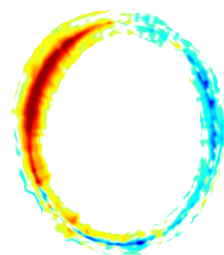


# A Research Perspective on Climate Services

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International Research Institute for Climate and Society  
The Earth Institute of Columbia University

*International Conference on Climate Services (ICCS)*

New York, NY, 15 – 17 October 2011



# ιστορίη – “research”

John William Waterhouse, *Consulting the Oracle*, c. 1884



Κροΐσος ... ἐπειρωτᾷ εἰ στρατεύηται ἐπὶ Πέρσας ...  
ἢν στρατεύηται ἐπὶ Πέρσας, μεγάλην ἀρχὴν μιν καταλύσειν  
Herodotus, *The Histories*



# Research questions

1. Ambiguous answer? Or
2. Poorly frar



# Research questions

“We may not know many of the answers,  
but we do know most of the questions.”

Bill MacMillan, *Hertford College orientation*

Types of questions:

1. Answerable v answerable ones;
2. Interesting v irrelevant ones.

What are the interesting *and* answerable questions?



# Research questions

1. Reduce the uncertainty in the projected impacts.

The British, he thought, must be gluttons for satire: even the weather forecast seemed to be some kind of spoof, predicting every possible combination of weather for the next twenty-four hours without actually committing itself to anything specific.

David John Lodge, *Changing Places*

2. Reduce the misuse of good knowledge of uncertainty.

"Five to one against and falling..." she said, "four to one against and falling...three to one...two...one...probability factor of one to one...we have normality, I repeat we have normality." She turned her microphone off — then turned it back on, with a slight smile and continued: "Anything you still can't cope with is therefore your own problem."

Douglas Adams, *A Hitchhikers Guide to the Galaxy*

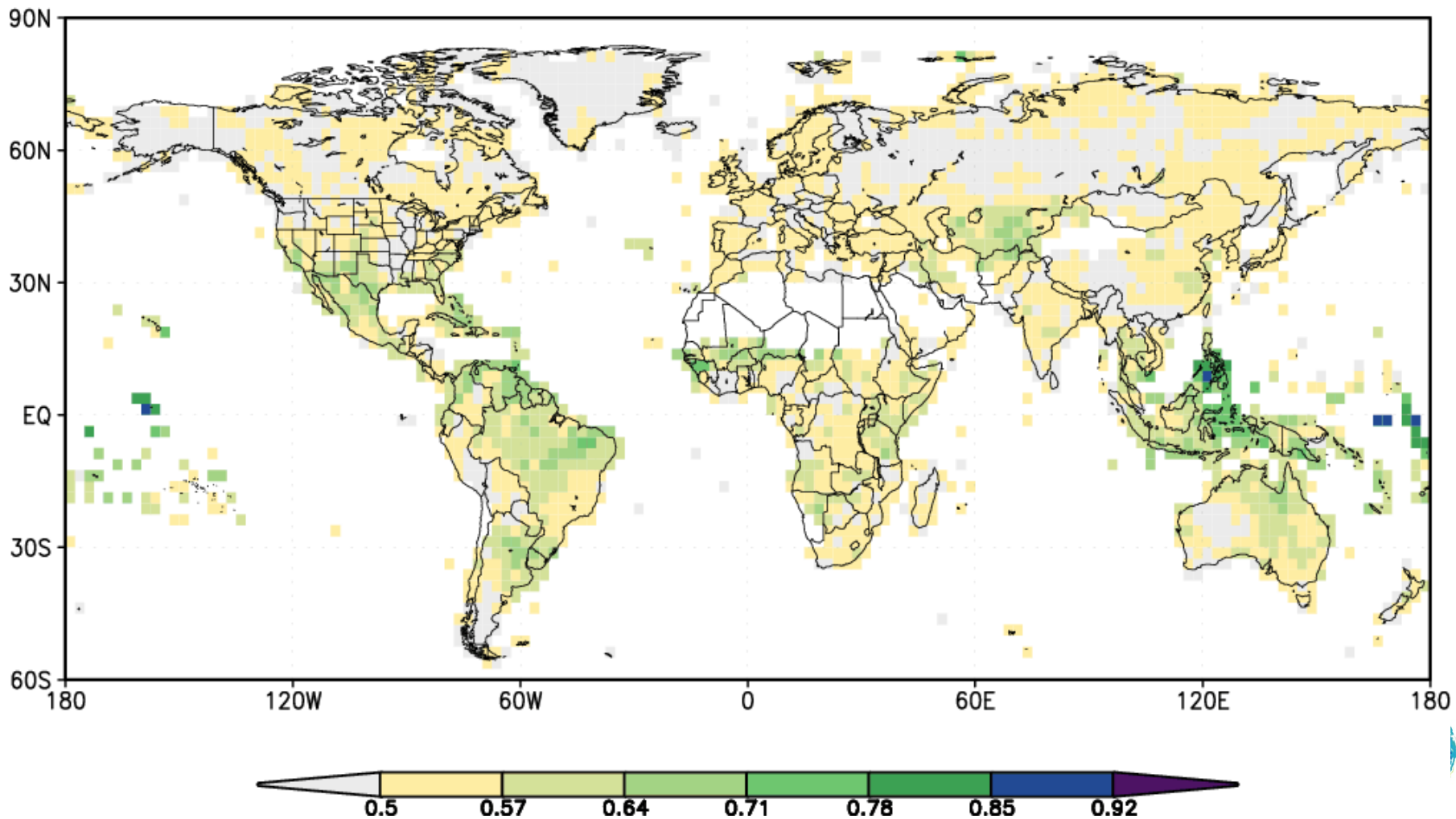


# Reducing the uncertainty

Skill of seasonal rainfall forecasts.

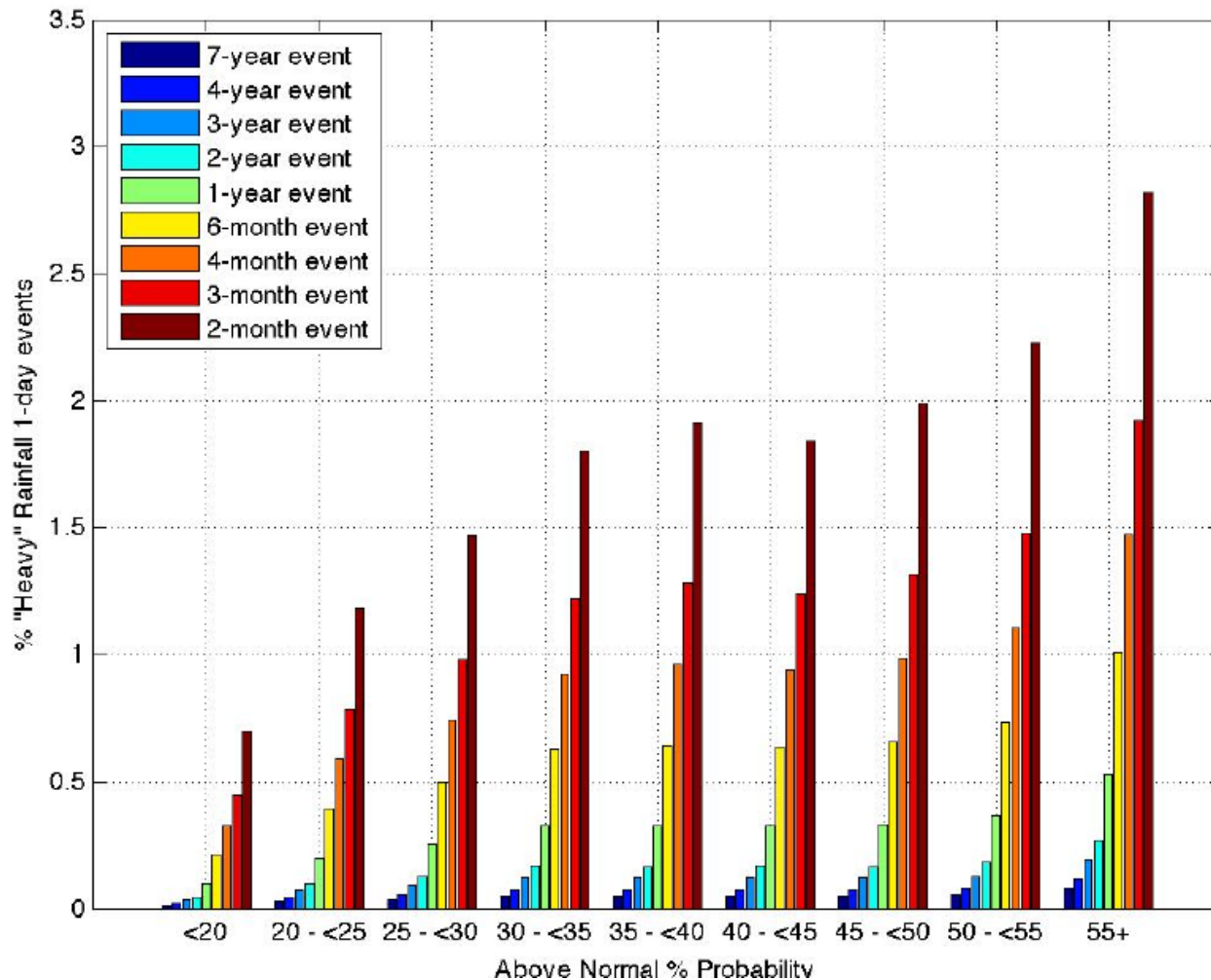
Importance of verification.

How to verify?

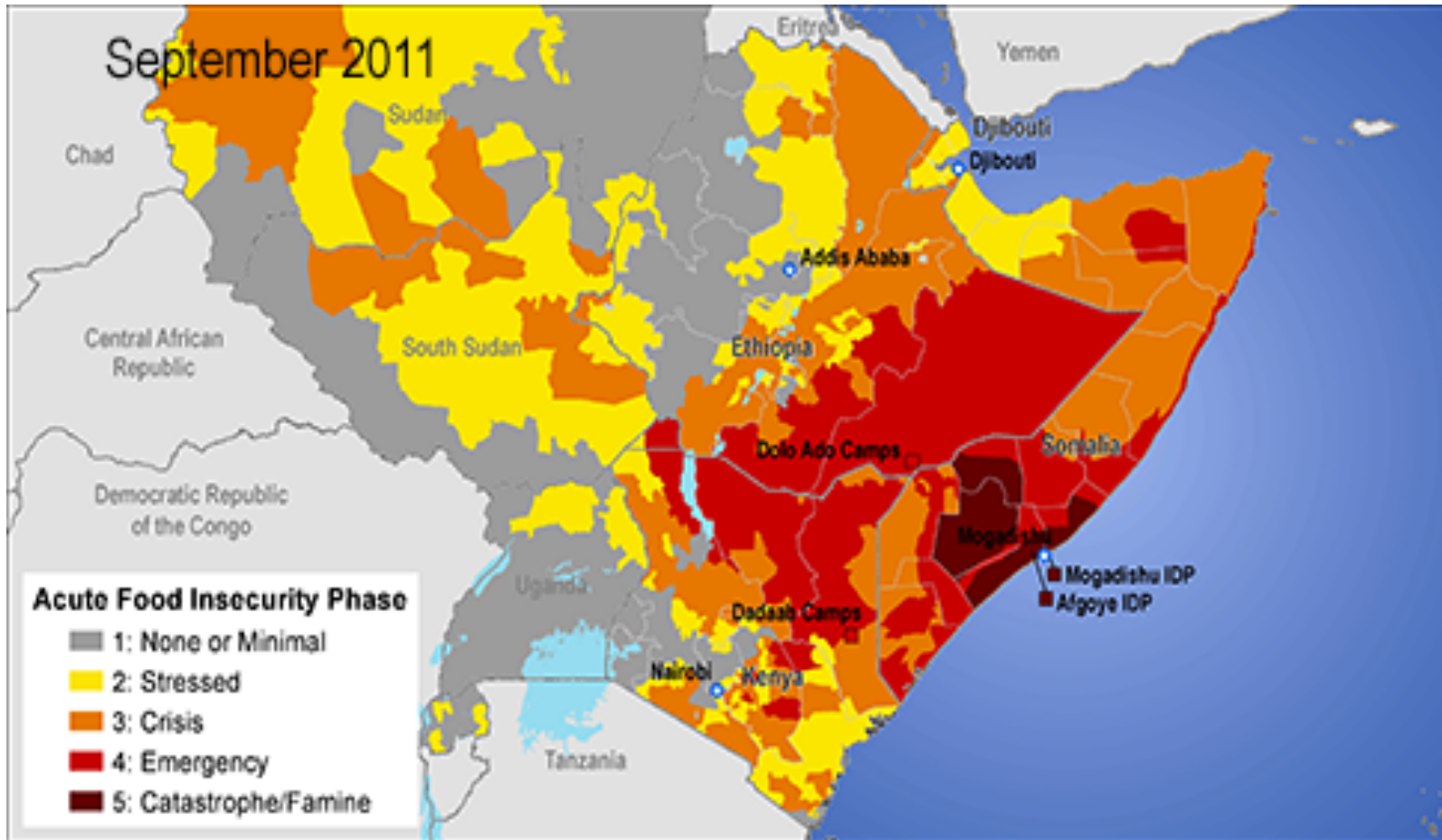


# Reducing the uncertainty: weather v climate

We are all affected by the weather, not the climate.  
Climate forecasts do not translate into impacts.



# Reducing the uncertainty: forecasting impacts



Best practices v fit for purpose



# Different types of uncertainty

## Imprecision

*Problem:* not knowing what the exact outcome will be.

*Solution:* indicate probabilities.

## Second-order uncertainty

*Problem:* not knowing what the exact probabilities should be.

*Solution:* indicate probability ranges.

## Intractability

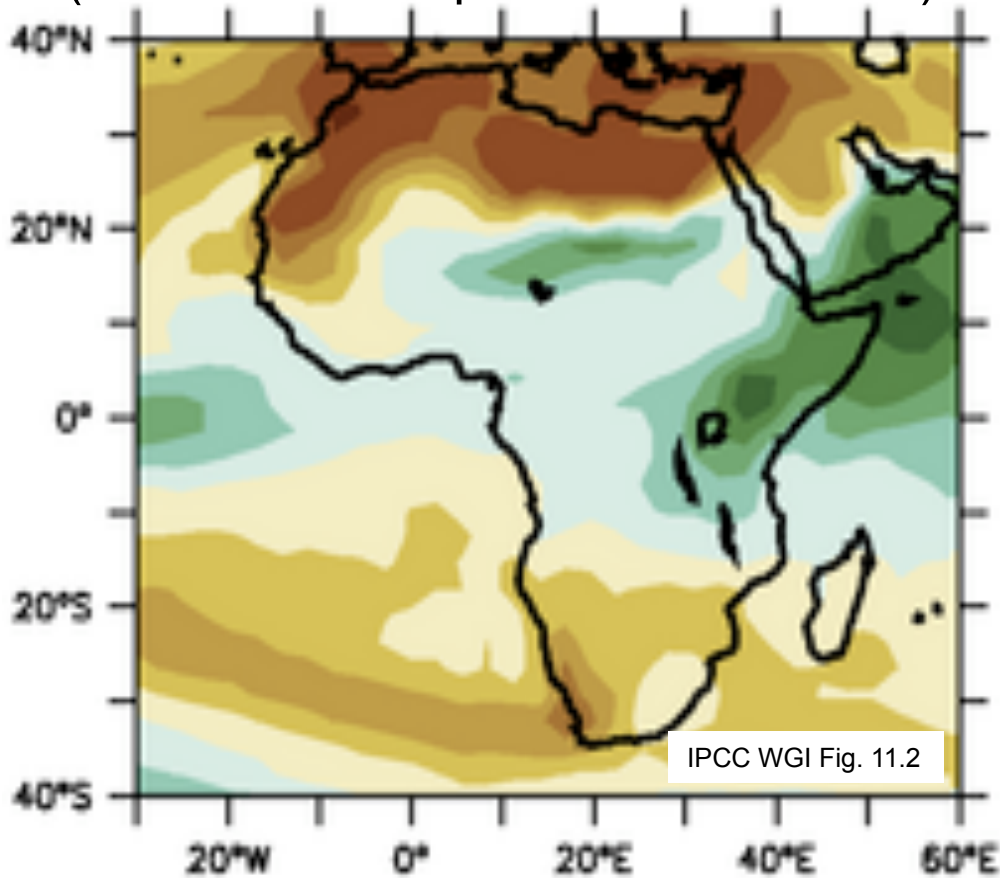
*Problem:* not knowing how to estimate the probabilities at all.

*Solution:* dialogue; don't pretend to imprecision; identify tractable problems.

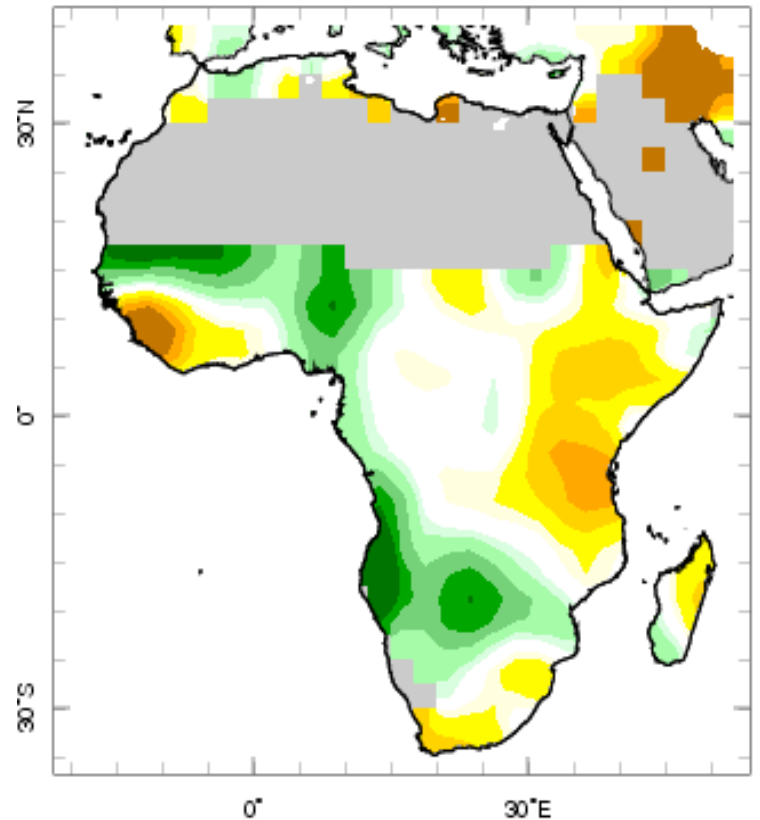


# Climate change uncertainty

Projected % change in rainfall  
(2080-2099 compared to 1980-1999)

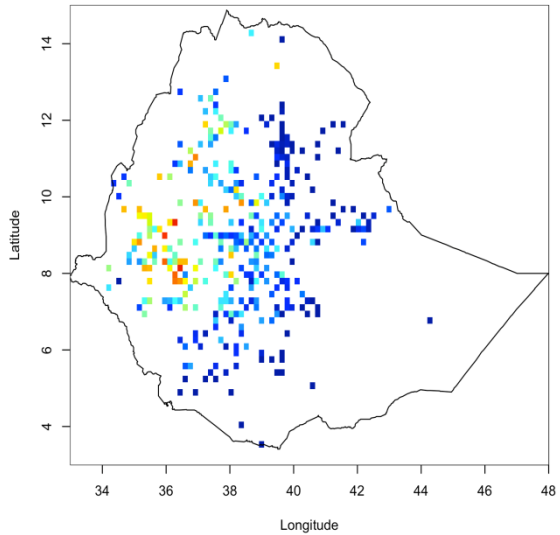


Observed % change in rainfall  
(1999-2011 compared to 1979-1998)



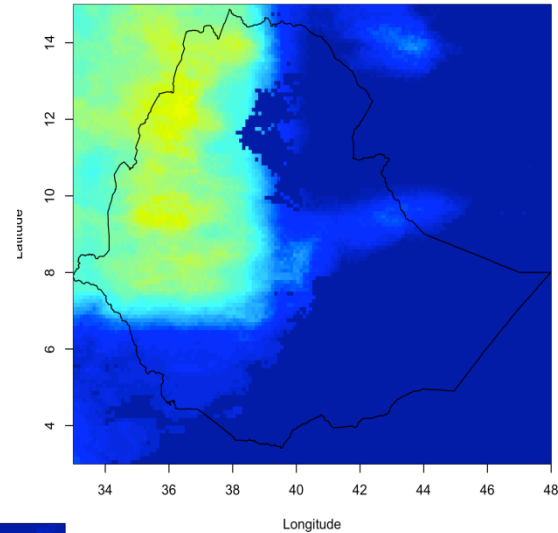
What can we say about the next few years?

# Reducing the uncertainty: data issues



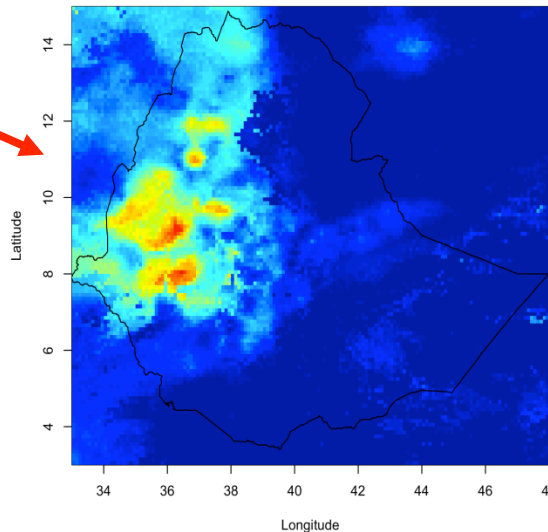
Gauge

Gauges are accurate, but have poor spatial coverage



Satellites

Satellites have good spatial coverage, but underestimate rainfall in the highlands



Blended

High-quality observational datasets can be created by blending satellites with gauge data available only at National Meteorological Services



# Research questions

1. Reduce the uncertainty in the projected impacts.

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David John Lodge, *Changing Places*

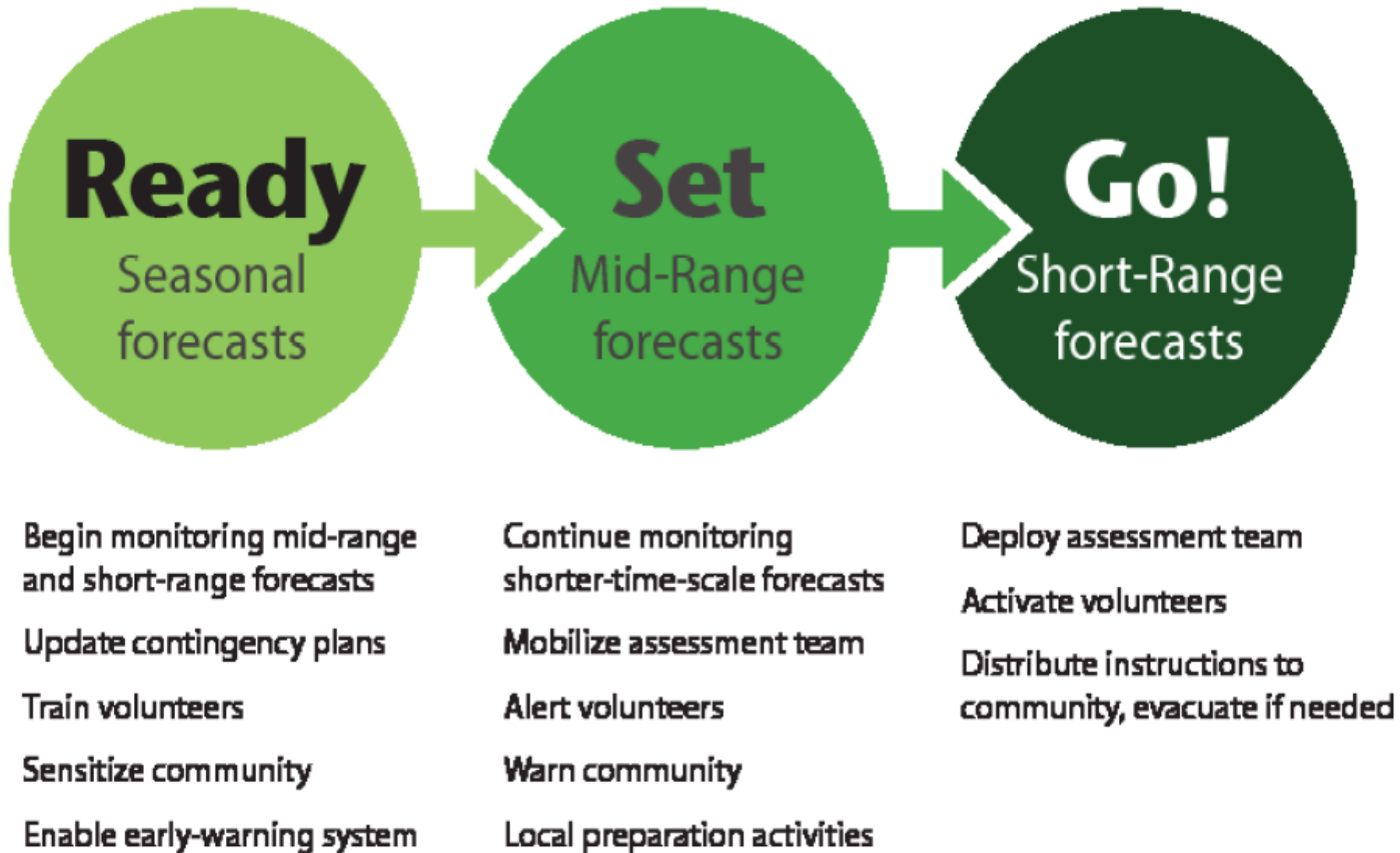
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Douglas Adams, *A Hitchhikers Guide to the Galaxy*



# Decision-making across timescales



# Ensuring good use of information

“Everything should be made as simple as possible, but not simpler.”

Precipitation Forecast in Context Map Tool - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://iridl.ldeo.columbia.edu/maproom/IFRC/Forecasts/index.html?mapsel=tot6dayapcpctle&map.S.plotvalue=0000+17+Feb 2010

Precipitation Forecast in Cont...

**IRI** International Federation of Red Cross and Red Crescent Societies

### Precipitation Forecast in Context Map Tool

Forecast Start Time: 0000 17 Feb 2010 0000 16 Feb 2010

76.25N

66.25S

178.75E 178.75E

Latitude: 60°N, 30°N, 0°, 30°S, 60°S  
Longitude: 180°, 150°W, 120°W, 90°W, 60°W, 30°W, 0°, 30°E, 60°E, 90°E, 120°E, 150°E

Forecast for 17-22 Feb 2010 Issued 0000 17 Feb 2010

Heavy Rainfall Very Heavy Rainfall Extremely Heavy Rainfall

Recommended action for areas in any of the three shades of blue: check local forecasts immediately for confirmation of timing and severity of rainfall. Floods associated with heavy rainfall may be possible any time within the next 6 days.

Where is unusually heavy rainfall expected?

**IRI** International Federation of Red Cross and Red Crescent Societies

#### Instructions for Use of this Tool

##### What Would You Like to Know?

###### Forecasts for the Next 6 Days

- How much rain is expected cumulatively?
- Where is it expected to be wetter than average?
- Where is unusually heavy rainfall expected?
- How heavy is the rainfall expected to be?

###### Forecasts for the Next 3 Months

- Are the next 3 months likely to be unusually wet or dry?
- Are the next 3 months likely to be exceptionally wet or dry?
- Is it likely that unusually wet or dry conditions will continue?
- Is it likely that unusually wet or dry conditions will end?

76.25N

66.25S

178.75E 178.75E

Heavy Rainfall Very Heavy Rainfall Extremely Heavy Rainfall

Recommended action for areas in any of the three shades of blue: check local forecasts immediately for confirmation of timing and severity of rainfall. Floods associated with heavy rainfall may be possible any time within the next 6 days.

Where is unusually heavy rainfall expected?

# Ensuring good use of information

## A PARTNERSHIP TO SAVE LIVES



 International Federation  
of Red Cross and Red Crescent Societies

 The International Research Institute  
for Climate and Society

Bringing communities to the same desk rather than to the same table.



# Summary

The uncertainty in climate information is considerable because of:

1. Limited and poor quality data;
2. Imperfect models;
3. Inherent complexity.

The role of research is to:

1. Reduce the level and degree of uncertainty;
2. Identify how the uncertain information can be used to inform decision-making.





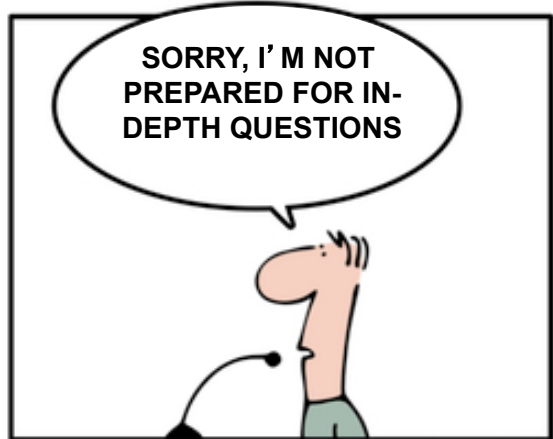
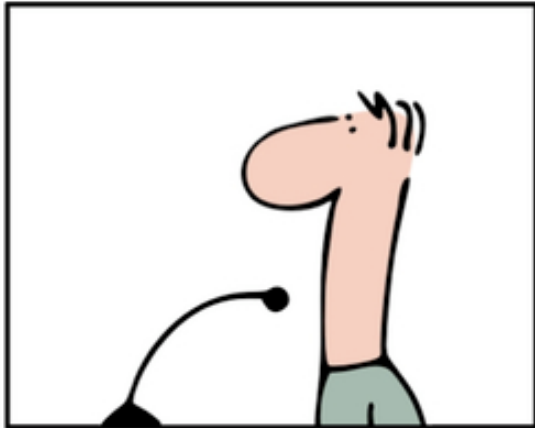
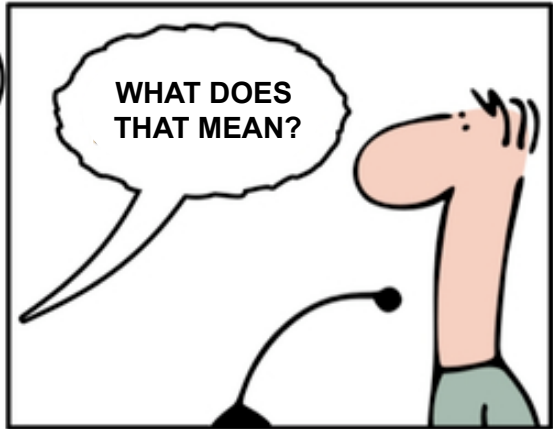
# Conclusions

Without a research component to climate services, we will provide either:

1. Good answers to boring questions, or
2. Bad answers to interesting questions.

Me





geek and poke

