The Use and Integration of Earth Observations for Early Warnings - A WMO Perspective

by

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WMO
Earth Observations must be

1. Routinely made
2. Accurate
3. Consistent
4. Available
WMO’s Observational Systems

1. Surface
2. Upper Air
3. Space based

4. These independent observations must be integrated to enhance usefulness
NMHS’s issue Early Warnings to Reduce Risk

1. Tornadoes
2. Cyclones/Hurricanes
3. Wind storms
4. Heat waves
5. etc…

Newest area is climate anomalies – such as El Niño/La Niña
ENSO event

- 1970’s link between Southern Oscillation and El Niño made
- 1980’s research into improved observations and climate models for prediction
- 1990’s research to understand risks
- 1990’s implementation of research into operations at global, regional and national centres
- 2000 establishment of Climate Outlook Fora’s (COFs) and El Niño Outlook
WMO’s coordinated El Niño Outlooks
Risks associated with El Niño-La Niña

Must link science knowledge to risk identification and understanding
How are early warnings (alerts) issued for ENSO events?

- COF’s decide on local/national outlook based on integrated observations and down-scaled global forecasts
- NMHS’s communicate this information to decision makers in - agriculture - health - disaster areas
- Decision makers/governments take actions
What actions can be taken

- For drier than normal conditions
  - sowing of crops may use drought resistant seeds

- For wetter than normal conditions
  - different crops may be planted
  - health organization may recommend spraying for vector borne diseases

- For warmer than normal conditions
  - heat alerts may be issued
  - different crops planted
  - health officials may take actions
ENSO Risks

Potential ENSO and Climate Change Impacts

**CLIMATE VARIATIONS AND CHANGES**
- Temperature
- Precipitation
- Sea Level Rise

**Health Impacts**
- Weather-related Mortality
- Infectious Diseases
- Air Quality-Respiratory Illnesses

**Agriculture Impacts**
- Crop yields
- Irrigation demands

**Forest Impacts**
- Change in forest composition
- Shift geographic range of forests
- Forest Health and Productivity

**Water Resource Impacts**
- Changes in water supply
- Water quality
- Increased Competition for water

**Impacts on Coastal Areas**
- Erosion of beaches
- Inundate coastal lands
- Costs to defend coastal communities

**Species and Natural Areas**
- Shift in ecological zones
- Loss of habitat and species

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World Meteorological Organization
Today observations are not ideal

Global Earth Observation System of Systems (GEOSS):

- Will improve our observations, the integration of the observations and our understanding of the environment
- Will greatly improve access to observations analysis and forecasts
- These actions will lead to ability to issue globally integrated early warnings
In Summary to reduce Risks

1. Identify Risks
2. Observe environment in an integrated way
3. Analyse the integrated observations
4. Evaluate the scientific understanding
5. Issue warnings that are timely, consistent and understandable
6. Communicate and educate citizens, decision makers and governments

WMO OMM
World Meteorological Organization
Session 2.9 Reducing risk through earth observations
The message from WMO’s risk reduction

Early Warnings prevent natural hazards from becoming natural disasters