

The challenge of explaining asteroid impact hazards: a call for responsible communication about science and risks



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Background

NEOO Program budget FY 1998-2011: ca. \$4 MM/yr

2010: President calls for human mission to an asteroid

2012 budget request: \$20.4 MM for NEOO program

2014 budget request: \$40 million for NEOO program

NEOO Program's role in the Asteroid Initiative: provide information on the orbits and characteristics of NEOs that might be accessible for human missions and NEOs that might pose a hazard of colliding with Earth

Other events

Defending Planet Earth: Near-Earth Object Surveys and Hazard Mitigation Strategies (NRC, 2010)

SWF-ASE workshop, NEO risk communication, 2011

House Science Committee hearing, 3/19/13

Planetary Defense Conference 2013

B612-ASE media event, fall 2013

NASA-FEMA TTXs 2013, 2014

IAWN Steering Committee meeting, January 2014

IAWN communication workshop, September 2014

Committee to Review Near Earth Object Surveys and Hazard Mitigation Strategies (NRC 2010):

The statistical risk to human life and property associated with impacts of [asteroids] is real, but it falls outside the everyday experience of most of humanity. This risk must therefore be *communicated effectively* to the community at large in the context of other natural disasters, particularly those that the local community is likely to encounter. Scientists must *carefully assess and explain the hazard* so that appropriate public policy measures, commensurate with the level of risk, can be put into action. There must be an *assessment of the statistical risk from [asteroids] that is reasonable and acceptable to the general public.*

SWF-ASE NEO communication workshop, 2011

“Make use of the findings of experts in risk communication in designing its communication strategy.”

From the beginning, the network should include “skilled communicators supported by risk analysts, planners, scientists, psychologists, emergency management experts and other functional experts.”

AS YOU CAN
READILY
SEE...

$$\frac{1+r}{1-r} = \arctan r$$
$$F(r) = \frac{\sqrt{n-3}}{1.06} F(r)$$
$$z = r \sqrt{\frac{n-2}{1+r}}$$
$$\sum_i (x_i - \bar{x})(y_i - \bar{y})$$
$$p = \frac{\sum_i (x_i - \bar{x})^2 \sum_i (y_i - \bar{y})^2}{6 \sum d_i^2}$$
$$p = 1 - \frac{n(n^2 - 1)}{0.6325}$$
$$\sigma = \frac{(n-1)^{1/2}}{1}$$

! yowza!
Woo!
Woo!

pwattin '14
Natural Hazards
OBSERVER

NASA-FEMA TTX #1, April 3, 2013

“Improve tools for communications on the nature and evolution of NEO threats to make it more clear to the public and decision makers how an actual threat might evolve.”

“Technical terms such as ‘Monte Carlo’ should be clearly defined.”

“The uncertainty and level of risk need to be made clear to the public and to decision makers using metrics and diagrams that can be readily understood....”

The current scales that rate potential threats might be useful to experts, but [are] difficult for the public to understand. A simpler system should be considered for informing the public.”

Planetary Defense Conference 2013 white paper

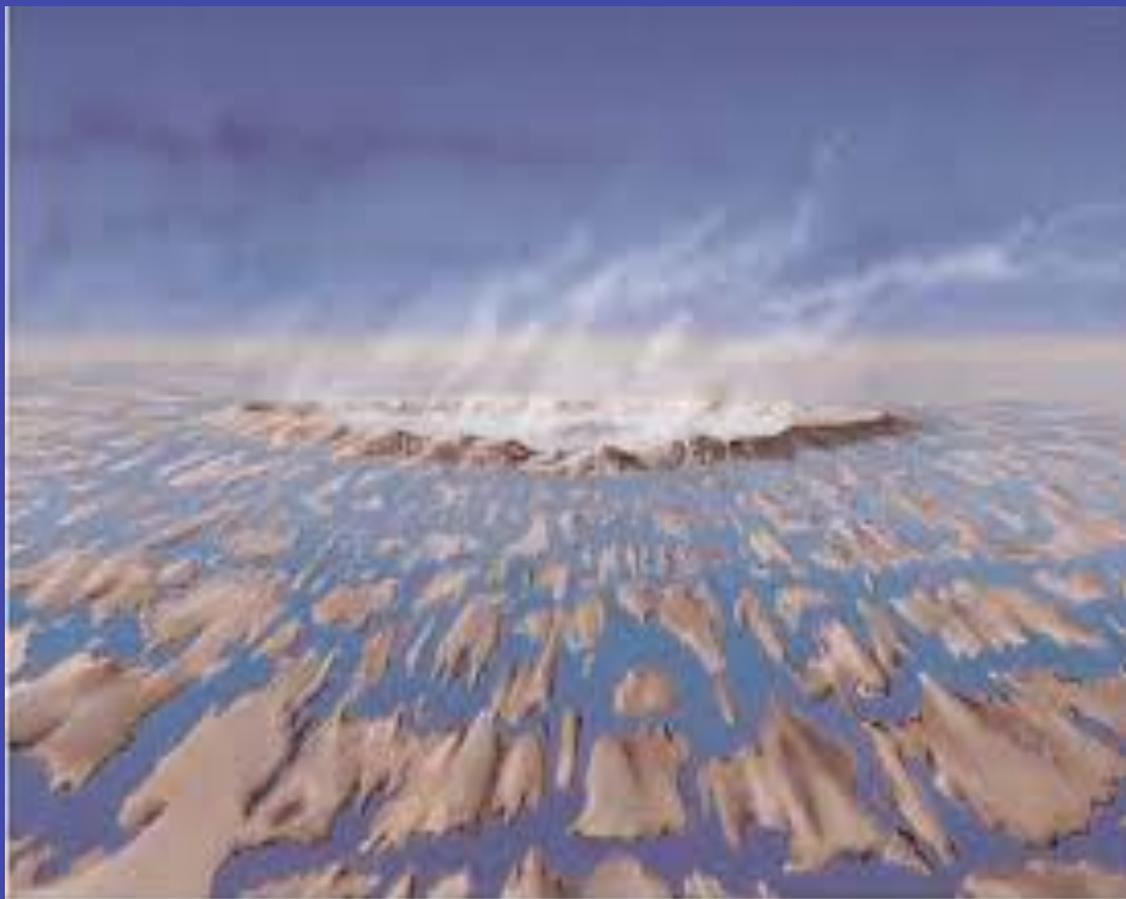
“One of the key challenges of managing the consequences of an asteroid event is *educating* the public on the nature of NEO *threats*, their evolution, and (in the event of an actual *threat*) what the public can do to protect themselves... Key decision makers will need the risk information presented in standardized, easy-to-digest forms.”

“An international communications response plan needs to focus on *educating* government officials and the public on the nature of NEO threats.... A successful approach will take advantage of teaching opportunities during asteroid close approaches and noteworthy meteor events. An effective responsive plan will develop a clear international chain of command for dealing with NEO risks. The plan will also design a communication strategy that makes use of findings from experts in risk communications and will employ ‘trust agents’ that have appropriate skills and credibility to communicate with non-expert audiences.”

Artist's concept



Artist's concept



Artist's concept





After Sandy



After Tunguska impact (1908)



Japan tsunami



Artist's concept

The L'Aquila earthquake prediction case: Lessons for planetary scientists?

April 2009: magnitude-6.3 quake hits L'Aquila, 309 die

2012: “Seven experts tasked with giving advice ahead of the deadly earthquake that struck here in 2009 have been found guilty of manslaughter.” (*Science*)

The public prosecutor in this case said the experts “were not being charged with having failed to predict the exact time, place, and magnitude of the deadly quake, information that he said modern science was not able to provide.” Instead, they were charged with, and found guilty of, making a series of “banal and self-contradictory” statements preceding the quake, many of which were “at best scientifically useless” or, worse, “misleading.”

Convicted geoscientist Enzo Boschi (INGV), *Science*, 9/13:

National Commission for the Forecast and Prevention of Major Risks – “the connecting structure between the National Service of Civil Protection and the scientific community” – met a week before the quake. The meeting was run by the Civil Protection Agency (CPA), which is “exclusively responsible for communicating any state of risk.”

CPA official Bernardo De Bernardinis said in a TV interview before the meeting that ongoing tremors felt in L’Aquila posed “no danger” and that the “the scientific community continues to confirm to me that in fact it is a favorable situation.” De Bernardinis went on to say that the ongoing tremors helped to discharge energy.”

Prosecutor “distorted the argument of one of my journal publications,” which “highlighted the statistical importance of temporal ‘clustering’ of earthquakes. “We posited that the high probability rate calculated for the Aquilan territory is not statistically meaningful because it is based on three events that occurred in the 17th and 18th centuries.” Data in hand “hardly a sufficient basis to describe what would happen in subsequent centuries.”

Responsible science communication

What are your goals?

Educating? Informing? Advocating? Persuading?

What sort of ethical framework should govern discussions of risks, benefits, “facts,” uncertainties?

Choose moderation, curb enthusiasm (“cheerleading”), be accurate and complete, be clear about your intentions.

“Stealth advocacy” can undermine public trust.

Questions?