Multispectral satellite observations on sea surface to estimate hooking depths for Tuna longliners

J.K. Rajapaksha[1*] and L. Samarakoon[2]

[1]National Institute of Oceanography Marine Sciences, National Aquatic Resources Research & Development Agency (NARA), Crow Island, Colombo 15, Sri Lanka.

[2]Geoinformatics Center, Asian Institute of Technology, PO.Box4, Klong Luang, Pathum Thani 12120, Thailand.

Commercial fishermen are always looking at the state-of-the-art technology for the success of fishing and the profit by lessening the operational cost. Depth of fishing gear deployment is one of the most import factors which determine the fishing success as fish schools are sensitive to the temperature of the water column. Therefore, an effective method of obtaining a vertical temperature profile of the ocean was discussed.

Sea surface temperature (SST) and sea surface dynamic heights (SSH) from satellites and in-situ temperature profiles from Argo floats were analyzed for a period of 3years. A simple 5 parameter equation representing the mixed layer thermocline and a linear term to account for deep water cooling was used to model *in-situ* temperature profiles. A set of linear relationships were found in order to predict the required parameters. The parameters were used to construct the vertical temperature profile using satellite observations.

Minimum mixed surface layer is about 40 m and its temperature varied between 27°C -30°C during the 3-year period. Thermocline depths in the NE Indian Ocean varied between 75 m-150 m and corresponding temperature at thermocline varied between 23.0°C -19.0°C. Thermocline depths have shown a linear relation to SSH and the relationship is sensitive to the latitudes. It was found that the mixed layer temperature and model parameters are linearly related in the sigmoid model. Hence, all 5 parameters can be obtained from satellite measured SST and SSH to predict the vertical temperature profiles in a 1° grid.

The vertical temperature profiles in 1^{o} grid can be used to predict the depth of any temperature interested, for instance, the tuna swimming temperature. Hence, knowing the tuna swimming temperature, information on tuna aggregating depth can be provided in relation to space and time to set longline hooking depth accurately.

Keywords: satellite data, sigmoid model, thermocline prediction, tuna hooking depth, Indian Ocean

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*Corresponding author e-mail:jagath_r@hotmail.com