

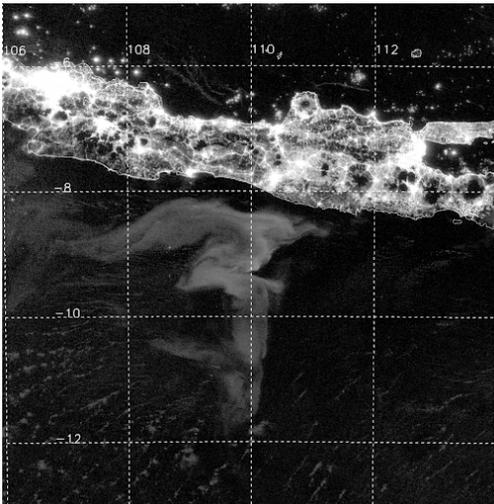


Milky Sea Phenomenon

 drishtias.com/printpdf/milky-sea-phenomenon

Why in News

The scientists are using new satellite technology **Day/Night Band** to find **glow-in-the-dark milky seas**.



Key Points

- **About:**
 - Also **called mareel**, it is a **rare form of marine bioluminescence** where the **nocturnal ocean surface** produces a widespread, uniform and **steady whitish glow**.

Bioluminescence is **light produced by a chemical reaction within a living organism**.
 - About **two or three milky seas occur per year** worldwide, mostly in the waters of the **northwest Indian Ocean** and **off the coast of Indonesia**.
 - Sometimes **exceeding 1,00,000 km₂ in surface area**, it **persists for days to weeks**, drifting within doldrums amid the prevailing **sea-surface currents** and aligning with narrow ranges of sea-surface temperature and marine biomass in a way that suggests water mass isolation.

- **Causes:**
 - Arises from a **saprophytic relationship between luminous bacteria and microalgae** that expresses on the macroscale.
 - A strain of luminous bacteria called **Vibrio harveyi** colonizing algae at the water's surface has been found.
 - **Indian Ocean Dipole (IOD):**
 - During its positive phase, the IOD corresponds to warm/wet conditions with warm pooling waters on the western side of the Indian Ocean, and cool/dry conditions with strong easterly winds on the eastern side.
 - These winds **generate upwelling of cool, nutrient-rich coastal waters** which drift offshore with the currents, **leading to algal blooms over a broad region**, and potentially, conditions favourable for **milky sea genesis**.
- **Purpose:**
 - Luminous bacteria cause the particles they colonize to glow. The purpose of this glow **could be to attract fish that eat them**.
 - These bacteria thrive in the guts of fishes, so when their populations get too big for their main food supply, **a fish's stomach makes a great second option**.
- **Detection:**
 - **Source of Information:** The awareness of milky seas is recorded **primarily from mariner sightings concentrated in the major shipping lanes**.
 - In 1995, the **low-light satellite measurements** provided the first overview of a milky sea, off the Somalia coast.
 - **Instrument for Detection:**
 - **Operational Linescan System (OLS):** Carried by Defense Meteorological Satellite Program (DMSP) series of military weather satellites (US).
 - This instrument is capable of detecting very weak light sources.
 - **Day/Night Band (DNB):** It is planned for **US' National Oceanic and Atmospheric Administration's** and part of the Visible Infrared Imaging Radiometer Suite (VIIRS) and is carried on satellites.
 - **Limitations:** These instruments have several limitations from the standpoint of milky sea detection.
 - The **OLS cannot detect the more common bioluminescence events** associated with disturbed-water due to their, typically small extent.
 - The **DNB's** spectral response is also **sensitive to mesospheric airglow emissions**, which occur as both reflected light off the clouds and as direct upwelling emissions to space.
 - Atmospheric gravity waves** modulate the intensity of light and form patterns of brightness having spatial scales similar to those expected from milky seas.

Source: DTE