

Heat_Wave_System_20071115

Richard B. Rood

734-647-3530

rbrood@umich.edu

<http://aoss.engin.umich.edu./people/rbrood>



Heat Wave System

- There is an existing system that serves to evaluate environmental information and provide advisories of extremes that impact human life.
 - The “system” is often regional or local
 - There are a few basic elements of the system



Heat Wave System: Basic elements

ENVIRONMENTAL
OBSERVATIONS and
FORECASTS

HUMAN HEALTH AND
PHYSIOLOGICAL
INFORMATION

HEAT-RELATED
ENVIRONMENTAL
PRODUCTS
(e.g heat index)

COMMUNICATIONS
of PRODUCTS

ACTIONS BASED
ON PRODUCTS
and
COMMUNICATIONS



Heat Wave System: Basic elements: analysis

- When implemented well the existing system works. That is, excess heat information is produced, it is communicated from the providers, it is used, it initiates action, and it has benefits.
- There are questions about the whether or not the system is optimal.



Heat Wave System: Basic elements: analysis

- A basic question is whether we building upon the current system or whether the current system can through incremental changes be improved or optimized.
 - The basic elements – measurements, the generation of information, the communications and the use of the information are robust.
 - Therefore, we are looking at how to improve the existing system. (Or conclude it is optimal.)
 - The implementation of elements of the existing system might be served by revolution rather than evolution.



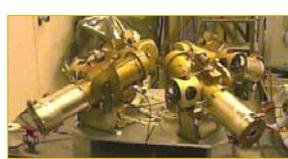
Heat Wave System: Research is a value of the community

- We are inclined to use our current knowledge to document successes and failures, and to develop strategies for improving the system.
 - Therefore, we are inclined to research to improve the system as a whole.
 - Scientific method
 - Social scientific method
 - Other ways to develop knowledge
- Therefore, research is one of the values of our community. It is one of the ways that we behave.



Heat Wave System: Research and validation

- Validation is an essential part of research. Validation is such an essential part of the system that it is an explicit value as well.



Heat Wave System: Policy

- Policy also determines the way that the community behaves. Therefore it contributes to the definition of the values of the community.
 - Policy is both internally and externally generated.
 - (where do resources fit in?)



Heat Wave System: Basic elements and values

ENVIRONMENTAL
OBSERVATIONS and
FORECASTS

HUMAN HEALTH AND
PHYSIOLOGICAL
INFORMATION

Research and Validation

HEAT-RELATED
ENVIRONMENTAL
PRODUCTS
(e.g heat index)

COMMUNICATIONS
of PRODUCTS

ACTIONS BASED
ON PRODUCTS
and
COMMUNICATIONS

Policy



Heat Wave System: Impact of Values

- Research and Validation and Policy influence each of the elements of the system.
 - There is direct interaction with individual elements of the system
 - Is there a view of the system as a whole?
 - If not, then excess fragmentation will be a characteristic of the system.
 - (The values of the community directly influence the resources for the community and the use of resources by the community.)



Heat Wave System: Basic elements: analysis

- With the existence of a functioning system, and research and validation, then there is a natural division into a research component and an operational component.
 - What is the process for research to migrate to operations?
 - How is research targeted?
 - Individual elements
 - System as a whole



Heat Wave System: Basic elements: analysis

- A more granular view is needed to identify gaps and develop priorities
 - There is research and validation at all levels and the culture of the research is different for different parts of the system
 - There is the need to accommodate information that comes from sources other than directed research.
 - There is validation of the system, validation of the elements of the system, and validation of the components of the system
 - Communications needs to be subdivided into
 - Education
 - Public awareness
 - Service providers
 - Targeted for at risk communities
 - etc.
 - Communications is
 - Internal to the community
 - An interface to external communities
 - Multi-directional (2 way, interconnected,



Heat Wave System: Basic elements: analysis

- A more granular view is needed to identify gaps and develop priorities
 - Heat wave systems are different from city to city, region to region, country to country
 - What's hot in Toronto is not hot in Atlanta
 - What's hot in spring is not hot in the late summer
 - What's hot to the poor might not be hot to the rich
 - What's hot to the unhealthy might not be hot to the wealthy
 -
 - Therefore, the idea of standards of process of information of response needs to accommodate this granularity
 - One size does not fit all.



Heat Wave System: Basic elements: analysis

- More stuff ... a fleeting idea ... policy



Heat Wave System: Basic elements: analysis

- There are communities and resources outside of the core of the heat wave community, whose actions have a large influence on resilience to heat waves (e.g. urban planning.)
 - The requirements of the heat wave community need to be integrated into these communities



Trying to put together some ideas from the meeting.

-
- Given:



Heat Wave System: Basic elements and values

ENVIRONMENTAL
OBSERVATIONS and
FORECASTS

HUMAN HEALTH AND
PHYSIOLOGICAL
INFORMATION

Research and Validation

HEAT-RELATED
ENVIRONMENTAL
PRODUCTS
(e.g heat index)

COMMUNICATION
of PRODUCTS

ACTIONS BASED
ON PRODUCTS
and
COMMUNICATION

Policy



Heat Wave System:

Research and Validation: Environmental Observations ...

- Are there unused observations that could have significant impact?
- Are there observations that, if taken, would have high impact?
- Forecast information
 - Better use of weather forecast data
 - Use of climate models to project into the future
- ...



Heat Wave System:

Research and Validation: Human health ...

- Adequate data on morbidity and mortality?
- Attribution of morbidity and mortality to heat?
- Physiology of environmental heat, especially at extremes predicted for the future
- Strategies of dispersion of warnings
- Most effective communication targets
- Most effective responses
- Most effective development of societal capabilities
-



Heat Wave System:

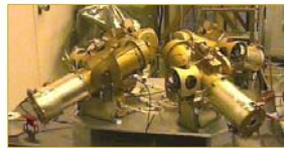
Research and Validation: Heat-related products ...

- Need to evaluate alternative algorithms to calculate advisory, watch, warning
- Impact of new data types, new data sources
- Downscaling and localized information
 - Resolution
 - Types of parameters
- Definition of validation process and standards
- Linking of environmental information to human health effects
-



Heat Wave System: Research and Validation: Communications ...

- Broadcast versus targeted communications
 - Vulnerable communities
 - Care communities
 - First responder communities
- Communications based on regional capabilities
- Communication tools
 - Guidelines for appropriate response
 - Ancillary materials
- Use of social networks
- Sophistication and nuanced information versus need for simplicity and clarity of message
- ...



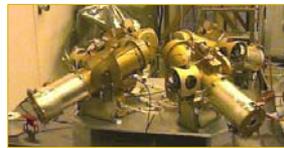
Heat Wave System:

Research and Validation: Actions based on ...

- Need for customized information to particular communities
 - Schools
 - Outdoor workers
 - Elderly
- Training focused on care and first responder communities
- Most effective things for communities to do
 - Reactive
 - Building resilience
- ...



Heat Wave System: Policy



- Standardization?
 - Product generation
 - Communications
 - Responses
- Certified sources of information?
- Community values, behavior and governance.



Open community?

- This an ideal candidate for developing a community in the spirit of the open source culture. While complex, it is reasonably well defined and is functioning. The combination of complexity and quasi-regular process is well suited to community contributions. There are some artifacts of the development of the current system which could be improved. There are issues of transparency to basic calculations and access to information.
 - Governance model
 - Infrastructure
 - Transparency