

Steno's principles of sedimentary layers

Nicolas Steno (or Niels Stensen in the usage of his native Denmark) lived from 1638 to 1686 and was a natural scientist trying to understand rocks and fossils. He lived in an age when fossils were not yet widely accepted as remains of ancient life, and when rocks were still viewed solely as the substrate on which humans found themselves. In 1669, Steno published a treatise that included observations about layers of sediment, and sedimentary rock, that were "ground-breaking" in their time and are still fundamental to understanding geology and Earth's history.

Steno's three Principles of . . .

Original lateral continuity: layers of sediment now truncated must have been deposited as laterally continuous layers.

This principle follows from the observation that sediments accumulate across broad surfaces, such as plains, continental shelves, and areas of deep sea floor, without abrupt interruption.

From this principle follows at least part of the Principle of Cross-Cutting Relationships: a feature cutting across layers must post-date such layers. The fault and erosional landscape in the sketch above would be examples of such later features (and the erosional surface postdates the fault that it truncates).

Original horizontality: layers now inclined must have been deposited as nearly horizontal layers.

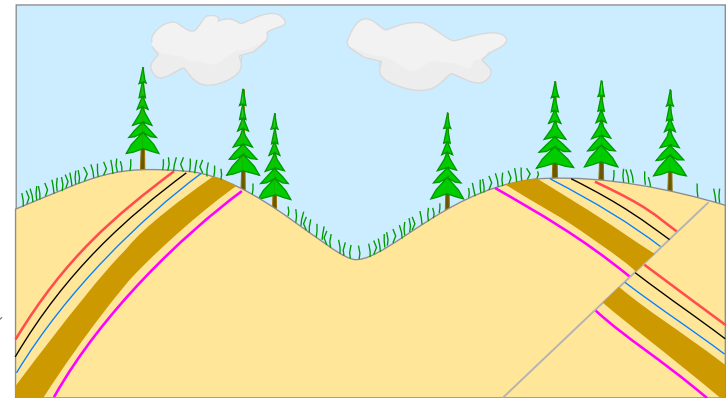
This principle follows from the observation that sediments accumulate on horizontal surfaces, or at most gently sloping surfaces, such as plains and continental shelves.

This principle has huge implications for physical geology, because it implies that all tilted and/or folded strata have been moved from their original situation by tectonic forces.

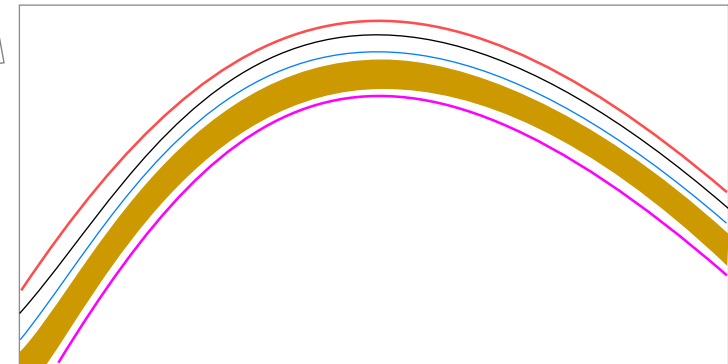
Superposition: younger layers overlies older layers.

This principle follows from the observation that things deposited from above accumulate on top of older things, whether we observe a desk, a garbage dump, or a depositional landscape.

This principle gives us much of historical geology: the concept of sedimentary layers and the fossils in them as historical records of environments and life through time.



What we observe today



What we infer about the past, using Steno's principles

