

InTeGrate

*Interdisciplinary Teaching about Earth
for a Sustainable Future*



The Changing Biosphere: Lessons from the Past

Unit 2: Causes of Mass Extinctions

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Objectives

By the end of this exercise, you should be able to:

1. Explain how the effects of either flood-basalt eruptions or meteor impacts could cause a mass extinction.
2. Describe evidence for flood-basalt eruptions or massive impacts at the end of one of the ancient mass extinctions.
3. Describe the probable effects of a flood-basalt eruption or a massive impact.
4. Compare and contrast the end-Permian and end-Cretaceous ancient mass extinctions.



0) Reading Groups

- This step is complete!
 - A. End-Cretaceous flood basalts
 - B. End-Permian flood basalts
 - C. End-Cretaceous impact
 - D. End-Permian potential impacts
- Label your nametag or index card with your reading group letter so you can form new groups easily.



SuperTeams

- Assigned by your Instructor
- Contain at least 1 student each from:
 - A. End-Cretaceous flood basalts
 - B. Late-Permian flood basalts
 - C. End-Cretaceous impact
 - D. Late-Permian potential impacts
- Groups should be 4 students (there can be groups of 5).
- You will break into smaller sub-groups.



Step 1) Understanding Causes

- Within your SuperTeam, split into pairs
 - **Flood basalts**: student(s) from grp A & student(s) from grp B
 - **Massive Impacts**: student(s) from grp C & student(s) from grp D
- You will work in pairs or in a group of 3 for this step and the next.



1) Questions - 10 min.

Flood Basalt Group

- a) How do flood-basalt eruptions differ from other volcanic eruptions?
- b) How could flood-basalt eruptions lead to global extinctions of whole families of organisms on land and in the sea?
- c) What evidence tells about the timing and extent of these particular eruptions?

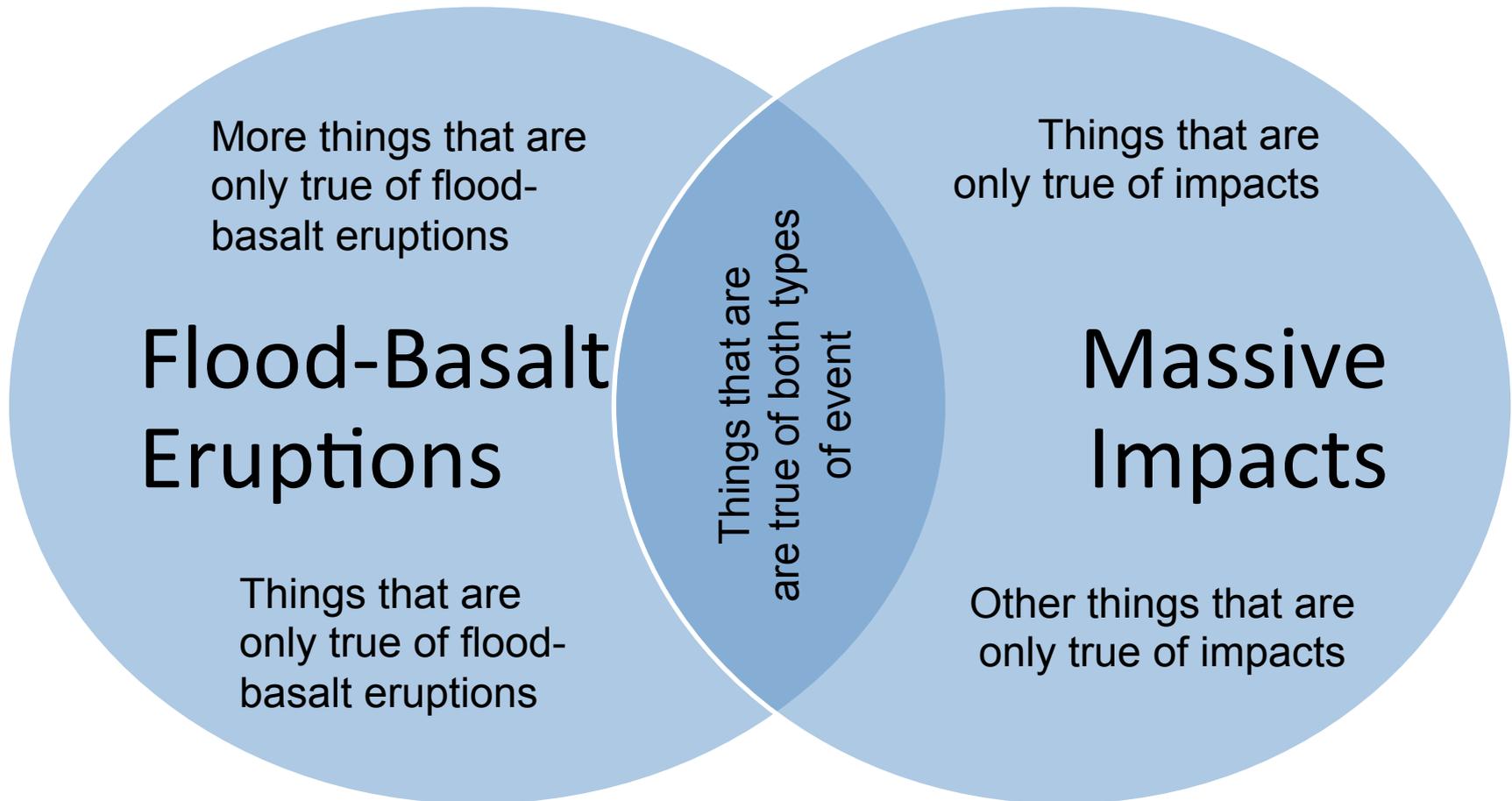
Massive Impact Group

- a) How could asteroid impact lead to global extinctions of whole families of organisms on land and in the sea?
- b) Are there alternative explanations for the formation of either of these sites?
- c) What is the evidence for impact at each site? How convincing is it?

Remember to take notes on your discussion.



2) Sample Venn Diagram





2) Recombine by Time Period

- Recombine into new pairs, still in your SuperTeam
 - **Permian**: student(s) from grp B & from grp D
 - **Cretaceous**: student(s) from grp A & from grp C
 - Work as a pair or in a group of 3
- Compare & Contrast with a Venn Diagram
 - How are the proposed causes similar and different?
 - How are their effects similar and different?
 - Is there good evidence for either event occurring and causing your extinction?



2) Potential Causes

10 minutes

Only
Flood-Basalt
Eruptions

Both

Only
Massive
Impacts

Causes
Effects
Evidence

Permian or Cretaceous?



3) Ancient Mass Extinctions

15 minutes – Whole SuperTeam

- What do you think caused each one?
- How do you think they were similar or different in terms of the atmosphere/oceans/food chain, etc.?
- Were the extinctions similar or different in severity, duration, etc.?
- Is there similar evidence to explain what happened in both cases? Or different?



3) Ancient Mass Extinctions

15 minutes

End-Permian

End-Cretaceous

Causes
Effects
Evidence



Things to Consider

- Is humanity prepared to deal with a flood-basalt eruption today?
- Is humanity prepared to deal with a massive impact?
- These questions and more on your homework!



Participation Points

What percentage of points in each category would you assign to each member of your SuperTeam?

Category	Names of Group Members				
					(self)
Preparation: Was the group member knowledgeable about the article that he/she read? (Should total 100 %)					
Discussion: Did the group member contribute meaningfully (on-topic) to the group's discussion? (Should total 100 %)					