

Scientific Method

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Scientific investigation of climate change

- What is scientific investigation?

What is science, the scientific method?

- Elements of the scientific method
 - Observations of some phenomenon.
 - Identification of patterns, relationships and the generation of suppositions, hypotheses.
 - In principle, hypotheses are testable:
 - Experiments: cause and effect
 - Prediction instead of experiments?
 - Development of constructs, theory, which follow from successful hypothesis.
 - Predict behavior, what does the next observation might look like?
 - Development of tests, experiments that challenge the hypotheses and predictions.
 - Validate or refute theory and elements from which the theory is constructed.

What is science, the scientific method?

- Science is a process of investigation
 - The result of scientific investigation includes the generation of
 - Knowledge within a prescribed levels of constraints
 - Uncertainty: How sure are we about that specific piece of knowledge.
 - Science does not generate a systematic exposition of facts
 - Facts are, perhaps knowledge, whose uncertainty is so low, that that know is certain.
 - Theories develop out of tested hypotheses.
 - Theory is NOT conjecture
 - Theory is subject to change
 - Science requires validation
 - Requires that hypotheses and theories are testable
 - Requires transparency so that independent investigators can repeat tests and develop new tests.

Science, Scientific Method

- Much of the rhetoric of the disputes about climate change is over what is science, scientific investigation, and arguments over
 - facts
 - theory
 - consensus
 - ...
- Scientists DO impart their personalities and beliefs onto their results
 - But the fact that it is independently testable, ultimately, counters this potential prejudice.