

Chapter 2. A brief history of geomorphology

Introduction

The discipline is very old if we consider its object of observation - landforms - and the sources go back to Antiquity and the Middle Ages, both Western (Aristotle, Avicenna, Strabo) and Chinese. For example, Shen Kuo (1031-1095), a great Chinese naturalist and politician, observed fossilised shells in a cliff and concluded that this was an ancient coastline. Other formations inspired the idea that the Earth's surface is shaped and reshaped by erosion and that the climate may have changed (Leonardo da Vinci). Although geomorphology did not yet exist as such, great naturalists and travellers such as Alexander von Humboldt, James Hutton and John Playfair laid the foundations of erosion. Carl Friedrich Naumann first used the term morphology of the Earth's surface in 1858 in his geology textbook.

2.1. Catastrophism (Georges Cuvier, 1768-1832): In the 17th-18th centuries, the dominant paradigm was Catastrophism; "All natural objects (living or not) resulted from sudden and relatively recent events" (Age of the Earth ~10-100 ma). "Surface features appeared suddenly in the past"

2.2. The unifomitarists (James Hutton 1726-1797, John Playfair 1748-1819, Sir Charles Lyell 1797-1875) : « the present is the key to the past" (same causes, same effects)

2. 3. Evolutionists (Jean-Baptiste de Lamarck 1744-1829, Charles Darwin 1809-1882, Alfred Wallace 1823-1913): theory based on natural selection; Natural selection is a process involved in the evolution of species. It corresponds to a "sorting out" of the individuals best able to survive or reproduce, whatever the reason why they have such an aptitude".

2. 4. Expéditions du Grand Canyon du Colorado (John Wesley Powell 1834–1902): «the river preceded the canyons and then cut the canyons before the plateau rose »

- Classification of valleys and watersheds

- Definition of the base level of rivers

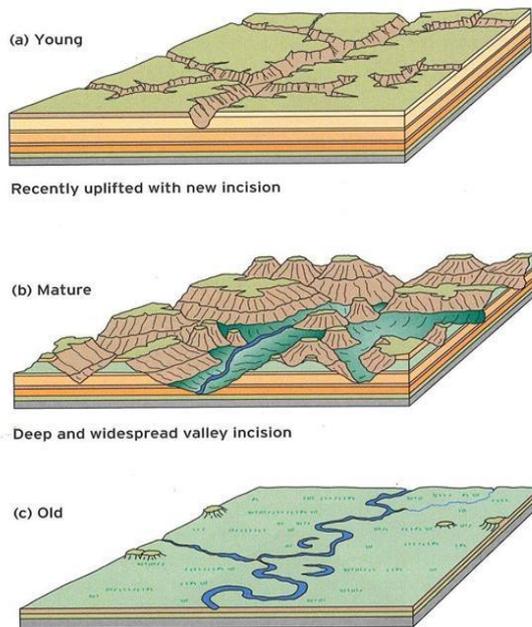


Figure 2.1. Davis model (geomorphological cycle)

2. 5 . Erosion cycle model (Davis model; 1850-1934): "The creation of relief is rapid and short compared to the time required to erode it", a mixture of Darwinism and catastrophism.

William Morris Davis described the first landform evolution model, the Davis model (geomorphological cycle), including three stages: young, mature and old (fig.01). Slopes become increasingly shallow, so the topography becomes very flat.

2. 6 . Idea of an equilibrium in erosional systems (Grove Karl Gilbert 1843-1918): "all rivers work towards a graduated state, a state of dynamic equilibrium which is reached when the net effect of flowing water does not generate either bed erosion or sediment deposition, when the landscape reflects a balance between the resistance of rocks to erosion and the processes acting on them".