th>Lead</th>
<th>Delivery Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEA 1/1</td>
<td>Continue to develop a white paper on applications (an inventory of what is being done in private as well as public sector) with specific input from WMO capacity building document</td>
<td>Brian Mills</td>
<td>Dec 1, 2006</td>
</tr>
<tr>
<td>SEA 1/2</td>
<td>List of members of other relevant WMO working groups</td>
<td>IPO</td>
<td>May 31, 2006 (revised)</td>
</tr>
<tr>
<td>SEA 1/3</td>
<td>Inventory of the use of applied forecasts (success stories)</td>
<td>PWS TF</td>
<td>May, 2006</td>
</tr>
<tr>
<td>SEA 1/4</td>
<td>finalize list of sectors / interest groups and define terms of reference (Incl SEA)</td>
<td>WG &amp; IPO</td>
<td>Dec 1, 2006 (revised)</td>
</tr>
<tr>
<td>SEA 1/5</td>
<td>Identify funding for small scholarships for social scientists (report to WG)</td>
<td>IPO</td>
<td>May 31, 2006 (revised)</td>
</tr>
<tr>
<td>SEA 1/6</td>
<td>Guidelines for SEA Demonstration projects</td>
<td>Chair, WG</td>
<td>Dec 1, 2006 (revised)</td>
</tr>
</tbody>
</table>
## SERA - Action Items (2)

<table>
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<tr>
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<tbody>
<tr>
<td>SEA 1/7</td>
<td>Launch joint initiatives at international/national levels (joint with organizations such as WHO, IFRCC, etc)</td>
<td>WG</td>
<td>COMPLETED</td>
</tr>
<tr>
<td>SEA 1/8</td>
<td>Adapt Jeff Lazo’s NCAR training and education programme for international community - Concept paper</td>
<td>WG (involve IRI and COMET)</td>
<td>Dec 1, 2006 (revised)</td>
</tr>
<tr>
<td>SEA 1/9</td>
<td>Address concerns about the THORPEX website to WMO</td>
<td>IPO</td>
<td>COMPLETED</td>
</tr>
<tr>
<td>SEA 1/10</td>
<td>Input to THORPEX International Symposium planned for Dec 2006 (e.g. invited lectures)</td>
<td>Chair, WG Dir, IPO</td>
<td>Dec 1, 2006 (revised)</td>
</tr>
<tr>
<td>SEA 1/11</td>
<td>Input to WMO SEB conference, including specific recommendations about speakers and topics. What do we want senior ministers to say about SEB. Recommend membership for international steering committee</td>
<td>WG</td>
<td>Jan 20, 2006</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>March 20, 2006</td>
</tr>
<tr>
<td>SEA 1/12</td>
<td>White paper for SEB conference</td>
<td>Chair, WG</td>
<td>?</td>
</tr>
<tr>
<td>Action</td>
<td>Description</td>
<td>Lead</td>
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<tr>
<td>SEA 1/13</td>
<td>Seek formal cooperation with AMMA</td>
<td>Dir, IPO</td>
<td>COMPLETED</td>
</tr>
<tr>
<td>SEA 1/14</td>
<td>review proposals from the social and economic perspective to look at opportunities for THORPEX to engage in other IPY activities (continuous ongoing activity)</td>
<td>Brian</td>
<td>Dec 1, 2006 (revised)</td>
</tr>
<tr>
<td>SEA 1/15</td>
<td>Agenda for March mtg.</td>
<td>Chair, WG</td>
<td>COMPLETED</td>
</tr>
<tr>
<td>SEA 1/16</td>
<td>Review TIP (with suggestions for revision)</td>
<td>WG</td>
<td>Dec 1, 2006 (revised)</td>
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<tr>
<td>SERA 2/1</td>
<td>Review structure of WG to represent the broader interests of CAS and revise terms of reference</td>
<td>Chair, WG</td>
<td>Dec 1, 2006</td>
</tr>
<tr>
<td>SERA 2/2</td>
<td>Establish a CAS THORPEX SERA website</td>
<td>IPO</td>
<td>Dec 1, 2006</td>
</tr>
<tr>
<td>SERA 2/3</td>
<td>Communicated WG name change to THORPEX IPO</td>
<td>Chair</td>
<td>COMPLETED</td>
</tr>
<tr>
<td>SERA 2/4</td>
<td>Collect WMO and NMHS survey instruments</td>
<td>WG, IPO</td>
<td>Dec 1, 2006</td>
</tr>
<tr>
<td>SERA 2/5</td>
<td>Develop closer ties with AMMA, especially AMMA WG-4</td>
<td>Chair, IPO</td>
<td>Dec 1, 2006</td>
</tr>
<tr>
<td>SERA 2/6</td>
<td>Inform GEO of SERA activities</td>
<td>Chair, IPO</td>
<td>Ongoing</td>
</tr>
<tr>
<td>SERA 2/7</td>
<td>Inform DPM, HWR, APP, PWS, WCP and other relevant programmes of SERA activities</td>
<td>Chair, IPO</td>
<td>Ongoing</td>
</tr>
<tr>
<td>SERA 2/8</td>
<td>Setup WG meeting with ISDR, IFRC and other relevant organizations to discuss societal impacts</td>
<td>Chair, IPO</td>
<td>August, 1 2006</td>
</tr>
<tr>
<td>SERA 2/9</td>
<td>Each WG member to take responsibility for outlining a specific activity in the SERA “Research agenda”</td>
<td>WG</td>
<td>Dec 1, 2006</td>
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What are weather forecasts worth?
Dr. Jeffrey K. Lazo
National Center for Atmospheric Research
Boulder, CO

Valuing meteorological products and services: A Canadian perspective and case study
Dr. Douglas A. Smith
Carleton University
Ottawa, ON

Environment Canada panel: Needs, capacities and experiences
Mr. Greg McComb
Valuation & Market Instruments Design
Ottawa, ON

Mr. Richard Campbell
Atmospheric Monitoring & Water Survey (MSC)
Toronto, ON

Mr. Phil Jacobson
Services, Clients & Partners (MSC)
Gatineau, QC

Mr. Adam Fenech
Atmospheric & Climate Science (MSC)
Toronto, ON

Panel Questions & General Discussion
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Context for Valuation of Meteorological Products and Services
EC Social and Economic Research/Application Agenda

Activity 1 (on-going)
Formalize ad hoc committee and meet semi-annually (expand as needed to represent departmental OPGs) and report to member OPGs (2A1, 2A2, 2B2, 4B1, 5A2).

Activity 2 (2006-07)
Assessment of EP program needs and capacities (expertise), experiences and resources within EC related to socio-economic analysis, considerations, etc. Development of best practices for conducting analyses and incorporating findings into internal resource allocation processes and communications to the public. Identify, recommend/prioritization of potential case studies and implementation.

Activity 3 (2006-07)
National level inventory and assessment of users (representation across sectors; also within EC) of environmental prediction/monitoring information produced to understand who is accessing the information, products, and services of Environment Canada’s Environmental Prediction program; how the information is being used to support decisions; and the effectiveness of those decisions.

Activity 4 (2007-08)
National application based on results, resources and leveraging opportunities identified through Activities 2-3.
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SECURE AND SUSTAINABLE LIVING:
SOCIAL AND ECONOMIC BENEFITS OF WEATHER,
CLIMATE AND WATER SERVICES

INTERNATIONAL CONFERENCE: Madrid, Spain, 19 to 23 March 2007

How weather, climate and water information can help in decision making

EXPECTED OUTCOMES:
- Societal impacts of weather, climate and water information
- What matters to decision makers
- Best practices and knowledge transfer

FURTHER INFORMATION CAN BE OBTAINED FROM:
Sciences Planning Office
World Meteorological Organization
70 Avenue de la Paix
CH-1211 Geneva 20
Switzerland
Tel. +41 22 735 73 00
Fax: +41 22 735 75 11
Email: wmo@wmo.int

www.wmo.int/Madrid07
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Transportation-related projects

Outcomes at scales of decision-making:
Safety, mobility, environmental, economic (CESF)
...it’s sensitive to climate

Thermal cracking, frost heave/thaw settlement, heat-related rutting

Models/approaches/data supporting section and/or network level prediction

- Expert opinion/analysis
- Empirical/statistical
- Mechanistic-Empirical
- Mechanistic

Haas 2001, 2004
Detailed Report

Identification

- Section ID Number: 87-1622-1
- State: Ontario
- SHRP Region: North Atlantic
- Seasonal Round: A
- Deassign Date: 7/15/1998

Inventory/Construction

- Org. Construction Date: 6/1/1976
- Inside Shoulder Type
- Outside Shoulder Type
- Drainage Type
- Joint Spacing (ft)
- Load Transfer Type
- %Long. Steel Content

Pavement Layers

- Original Surface Layer (Layer Type:AC) 1.1 Inch
- AC Layer Below Surface (Binder Course) (Layer Type:AC) 3.1 Inch
- AC Layer Below Surface (Binder Course) (Layer Type:AC) 1.5 Inch
- Base Layer (Layer Type:GB) 6.7 Inch
- Subbase Layer (Layer Type:GS) 26.3 Inch
- Subgrade (Layer Type:SS) Inch

Location

- County
- Functional Class: 2
- Route Number: 11
- Elevation (ft): 989
- Latitude, deg.: 45.11
- Longitude, deg.: 79.31

Climate

- Climatic Region: Wet Freeze
- Freezing Index (C-Days): 1016.26
- Precipitation (mm): 1132.82
- Days Above 32 C: 0.3
- Years of Climatic Data: 27

FWD Deflection

- 7/23/1990

Data Source

LTPP DataPave Online
Hwy 11, MUSKOKA, ON
Three deterioration-relevant climate indicators

- **Extreme minimum daily temperature** (thermal cracking indicator)
- **Seven-day average maximum daily temperature** (rutting indicator)
- **Freezing and thawing indices** (indicator of frost and thaw depths)
Changes in timing of critical freeze

Potential Changes in Timing of Freeze for Muskoka, ON

Days to Critical Freeze Index (from October 1)

Season

- baseline
- HadCM3-A2x 2050s scenario
Changes in timing of critical thaw

Potential Changes in Thaw Timing for Muskoka, ON

Days to Critical Thaw Index (from December 1)

Season

baseline
HadCM3-A2x 2050s scenario
Winter Severity Indices: Applications for Winter Road Maintenance Activities in Ontario & Canada

MTO

Synectics Transportation Consultants

IMOS

- CEPA PS2 salts
- Performance-based management and $
- other environmental (sand, fuel, etc.)
Monthly Salt Use (NF Avalon) and Air Temperature (St. Johns A)

Monthly Salt Use (NF Avalon) and Snowfall Occurrence (St. Johns A)
Weather-related collision risk in Canadian cities

St. John’s
Halifax
Moncton, Fredericton, Saint John
Quebec City, Sherbrooke, Montreal
Ottawa, Toronto, Barrie, Hamilton, Kitchener, London, Sudbury, Thunder Bay
Winnipeg
Regina, Saskatoon
Edmonton, Calgary
Kelowna, Vancouver, Victoria
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