

- Uniformitarianism has two distinct components:
 1. Substantive uniformitarianism: A testable theory claiming uniformity of rates/conditions in geological processes
 2. Methodological uniformitarianism: A principle asserting natural laws remain constant across time and space
- Main argument: Substantive uniformitarianism is false and should be abandoned; methodological uniformitarianism is redundant as it's inherent to all science

HISTORICAL DEVELOPMENT

19th Century Context:

- Catastrophists (like Buckland) believed in:
 - Series of major upheavals in Earth's history
 - Divine intervention in geological processes
 - Geology as supporting religious views

Lyell's Response:

1. Substantive Uniformitarianism:
 - Proposed gradual change through constant natural processes
 - Argued for uniform rates of geological change
 - Initially denied progression in organic history
 2. Methodological Uniformitarianism:
 - Asserted invariability of natural laws
 - Aimed to eliminate supernatural explanations
 - Made geology truly scientific
- Important Distinction:
 - These two concepts were related but logically distinct
 - Could have catastrophic theories that reject substantive uniformitarianism while maintaining methodological uniformitarianism

LATER INTERPRETATION

- Term "uniformitarianism" coined by Whewell (1832)
- Historical confusion:
 - Some geologists applied term to substantive theory
 - Others used it for methodological principle
- Ongoing debate:
 - Critics attacked substantive theory
 - Defenders upheld methodological principle
 - Much confusion due to single term describing two concepts

STATUS OF THE CONCEPT

1. Substantive Uniformitarianism:
 - No longer tenable as strict theory
 - Contradicted by new data (e.g., non-uniform patterns in extinction)
 - Restricts hypothesis formation
2. Methodological Uniformitarianism:
 - Still valid but redundant
 - Not unique to geology
 - Simply represents basic scientific induction
 - Requires two principles: a. Spatial/temporal invariance of natural laws b. Simplicity principle (use observable causes before theoretical ones)

CONCLUSION

- Substantive uniformitarianism: Should be abandoned as incorrect
- Methodological uniformitarianism:
 - Was historically important in establishing geology as science
 - Now redundant as it's equivalent to saying "geology is science"
 - Term should be retired as its historical purpose (combating supernatural explanations) is complete
 - Keeping it risks confusion and false impression of geology having unique scientific principles