

Highlights of the year of physics 2005 at the Department of Geophysics in Zagreb

The year of 2005 was the international year of Albert Einstein and physics in general. A multitude of events happened all over the world associated to that, and much of the related information can be easily found via internet. These celebrities allowed for an accommodating occasion at the Department of Geophysics, Faculty of Science, University of Zagreb, to introduce a couple of geophysical experiments for a broad audience, to show its seismological facilities and the Memorial room of Andrija Mohorovičić. More than a thousand people saw the geophysical facilities and the experiments within three days during Physics Week and the Department Open Days in November 2005. Media followed the events for several days taking place in the city of Zagreb, Faculty of Science, Institute Ruder Bošković and the Institute of Physics. The aim of this short article is to document the highlights of the year of physics – geophysics. These celebrities partly continued on/off through 2007, which is a 150-year anniversary of the birthday of Andrija Mohorovičić.

1. Introduction

World year of Physics 2005 (WYP2005) started at the Department of Geophysics (DOG) as an idea to popularize Geophysics, to make a demonstration experiment of common Croatian northeasterly Bora wind and to renovate and display to general public old Mohorovičić seismographs which he used in his discovery of discontinuity between the Earth's crust and mantle. As the



enthusiasm grew between the staff and students, many more ideas were incorporated into the project (full list of activities in Table 1.). More than twenty people from the DOG were involved into the project with an outreach to more than several thousand high school and junior school children throughout the country who participated in our activities. Several TV shows covered the festivities with special focus onto experiments we have prepared.

2. Experiments

In the end two demonstration experiments were constructed to demonstrate Bora winds and Tsunami wave. Both of them are still in use and regularly performed for the DOG students and high school graduates at annual University Science Fair.

– Hydraulic jump experiment: Cooking Bora winds for children



We constructed a demonstration experiment in geophysical fluid dynamics showing and visualizing hydraulic jump which is a crude but simple and easy to understand model of Adriatic Bora winds. The idea came from the laboratory of Clive Dorman who was more than kind enough to perform experiment for us in his USA lab showing through internet video streaming the initial setup. For the purpose of performance, we have made a fiberglass tank

with two compartments where larger one was opened at one side. In a closed compartment we have prepared solid CO_2 as a tracer putting the dry ice into hot water. With one of the sides of smaller compartment, where tracer was prepared, we have managed to control the flow of tracer. As the whole tank was slightly tilted, CO_2 started to flow, being heavier than air, down to the obstacle which simulated a mountain, e.g. the Mountain of Velebit. On the downside of the »Velebit« a hydraulic jump was generated. With tracer compartment side, we could also make waves that showed how Bora gusts are produced. As a whole, process of preparing CO_2 tracer looked like cooking. We have used this idea and presented the general public that we are cooking Bora winds for them. To accompany the demonstration, we even prepared a presentation with theoretical background which included detail physical receipt explaining how nature prepares Bora.

Up to now we have »cooked« more than several thousand portions of Bora winds for school kids and general audience and performed experiment in one of the education TV shows at National Croatian Television (HTV).

– Wave experiment: Producing Tsunami

Inspiration for Tsunami experiment was unfortunate event of deadly Christmas Tsunami in Indian Ocean



in 2004. We wanted to demonstrate general public and to our students how this destructive natural phenomenon, which combines two disciplines studied at DOG (seismology and physical oceanography), is formed. We have constructed elongated water tank (approximation of shallow water) with a slope to show coastal effects of Tsunami wave. The wave was created by putting balloon into water and punching it to simulate crash of



the meteorite into ocean producing Tsunami. The small Tsunami we have created then propagated to the slope, was amplified due to change in depth and finally broke on simulated shore. As within Bora, we have accompanied Tsunami experiment with theoretical background presentation which included results from Adriatic Tsunami wave studies. The experiment turned out to be quite a success, especially with young children, and ended up on multimedia CD which accompanies 8th grade junior school physics textbook.

3. Opening of Mohorovičić memorial rooms

Andrija Mohorovičić legacy at DOG includes not only his scientific work that changed perception of the Earth composition, but also correspondence

Table 1. List of all activities at DOG during WYP2005

DOG activities during WYP2005	
Lectures	
1	M. Orlić: Tsunami, March 2005, Series of lectures »Beauty of Physics«
2	I. Sović: Lonac na vatri, March 2005, Series of lectures »Beauty of Physics«
3	M. Herak: Živjeti s potresima, May 2005, Series of popular lectures at University of Zagreb
Books	
1	M. Herak, M. Movre, B. Obelić i M. Požek (edt.): I to je fizika..., Zbornik popularnih predavanja na Sveučilištu povodom Svjetske godine fizike, 2006.
Experiments	
1	Hydraulic jump experiment: Cooking Bora winds for children
2	Wave experiment: Producing Tsunami
WYP2005 Physics Week 07. – 12.11.	
1	Opening of Mohorovičić memorial rooms, 09.11.
2	DOG open days, 10.–12.11. – more than 1000 children visited Department

with other distinguished world seismologists and scientists of his time and original seismographs that he used to discover discontinuity between the Earth's mantle and crust. As instruments were in bad shape, and correspondence in archive we thought that WYP2005 would be a good opportunity to restore his legacy and display them to general public. Thus, in the basement of DOG Mohorovičić memorial rooms were opened during WYP2005 Physics week in November where three seismographs were fully renovated and are now in working conditions. Opening of Mohorovičić memorial rooms turned out to be a good introduction into 2007 Mohorovičić year celebrating his 150th birthday.

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For further information on WYP2005 at DOG please visit: www.wyp2005.hr

For further information on Clive Dorman GFD experiments please visit:
www.geology.sdsu.edu/classes/oc320/oceanslab.html

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