

OBSERVING STRESS OF ARTIFICIAL NIGHT LIGHTING ON MARINE ECOSYSTEMS - A REMOTE SENSING APPLICATION STUDY

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ABSTRACT:

Satellite based observation of nocturnal lighting opens up a variety of research and application fields dealing with direct and indirect impacts of light on the environment. The National Oceanic and Atmospheric Administration's National Geophysical Data Center (NOAA-NGDC) processes and archives nighttime lights data acquired by the U.S. Air Force Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS). Initially designed to detect moonlit clouds this sensor is equipped with a photomultiplier tube intensifying the visible band signal at night and enabling the detection of lights present at the surface of the earth. It thus provides up-to-date information on the location and impact zone of oil and gas producing facilities, heavily lit fishing boats and the artificial night sky brightness that can extend many kilometers out from urban settlements. Artificial night lighting represents a direct threat to marine ecosystems and is an excellent proxy measure for indirect impacts such as human associated chronic water pollution. A growing body of evidence indicates that artificial sky brightness is an important stressor for many marine organisms, including birds and fish. In this paper we present selected 'eco-applications' of nighttime Earth Observation including assessment of light pollution impact on coral reefs and sea turtles. Coral reefs are highly photosensitive, i.e. many species synchronize their spawning through detection of low light intensity from moonlight and reef structure is strongly influenced by illumination. Settlements and other artificial sources of lighting provide illumination brighter than the full moon, especially at shorter wavelengths. Seabirds are intimately linked with the light features of their environments since they are nocturnally active. On the Azores Islands a campaign was initiated reporting light-induced falls of marine birds. Results will be presented of taking these available in situ data as reference for analyzing spatial correlations of altered environmental conditions and actual impact cases.

TOPIC: Remote sensing applications

ALTERNATIVE TOPIC: Not Specified