



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

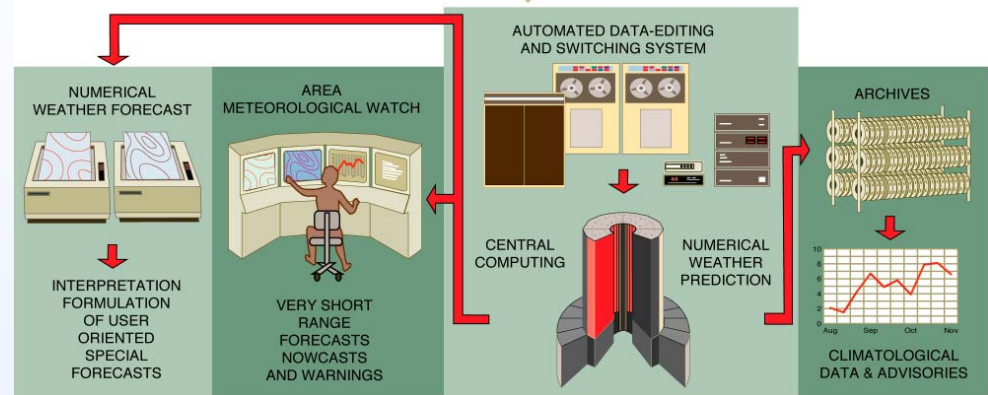
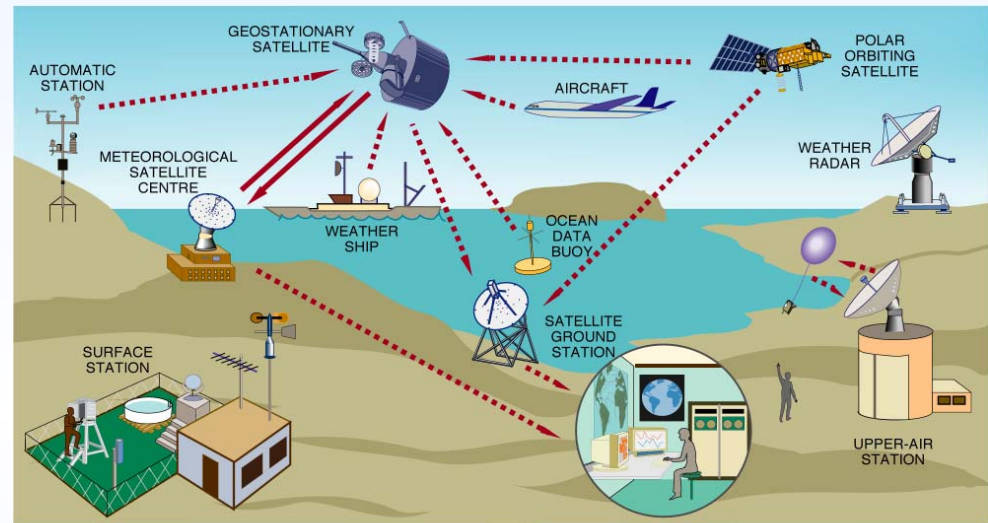
by

Ken Davidson

WMO

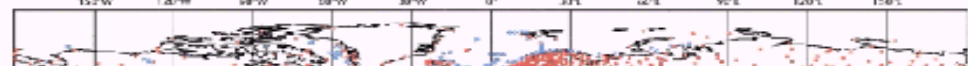
Earth Observations must be

1. Routinely made
2. Accurate
3. Consistent
4. Available

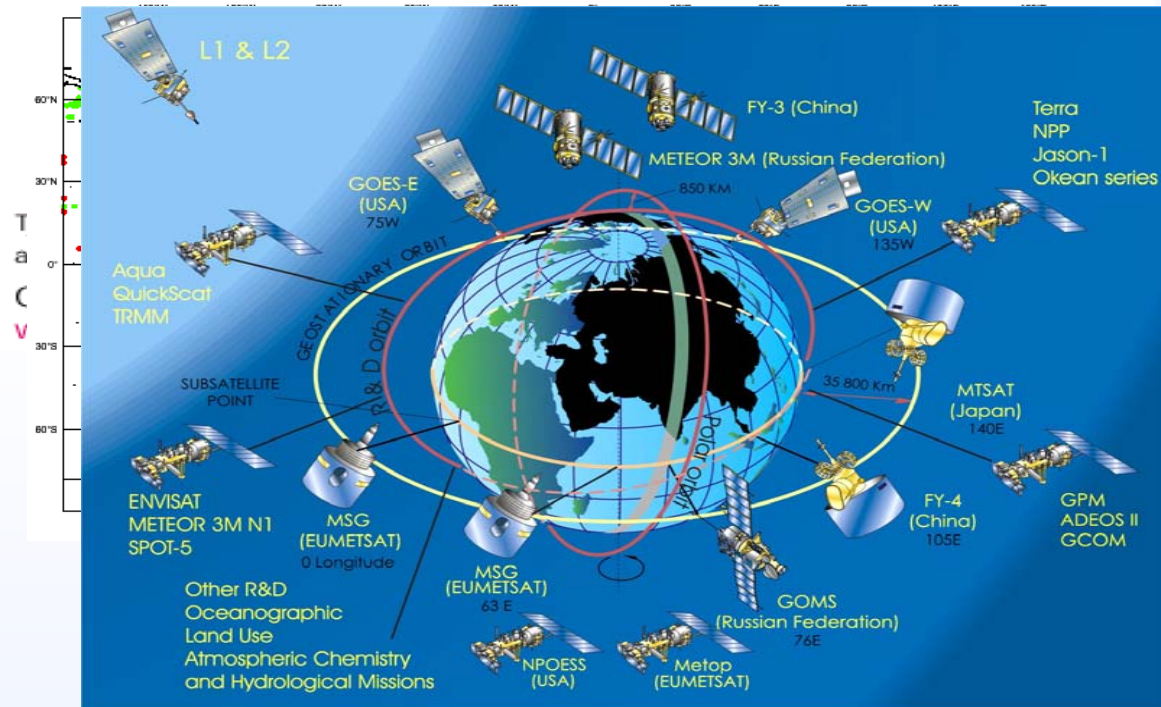


WMO's Observational Systems

1. Surface
2. Upper Air
3. Space based



ECMWF Data Coverage (All obs) - AIRCRAFT
06/JAN/2003; 00 UTC
Total number of obs = 37249



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

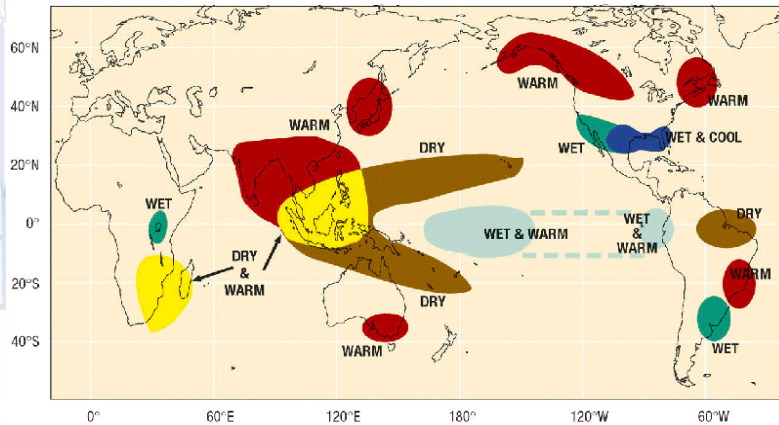
ENSO event

- 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

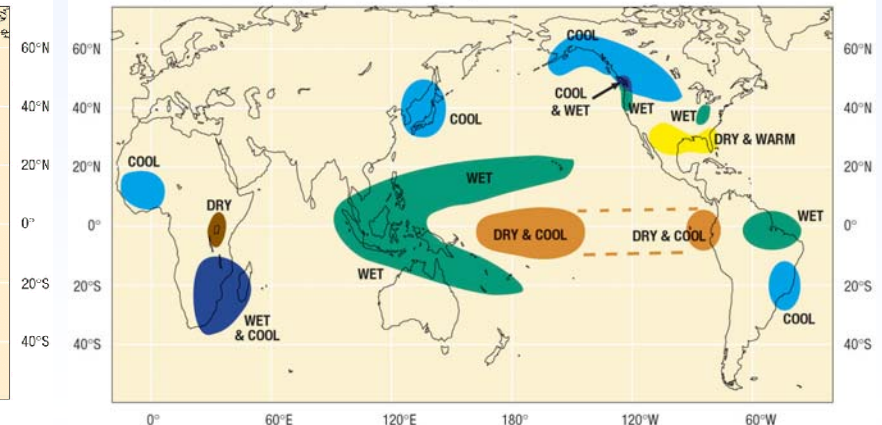
WMO's coordinated El Niño Outlooks

Risks associated with El Niño-La Niña

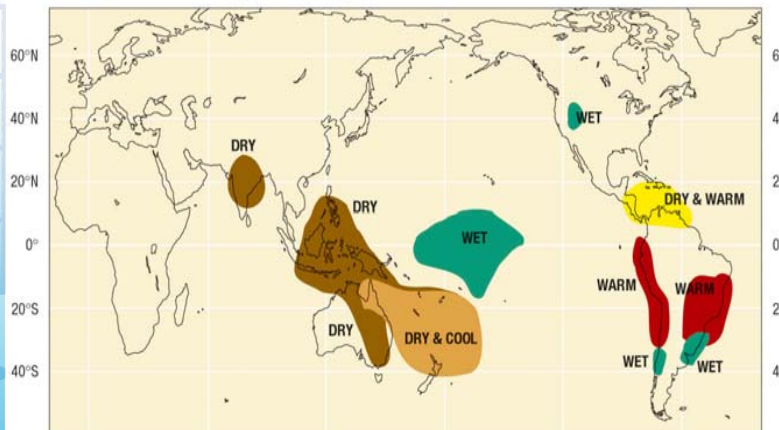
Warm episode relationships December–February



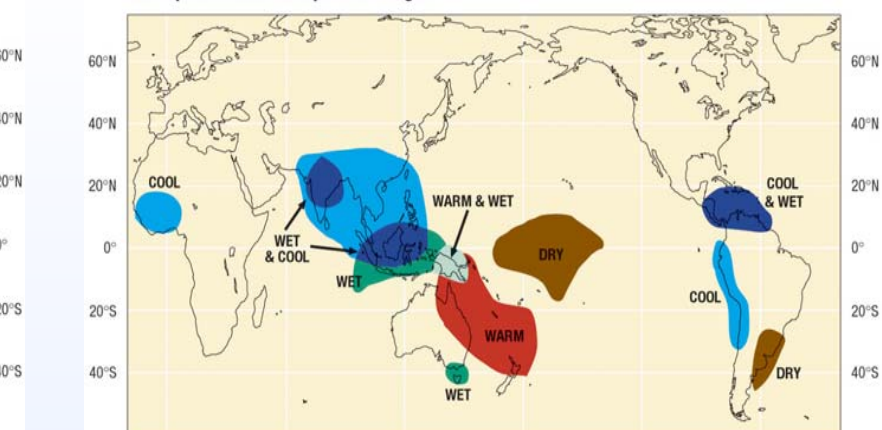
Cold episode relationships December–February



Warm episode relationships June–August



Cold episode relationships June–August



Must link science knowledge to risk identification and understanding

How are early warnings (alerts) issued for ENSO events?

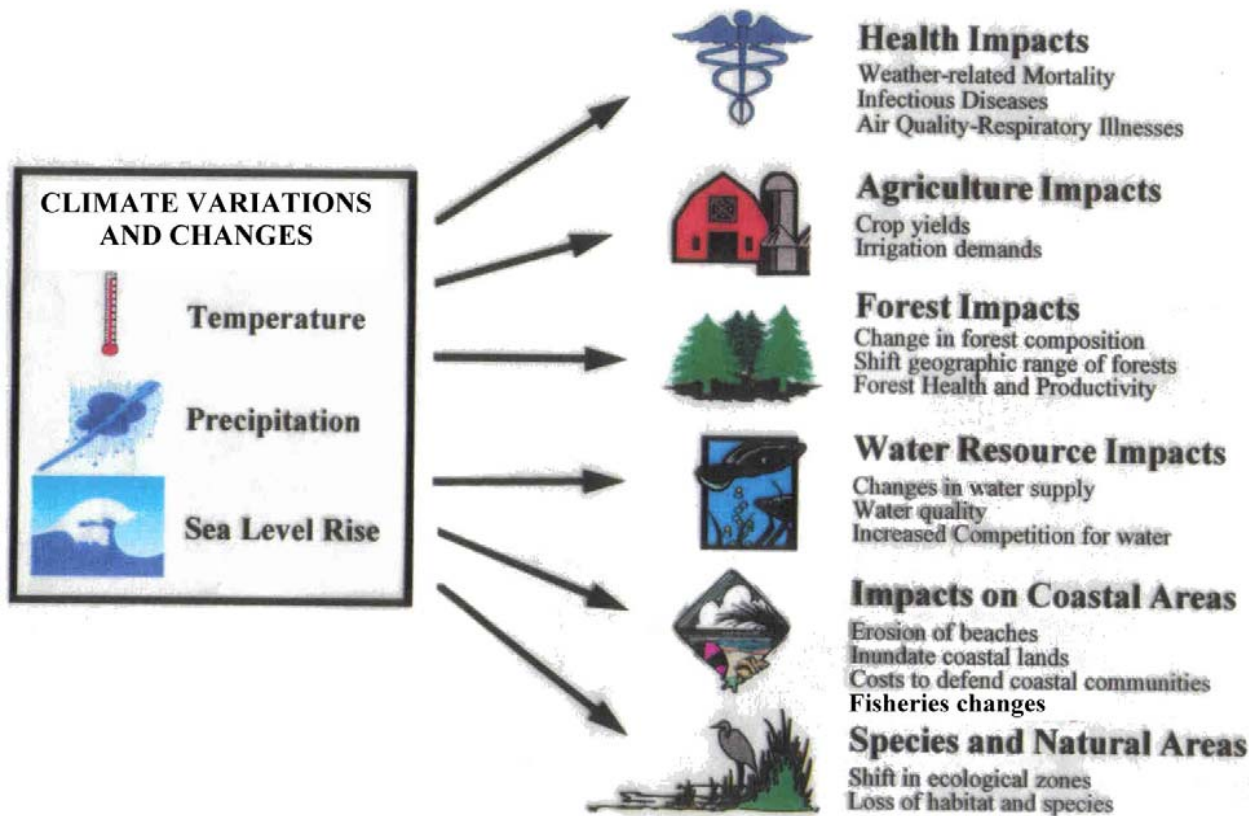
- COF's decide on local/national outlook based on integrated observations and down-scaled global forecasts
- NMHS's communicate this information to decision makers in
 - agriculture
 - health
 - disaster areas
- Decision makers/governments take actions

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



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



*The message from
WMO's risk reduction*

Early Warnings

prevent natural hazards

from becoming natural disasters