

Evaporation duct refractivity profile from satellite meteorological data

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The refractivity profile is initial data for the microwave propagation prediction models. Evaporation duct height is usually used to characterize refractivity profile in the surface layer over sea. The evaporation duct height is calculated using bulk measurement of air temperature, wind speed, humidity, pressure at some level and sea surface temperature. Four prevailing models: LKB(Liu-Katsaros-Businger), RSHMU (Russian State Hydro-Meteorological University) optimized by us, ECMWF (European Center for Medium range Weather Forecast) and COARE (Coupled Ocean-Atmosphere Response Experiment) were examined. The results of computation using above mentioned models were compared with the direct refractometric measurements. All measurements (meteorological and refractometric) were made by us during two marine expeditions. First expedition was in the Atlantic ocean from March to May in latitude $22^{\circ} - 32^{\circ}$ North and longitude $52^{\circ} - 65^{\circ}$ West (29 measurements). Second one was in the Indian ocean from December to February in latitude $0^{\circ} - 15^{\circ}$ North and longitude $55^{\circ} - 80^{\circ}$ East (94 measurements). The approximation by least square-root method was carried out to compare the direct measurements of evaporation duct height with the results of computations. The minimum square-root error is obtained for LKB model (2.59m, for negative air-sea temperature difference 2.42m), maximum - for ECMWF model(2.72m). All models overestimate low evaporation duct heights and underestimate - high values. This effect is least of all define in RSHMU model. The sensitivity of the models to the measurement accuracy of the meteorological parameters have also been examined using Monte-Carlo method. The least sensitive model to measurement accuracy of the meteorological parameters is LKB model and the most sensitive is RSHMU one. Improvement of this models is limited to the finite measurement accuracy of the evaporation duct height and the meteorological parameters. As result possibility of using satellite data for evaporation duct refractivity calculation have been estimated.