

Freshman Seminar 23I GEOSCIFI MOVIES: REAL VS. FICTION

Miaki Ishii (Department of Earth and Planetary Sciences)

Time: Wednesdays 13:00-16:00

Location: Geological Museum Room 204 (McKinstry Seminar Room)

Laboratory: Sundays 18:00-21:00 at Geological Museum Visualization Lab

Note: Students are required to watch the assigned movie prior to class, and must be comfortable with high-school level math and science.

Natural disasters such as earthquakes, tsunamis, hurricanes, and volcanic eruptions have major impact on society and cause great tragedies. The participants in this seminar will examine one Earth-science related science fiction movie each week and discuss features from the movie that are strange, surprising, or novel. These features are ranked for their likelihood of being fiction, and the few that are thought to be most realistic and most fictitious are discussed in depth. Simple math and science concepts are used to test how likely some effects are (e.g., is magnitude 11 earthquake possible and why?), and also to understand the underlying science behind these features (e.g., what are the factors that control the size of an earthquake?). If applicable, we discuss how these scientific ideas are exaggerated to dramatize the effects. In addition, one natural phenomenon related to the assigned movie will be examined to clarify myths and misunderstandings. This part of the class will be mainly led by the instructor where the level of current understanding and remaining questions are presented.

Seminar Outline

Movie	Topic	Reading (background)	Reading (article)	Quantitative Exercise	Student Exercise
	Introduction to Seminar and preparation for the Montserrat Role Playing				
	Montserrat Role Playing Game				
Dante's Peak	volcanic hazard & monitoring	Coch, 1995 pp. 85-107	US volcanoes most likely to erupt next MNN article, 2010	estimating pH of lake amount of volcanic gas needed → gas in the atmosphere	

Day After Tomorrow	Earth System and climate	Marshak, 2008, pp. 819-831	Pacific blob and El Nino CBC article, 2015	temperature drop due to tropopause air height of storm surge and wind speed	Climate true/false
Core	magnetic field & Earth's internal structure	Marshak, 2008, pp. 47-52 Grotzinger & Jordan, 2010, pp. 383-388	magnetic field reversal, BBC article, 2015	induced current due to fluctuation in magnetic field volume of nuclear warhead claimed to have been on board	Jeopardy
Twister	tornadoes	Ebert, 2000, pp. 71-76; Abbott, 2004, pp. 291-298	2013 Oklahoma tornado, CBS article, 2014	conservation of angular momentum	tornado true/false with clickers
2012	plate tectonics	Press & Siever, 2001, pp. 456-460, 475-481	Yellowstone eruption, livescience article, 2012	estimating fault length for magnitude 10.9 earthquake water height estimate	cross word puzzle
Armageddon	meteoroid impact	Abbott, 2004, pp. 408-411, 413-414, 418-419, 421-424	how oil drilling works, HowStuffWorks article, >2008.	estimating the gravitational acceleration on the asteroid	drilling on asteroid vs. Earth
Volcano	volcanoes	Glötzinger & Jorndan, 2010, pp. 320-325; Keller, 2002, pp. 175-181; Reynolds et al., 2010, p. 143	birth of Paricutin, amusingplanet.com article, 2014	estimate the amount of water needed to stop volcanic eruption	Pictionary
Deep Impact	mass extinction events	Abbott, 2004, pp. 392-394, 398-404; Glötzinger & Jorndan, 2010, pp. 298-299	sixth mass extinction, Washington Post article, 2015	tsunami travel time calculation amount of energy needed to deflect a comet	word match
Into the Storm	extreme weather	NSSL fact sheets preparation for Disaster Dynamics	extreme weather and climate change, CBC articles, 2015	wind speed (and tornado scale) needed to get bicycle stuck into a car	Disaster Dynamics: Hurricane Landfall

San	earthquakes	Coch, 1995, pp. 132-137	Cascadia eq, New Yorker	geometrical spreading (energy	bingo
Andreas		Abbott, 2004, pp. 81-83	article, 2015	conservation) and effects felt in	
				the NE USA	

Montserrat Role Playing Game

For the second week's class, the students will play Montserrat Role Playing Game. This game takes place on an island of Montserrat where a volcano eruption may occur. Material necessary for this game will be provided during the first class. Students are expected to be active participants in their assigned roles (government, community, or scientists). The game will take full three hours of the class, and students who are late for the class will not be allowed to participate. Therefore, students with schedules that will not allow on-time start of the class are discouraged from taking the course.

Assignments:

1. **Weekly exercises**
2. **Final Project**

The final project for Freshman Seminar 23i is a group project to create a blockbuster GeoSciFi movie plot.

Requirements

- Group work with 2 to 5 members (each member must contribute significantly to the project)
- Exciting story involving at least one natural hazard
- At least one scientifically correct fate is featured prominently
- At least one law of physics is violated
- At least one cool computer graphics scene is included (at least described)
- At least one emotionally touching scene is included
- Well-structured plot/story
 - Introduction: background information, stage/character setup
 - Change: something happens, development of excitement
 - Climax: culmination point of the plot
 - Conclusion: aftermath

Presentation

- 15-minute presentation
- Presentation of the plot(reading storyline, acting out, etc.)
- Explanation of how the plot satisfies each of the requirements
- One or more back of the envelope calculation associated with the plot

- Movie poster

Report

- One report/group
- Write of the plot/story (including character description)
- Explanation of how the plot/story satisfies each of the requirements
- One or more back of the envelope calculation associated with the natural disaster featured in the plot
- References/citations
- Movie poster
- Clearly state who contributed to which part
- Attach signed Honour Code from each member of the group
- Due prior to meeting on December 9th.

Academic Integrity:

Excluding group assignments, students should be aware that collaboration of any sort on any work submitted for formal evaluation is not permitted. This means that you may not discuss any of the written assignments with other students. All work should be entirely your own and must use appropriate citation practices to acknowledge the use of books, articles, websites, lectures, discussions, etc., that you have consulted to complete your assignments.