Geophysical Research Abstracts
Vol. 20, EGU2018-9096, 2018
EGU General Assembly 2018

Experiments modeling meteorite crater impact and exploitation of registered seismological data at school

Diane Carrer (1), Jérémy Camponovo (2), Jean-Luc Berenguer (3), Fatima Moujdi-Menauge (4), and Julien Balestra (5)

(1) International Highschool Valbonne, France (diane.carrer@ac-nice.fr), (2) International Highschool Valbonne, France (jeremy.camponovo@ac-nice.fr), (3) Géoazur , Université Côte d'Azur, France and International Highschool Valbonne (berenguer@unice.fr), (4) International Highschool Valbonne, France (fatima.moujdi-menauge@ac-nice.fr), (5) Géoazur , University Cote d'Azur, France (balestra@unice.fr)

Key-words: Red Planet, Mars, Seismology, SEIS seismometer , Modelling, InSight mission, , meteorites impact craters, steel balls, Mars Quakes, Software (made by Jérémy Camponovo) , Audacity software, seismic waves, Martian interior model.

In this poster session we detail the practical hands-on activity focused on impact experiments using low velocity impactors (steel balls), flour and cocoa to simulate meteorite strikes.
We will look at the relationships between crater size and impact energy. We will use a software to analyse the crater size. In addition we look at seismic waves propagation produced by the impactor. Teachers will leave with examples of hands-on activities that can be used with a wide range of ages and abilities.
During the hands-on activity, we will invite teachers to make these experiments and use the software made by Jérémy Camponovo to measure many parameters of the crater and locate it.

Next May 2018, NASA will launch its mission to the Red Planet called InSIGHT , after 2 years-delay. One of the most important aims of this geophysical mission is to implement a seismometer to study Mars' deep interior. The seismometer, called SEIS (made by the French labs CNES and IPGP), will be measuring the Red Planet's "vital signs" such as its pulse, recorded through seismology.

The only problem is that scientists are not certain to record any seismic data from tectonic activity (which probably stopped thousands of years ago). Thus, they have to look for another source of seismic vibration.
Meteorite strikes, which impact Mars five times a year on average, appear to be the right candidates to generate seismic vibration and seismic waves (in addition to potential Marsquakes, dust devils, and thermic contractions of the crust).
Scientists expect those meteorite strikes to generate enough signals to investigate the interior structure of Mars.
In such a context, meteorite impact craters are very interesting to study, from their formation, to the analysis of the waves they produce.
Here, we will develop an example of a hands-on activity focused on meteorites impacts, its modeling, and its data analysis.

We will start with a craters description based on satellite images of the Martian surface (ejecta blankets, overturned crater rim . . .). We then simulate impact craters.
Flour and cocoa surface impacted by steel balls will demonstrate what teachers can easily do in classroom.

The geophysical investigation will then be explained through a broad range of activities:
• Size and mass of Impactor and Crater Formation
• Velocity of Impactor and Crater Formation : Potential and Kinetic energy can be introduced in terms of energy transfer as the impactor falls: calculate the velocity of impact and plot that against crater diameter using v = (2gh)1/2
• Advanced Mathematical Modelling: Experimental investigations have shown that there is a power law relationship between the kinetic energy of the impactor E and the crater diameter D (Bunce, 2006; Leicester University).
• Software made by Jérémy Camponovo to analyse craters.