

Ocean Anoxic Event 1a (OAE 1a)

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What is Ocean Anoxic Event 1a (OAE 1a)?

- **Definition:** OAE 1a occurred during the **Cretaceous Period (145–66 million years ago)**, marking a time when **Earth's oceans became depleted of oxygen**. This led to severe disruptions in **marine ecosystems**.
- **Causes:** Triggered by **massive volcanic eruptions**, which released large amounts of **carbon dioxide (CO₂)**, resulting in **global warming** and **oxygen depletion** in the oceans.
 - These conditions created **anoxic marine basins**, where oxygen levels were nearly absent.
- **Impacts:** The interaction of **CO₂ and seawater** formed **carbonic acid**, dissolving marine organisms' shells and reducing oxygen levels.
 - This resulted in the extinction of several marine species, particularly **plankton**, and led to the formation of **black shales**, organic carbon-rich layers preserved in geological records.
- **Anoxic marine basins:** Bodies of water, often in **deep ocean regions**, where oxygen levels are extremely low or absent.
 - **Characteristics:** Favor the survival of specialized microbes and fungi while inhibiting most aerobic life forms.

- **Carbon Sequestration:** Low oxygen levels slow the decomposition of organic matter, aiding in **long-term carbon sequestration**, which helps reduce atmospheric CO₂ levels.
- **Examples:** **Black Sea**, **Cariaco Basin** (Caribbean Sea), and **Orca Basin** (Gulf of Mexico).

Key Highlights of the Recent Study

- **Timing:** The event began **119.5 million years ago**, confirmed through isotopic analysis of **volcanic tuffs** from Japan's Hokkaido Island.
 - OAE 1a lasted approximately **1.1 million years**, indicating the extended recovery period for oceans after CO₂-driven warming and anoxia.
 - **Volcanic activity:** Linked to massive volcanic eruptions, such as the **Ontong Java Nui complex**, which released significant CO₂ into the atmosphere and oceans.
 - **Modern relevance:** Highlights parallels between ancient volcanic CO₂ emissions and **current human-induced warming**.
 - Warns that rapid modern warming could trigger similar disruptions in **marine ecosystems** and potentially lead to a **Holocene extinction event**.
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Q1) What is the National Institute of Ocean Technology (NIOT)?

NIOT was established in November 1993 as an autonomous society under the Ministry of Earth Sciences, Government of India. NIOT is managed by a Governing Council and the Director is the head of the Institute.

Source: PHYS

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