Data & Modelling

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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   Massonnet et al. *Science* 2016
Hoffman et al. *BAMS 2017*
Parker *BAMS* 2017

M(odel) – O(bservation)

- Data needs to be collected

  - Which data do we need ?

- Observations have errors: O + ε

  - How best to communicate them ?

- Models need to simulate observations: M + ε

  - 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