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Underwater Muon Detection System to Measure Coastal Mixed Layer Depth for Ocean and Climate Studies

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Mixed Layer (ML) in Oceans is defined as the less dense upper region of the water column where turbulent mixing occurs. Mixed Layer Depth (MLD) is the depth of this region and shows diurnal, seasonal fluctuations, and spatial variations. MLD is an indicator for climate change. When atmospheric muons enter the sea, a decreased muon count at the bottom of water is observed. Muon count is proportional to the density of water which can be measured by counting muons at the bottom. Combining this measurement with the sea surface temperature, salinity, and altimetry data from earth observing satellites, MLD can be estimated. We proposed a 4m2 scintillator based underwater muon detection system which can measure average water column density by counting surviving muons at the bottom. Using a Geant4 model, it is shown that combining this density measurement with data from Earth observing satellites enables us to continuously estimate daily mean MLD with an accuracy of 3% for down to 60m depth.

Alternate track

I read the instructions above

Yes

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