Model the history of oceanic sediment deposition from rift to trench

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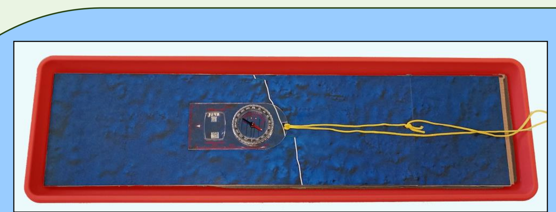
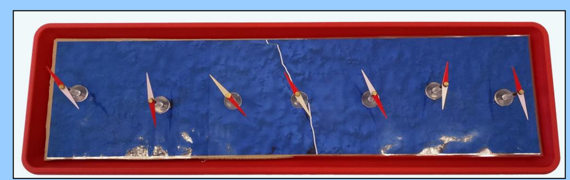
Plans & instructions available here

Sharing is encouraged

Step 1 : analyzing the core samples

Oceanographic boats observe that the magnetic field varies symmetrically in the center of the Atlantic ocean

Materials

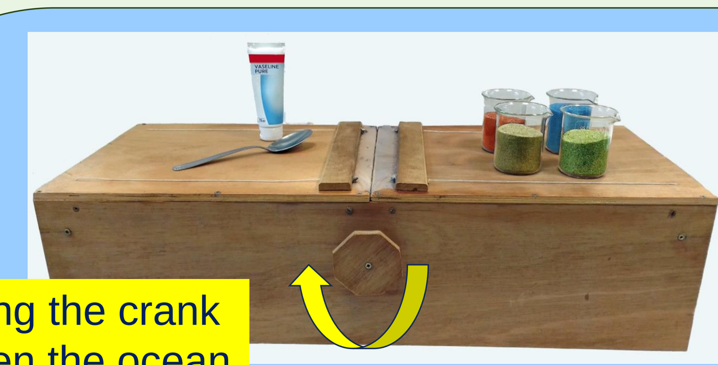
Sediment samples are taken from different boreholes and the fossil content of the layers resting on the basalts is determined

The fossil content of each sample makes it possible to define the age of the first layer of sediment deposited on the oceanic crust.

1	2	3	4	5	6	7	8
Globotruncana	Quiqueloculina	Globorotalia	Orbulina	Orbulina	Globorotalia	Quiqueloculina	Globotruncana
Maastritchian	Eocene	Miocene	Plioqaternary	Plioqaternary	Miocene	Eocene	Maastritchian

To be checked with the answer key

Step 2 : understanding oceanic accretion

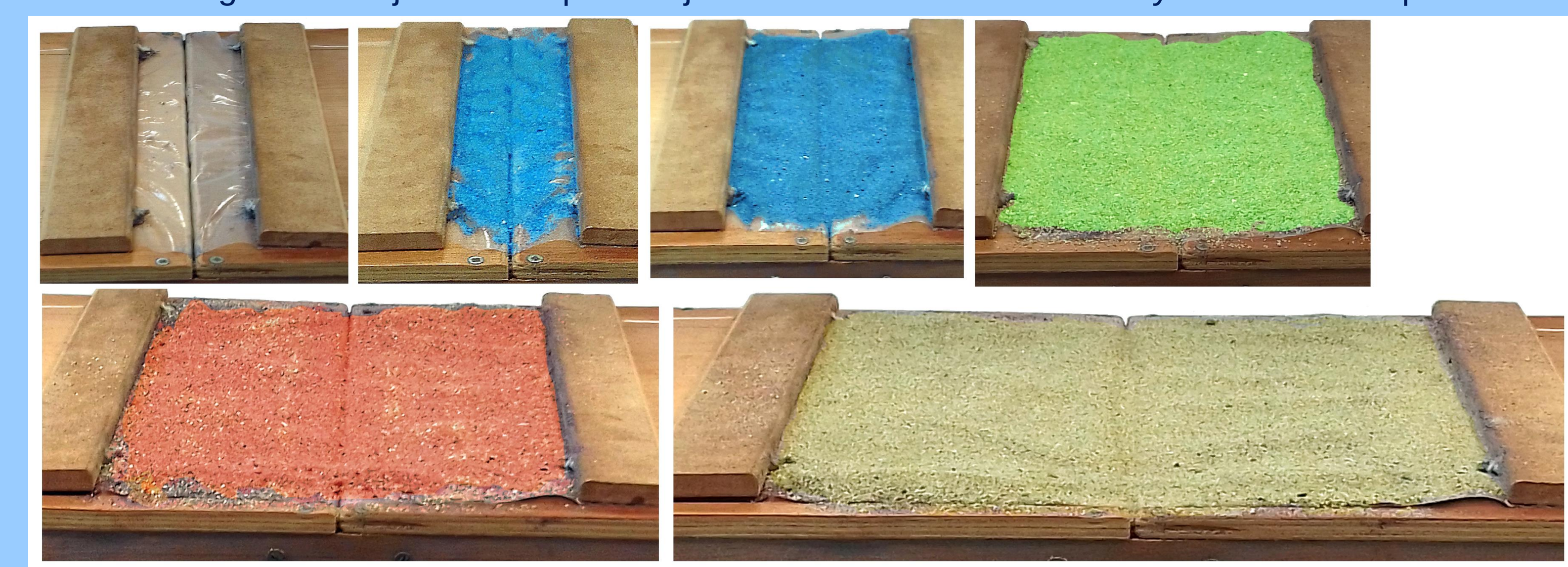


Turning the crank to open the ocean

Materials

This modelling allows us to understand why the sedimentary rocks formed at the accretion center are more recent than those at the edge of the margins, but also to visualize the superposition of sediments over time

Covering with a layer of sediments in the colors of stratigraphic chart



Rifting — 1st jurassic déposits — jurassic accretion — covered by cretaceous deposits

Cenozoic deposits — Plio-quaternary cover

Turning the model

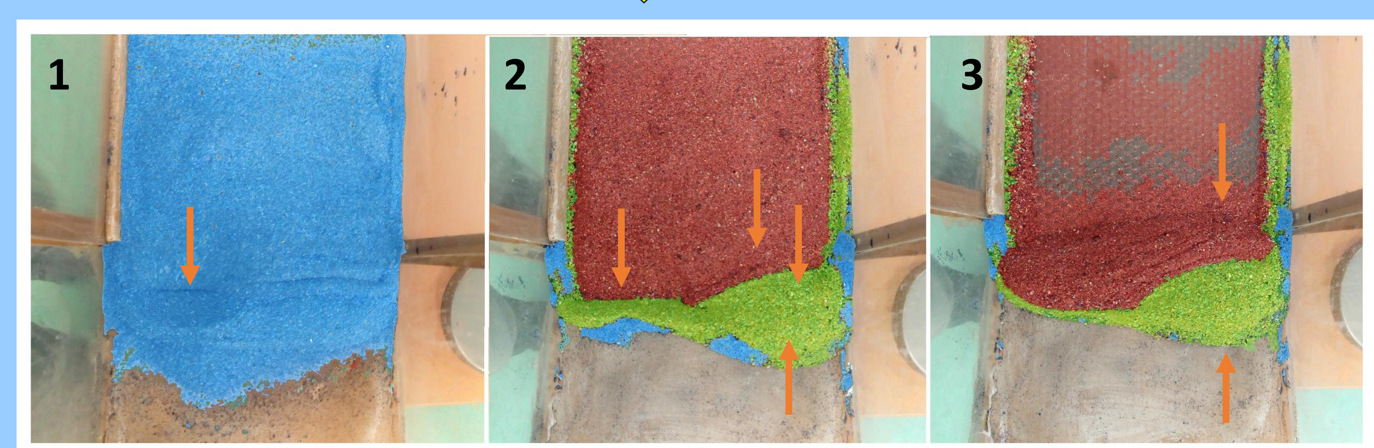
In parallel, filling tubes with the same thickness of sediment an move them apart over time

Step 3 : interpreting accretion prism

To understand the mechanisms allowing the accretion of sediment above the trench, this model pulls the « ocean floor » and prevents the majority of sediment from subduction

Materials

Turning the crank to subduct the ocean floor



Covering the « ocean floor » (plastic sheet) with colored sands (the oldest near the trench and the most recent further away)

Along with the disappearance of the oceanic lithosphère by subduction, students observe (1) the deepening of the trench, (2) the formation of overlaping sediment scales (3) allowing the 3D growth of the accretionary prism

Step 4 : deciphering sedimentary thrusts

Materials

Using plaster (with a more brittle behavior than sand) students can visualize the evolution of sedimentary rocks during collision. This model also allows students to understand the differences in the rheology of materials during convergences
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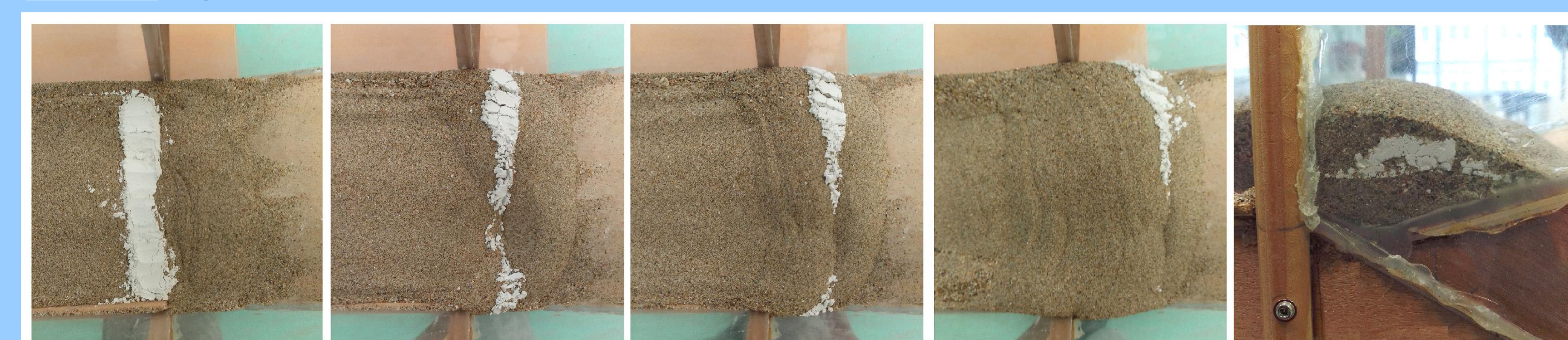

The formation of folds, faults and thrust faults are visible in 3D.