# PATRICK MANNING

## Long-Term Creation of the Lithosphere

#### Unpublished (2022)

The lithosphere, or " crust" of the Earth, consists of tectonic plates—the *stable* lithosphere of continental plates, separated by the *changing* lithosphere of oceanic plates.

This brief fact sheet outlines major changes in the lithosphere over millions of years, including steps in the evolution of *Homo sapiens* and examples of the concentration of mineral deposits. Overall, these changes were gradual. But today, mines are extracting the lithosphere at a **lightning pace**.



Figure 1. Tectonic plates and the continental lithosphere today

#### 0.01 million years ago

Formation of recent lithium salt deposits in Bonneville Salt Flats, Utah

#### 0.3 million years ago

Homo sapiens established throughout Africa

#### 3.0 to 2.5 million years ago

Genus Homo takes form (Homo erectus)

#### 5 million years ago

The Mediterranean Sea, previously consisting of isolated bodies of water, opened to the Atlantic and expanded in the Zanclean Flood as of 5.3 million years ago

#### 11 million years ago

Nile River formed

#### 15 million years ago

Formation of the Andes Mountains and of the world's largest silver deposits

#### PATRICK MANNING

World History Center | 3900 Posvar Hall | University of Pittsburgh | Pittsburgh, PA | 1-617-435-6540 | pmanning@pitt.edu

## PATRICK MANNING

#### 23 million years ago

Formation of the Sierra Madre Mountains (and silver deposits) in Mexico; closing of the isthmus of Panama

#### 50-40 million years ago

India collided with Asia, forming Himalayas; Sierra Nevada Mountains formed

#### 66 million years ago

Dinosaur extinction in the wake of an asteroid impact in Yucatan

## 70–35 million years ago

Creation of the Rocky Mountains

#### 70 million years ago

Mississippi River formed

#### 200 million years ago Oldest surviving oceanic crust

#### 266–255 million years ago

Creation of most petroleum; other petroleum was created later

## 300 million years ago

Beginning of creation of coal

## 550 million years ago

Beginning of creation of natural gas

### 200–300 million years ago

Pangea, a single continent of all the world's continental crust

### 3–1 billion years ago

Formation of diamonds

#### 1.8 billion years ago

Formation of spodumene, the igneous or volcanic mineral containing lithium

#### 3–1 billion years ago

Tectonic plate system formation

#### 3 billion years ago

By this time, 20 percent of continental crust had formed

#### 3.8 billion years ago

Oceans begin to form as Earth cooled below boiling point of water and more water arrived from meteors

#### 4 billion years ago

Early formation of continental crust

#### 4.5 billion years ago

Formation of the Earth