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Barrel organ of plate tectonics – a new tool for outreach and education

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Plate tectonics is the major geological concept to explain dynamics and structure of Earth's outer shell, the lithosphere. In the plate tectonic theory processes in the Earth lithosphere and its dynamics is driven by the relative motion and interaction of lithospheric plates. Geologically most active regions on Earth often correlate with the lithospheric plate boundaries. Thus for explaining the earth surface evolution, mountain building, volcanism and earthquake origin it is important to understand processes at the plate boundaries. However these processes associated with plate tectonics usually require significant period of time to take effects, therefore, their entire cycles cannot be directly observed in the nature by humans. This makes a challenge for scientists studying these processes, but also for teachers and popularizers trying to explain them to students and to the general public. Therefore, to overcome this problem, we developed a mechanical model of plate tectonics enabling demonstration of most important processes associated with plate tectonics in real time.

The mechanical model is a wooden box, more specifically a special type of barrel organ, with hand painted backdrops in the front side. These backdrops are divided into several components representing geodynamic processes associated with plate tectonics, specifically convective currents occurring in the mantle, sea-floor spreading, a subduction of the oceanic crust under the continental crust, partial melting and volcanism associated with subduction, a formation of magmatic stripes, an ascent of mantle plume throughout the mantle, a volcanic activity associated with hot spots, and a formation and degradation of volcanic islands on moving lithospheric plate. All components are set in motion by a handle controlled by a human operator, and the scene is illuminated with colored lights controlled automatically by an electric device embedded in the box. Operation of the model may be seen on www.geologyinexperiments.com where additional pictures and details about the construction are available.

This mechanical model represents a unique outreach tool how to present processes, normally taking eons to occur, to students and to the public in easy and funny way, and how to attract their attention to the most important concept in geology.