

## **Meteorite crater impact study: a new way to study seismology at school with exciting experiments, and an example of meteorite astroblema in France (Rochechouart)**

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The InSIGHT mission to Mars (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) supported by NASA, IPGP and CNES, is a great opportunity for teachers and pupils to study the Red planet, but also to study other fields of geology at school, such as seismology.

With our pupils, we are following the InSight mission and we look forward to analyze seismic data registered by the SEIS seismometer , once it will be available (the InSight mission will launch in 2018 from California, and will land to Mars in 2018 or 2019).

As this mission needs meteorite impacts to generate seismic waves ( to discover the Martian interior structure) , we've decided to model those meteorite strikes in the classroom.

With our pupils, we've modeled meteorite impact craters with different impactors , such as tennis balls, baseballs, or pingpong balls, and used an analogue substratum made by flour and cocoa. Then, we kept on going our geophysical investigation , studying several parameters.

For instance, we've studied the link between size of impactor and size of crater , the link between mass of impactor and Crater Formation, and the link between velocity of impactor and crater formation. In this geophysical approach , potential energy and kinetic energy can be introduced in terms of energy transfer as the impactor falls ( calculation of the velocity of impact and plotting that against crater diameter using  $v = (2gh)^{1/2}$ ).

For each crater formation made in class by students, we have registered seismological data thanks to Au-dacity software, and study the seismic signal propagation.

This exemple of hands-on activity with pupils, and its wide range of geophysical calculation shows how we can do simple experiment modeling meteorite crater impact and exploit registered seismological data at school.

We've finaly focused our work with the very famous example of the astroblema of Rochechouart in the South-west of France ( crater formation : - 214 My) , in which it's easy to recognize every typical structure of crater formation (ejecta blankets, overturned crater rim ) .

In this activity, pupils understand how a model in class can be close to real geological objects.