

**NEO PUBLIC OUTREACH AND EDUCATION AT
KLET OBSERVATORY AND CESKE BUDEJOVICE PLANETARIUM**

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INTRODUCTION

Increasing research results in the field of Near-Earth Objects (NEOs) as well as impact hazard investigations cause growing interest among general public and media. Moreover, people are usually interested in catastrophes, especially if they are far enough. This interest has generated an increasing number of enquiries from members of the public. Furthermore NEO related issues have outstanding educational value and outreach potential. So thus educating the public and the media on NEO detection, characterization, potential hazard, impact effects, mitigation missions, impact warnings belong to the most important tasks of NEOs scientists and research institutions.

KLEŤ OBSERVATORY AND ČESKÉ BUDĚJOVICE PLANETARIUM

Our institution represents an unique liaison of the small professional research institution devoted especially to NEO studies (the Klet Observatory, Czech Republic) and the educational and public outreach branch (the Observatory and Planetarium Ceske Budejovice, Czech Republic). It has been giving us an excellent opportunity for bringing NEO information to a wider audience. We have been obtaining a wide experience in NEO public outreach and education more than twenty years.

NEO PUBLIC OUTREACH AND EDUCATION

There are various tools of public outreach aimed to NEO research and hazard. As the most useful ones we consider: multimedia performances, educational multimedia presentations for schools at different levels in planetarium, summer excursions for wide public at the Klet Observatory on the top of the Klet mountain, public lectures and discussions, meetings, exhibitions and special on-line magazines (e-zins). Public lectures and other events are organized also outside the Ceske Budejovice and Klet facilities (in museums, planetariums, public observatories, at universities, special activities for talented youth, community days and so on). It seems to be very contributing and favoured by public to have opportunities for more or less informal meetings just with NEO researchers from time to time. Very important part of NEO public outreach consists of continuous contact with journalists and media including press releases, interviews, news, periodical programs including regular radio broadcast show on astronomy at the Czech Radio České Budějovice and so on.

NEOs ON THE NET

To the most useful tools belongs on-line magazines (e-zins) - The Czech public service on NEOs - www.planetky.cz and www.komety.cz.

There are many interesting and well designed websites maintained by NASA, JPL, ESA, the Planetary Society and others, but naturally the big majority of them are written in English. Therefore we have decided to design a special website in Czech devoted to NEOs and based on Klet long-time observing program, its international cooperation and experience in education and public outreach programs.

Czech public service on NEOs - www.planetky.cz - was designed by the Klet Observatory on February 2001. Till 2015 March there are 330 original articles written for general public by research team members regarding minor planets, spread into six themes. This number includes 108 articles directly about Near-Earth Objects. It has been indicated (March 28, 2015) that more than 353,000 visitors has viewed more than 2,978,000 pages on web www.planetky.cz so far. On the basis of language similarities this website has also been visited by many people from Central and East European countries like Slovakia, Poland, Ukraine, Russia and others.

There are following services for visitors on www.planetky.cz pages: search inside articles using full-text search procedure, sorting out articles into six themes for better orientation, server statistics, external links to important NEO webpages all over the world, orbit diagrams of minor planets, electronic postcards containing asteroid images, RSS Chanel, redirecting within easy reach from Facebook and Twitter profile of the Klet Observatory, the latest news from an complementary Klet server www.kometry.cz where information regarding Near-Earth comets can be found.

Amongst recent topics we can mention Chelyabinsk meteor explosion, a close approach of asteroid 2012 DA14, small asteroid 2014 AA on an Earth impacting trajectory, 2008 TC3, its impact and meteorites found, future close approaches of Apophis. recent NEO surveys Pan-STARRS, Catalina Sky Survey and NEOWISE mission and so on.

Taking into account an rapidly growing role of social media and networking we created both Facebook and Twitter profiles of Klet Observatory and we are running them on a topical basis.

LESSONS LEARNT

- Communications about NEOs needs to be clear, concise, comprehensive and correct. Always! Moreover to be certain, consistent, timely, transparent and honest. Trust is key! Doing so requires building trust among those who develop, communicate and receive NEO information. It is much harder to regain trust than to build it in the first place.
- Participatory and dialogic communication is very important. It is more than a simple two-way exchange among scientists and ignorants. It is a continuous process. Dialogue is critical to building trust.
- The wide public is not a monolithic audience. What can we expect the public to know with respect to science and mathematics? Try to use knowledge and experience of people from their civil life and/or profession.

- We cannot start to speak directly about NEO hazard. It is necessary to introduce our Solar System as a background, then to show NEO population, discovery, tracking and characterization and to focus on potentially hazardous asteroids and comets finally. Asteroids and comets that pass close to Earth can be important educational opportunities.
- We should speak simple, straightforward and familiar. Communicating with metaphor and analogy is a good appropriate technique and visualisations are an ideal tool. Try to link the scientific precision with the emotional atmosphere. On the other hand oversimplification can be just as confusing as too much information. It is important to acknowledge uncertainty too.
- How to explain the probability of any event in general? Of course, it is very difficult. We should use language and scale that can be understood by the general public, not the language of scientists, which often requires a basis of certain mathematical and scientific concepts, lacking in many people, even in those who are well-educated. We should not use numbers, statistics or probability calculations. While these tools are useful and necessary to NEO experts, they do not translate well to non-experts. Most people have little or no understanding of numerical probabilities and have only binary reaction when learning about a threat or crisis: YES OR NO. We should use common language as: none/slight/moderate/severe. There is also known psychological difference between “good” vs. “bad” probability for the same number (“I can win money in lottery” vs. “I can be affected by an accident”). Take also into account that the public does not worry much about the threats that are not immediate, that appears abstract. This point is similar to other natural hazards, to meteorology and so on.
- Take into account that there are different professional values and practices between scientists (some uncertainty or ambiguity in their findings) and journalists (need to eliminate uncertainty or ambiguity) .
- NEOs have also become a part of the public imagination as the subjects of thriller action movies. This may well distort the public understanding of these interesting bodies.
- Those in charge of communicating with the public about NEO hazard should be prepared in advance to deal with conspiracy theories and general disinformation („Only half of Russians polled believe the Chelyabinsk event was caused by meteor, the other half prefer bizarre explanations as off course ballistic missile, U.S. secret weapon, message from God, crashed alien spaceship...“)

- Consider strong and deep stigma attached to anything „nuclear“, especially in the case of methods of deflection of an impactor. This stigma is about the fear, has nothing to do with knowledge or ignorance of the facts.
- In these economic times, more than ever, the taxpaying public is very wary of groups of people who may overemphasise risk in order to obtain sufficient funding for research. The NEO community may well be in a “marketing” dilemma there. Moreover, commonly costs are visible, although prevention is often invisible.
- Mixing politics with NEO (risk) communication is lethally poisonous and undermines public trust. It is difficult to establish the trust if the audience receiving the communication believes that politics plays a part in creating the messaging.

RESUME

The essential goal of all mentioned NEO educational and public outreach tools is to bring relevant, clear, comprehensive and up to date information to students, educators, general public, mass and social media as well as policymakers and government officials.

National and international collaboration, both personal and institutional is essential both in NEO research, education and communication (IAU, MPC, NASA NEO Office, Planetary Society, Spaceguard Foundation, ESO, ESA, ASE, B612 Foundation, Czech Space Office etc.).

Lessons have learned from NEO educational and public outreach done by the Klet Observatory and Ceske Budejovice Planetarium until now help us to improve our efforts.

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