

# Data & Modelling

Chair: Nick Schutgens

Rapporteur: Ed Nowotnick

# Observations & Models

- **Data** is a [set](#) of values of [qualitative](#) or [quantitative variables](#) (*Wikipedia*).
- What is the fundamental difference between observations & models ?

Parker *BAMS* 2016

Hoffman et al. *BAMS* 2017

Parker *BAMS* 2017

Massonnet et al. *Science* 2016

# M(odel) – O(bservation)

- Data needs to be collected
  - Which data do we need ?
- Observations have errors:  $O + \varepsilon$ 
  - How best to communicate them ?
- Models need to simulate observations:  $M + \varepsilon$ 
  - What do we ignore ?
- Spatio-temporal sampling of M and O
  - Case-dependent
- Tools to compare M and O
  - What is available (operational/exploration) ?
- How to interpret  $M - O$  ?
  - Do we have the techniques ?

There are known knowns;

[..] things we know that we know.

There are known unknowns;

[..] things that we know we don't know.

But there are also unknown unknowns –

[..] things we do not know we don't know.

Former USA Secretary of Defense, Donald Rumsfeld