# Abstract Details

**AOGS 1st Annual Meeting > Ocean and Atmospheres > ASSIMILATIVE WAVE MODELLING FOR THE SOUTH EAST ASIAN SEAS >**

**Corresponding Author :** Dr. S. A. (sasraj@iitm.ac.in)

**Organization:** Indian Institute of Technology

**Category:** Ocean and Atmospheres

**Paper ID:** 57-OOA-A508

**Title:** ASSIMILATIVE WAVE MODELLING FOR THE SOUTH EAST ASIAN SEAS

**Abstract:** WAM, a third generation wave model has been implemented at the Tropical Marine Science Institute, National University of Singapore to predict the wave conditions in Singapore waters and ambient seas. The model was implemented to supplement the circulation and transport modeling efforts, especially in predicting and assessing the structure of physical parameters in the water column. Currently the effort has been implemented over the South East Asian Seas. The South China Seas is an interesting domain due to the exchanges of water mass between the Indian and Pacific Oceans. Within the SCS domain, the water depths also vary widely from tens of meters to thousands of meters. The modeling region is bounded by the longitudes 99oE and 121oE and latitudes 9oS and 24oN. The domain is gridded with a resolution of one-sixth degree with an option for nesting down to finer grids in the region of particular interest. The driving wind field is obtained from ECMWF in a grid resolution of 0.5o along longitudes and latitudes for the year 2001. The predictions are qualitatively compared with ERS-2 data. In overall, the predicted significant wave height and wave direction agree well with the satellite data. To enhance the wave predictive capability of the wave model, WAM, a data assimilation module along with a forecasting model is built over the WAM. Majority of the popular data assimilation techniques in use today would provide an improved estimate of the system state up to the current time level based on measurements. From a forecasting viewpoint, this corresponds to an updating of the initial conditions of a numerical model. The standard forecasting procedure is then to run the model into the future, driven by predicted boundary and forcing conditions. The problem with this methodology is that the updated initial conditions quickly disappear. Thus, after a certain forecast horizon the model predictions are no better than from an initially uncorrected model. This paper considers a novel approach to wave data assimilation and demonstrates that through the measurement forecast (made using so-called local models), entire model domain can be corrected over extended forecast horizons (i.e. long after updated initial conditions have become disappeared), thus offering significant improvements over the conventional methodology. The proposed data assimilation scheme can be executed in the post-processor and is operationally viable with the requirement of insignificant execution time. This scheme produces an efficiency of 30-60% in reducing root mean square error. The application of this proposed data assimilation procedure is demonstrated through a real-world wave data assimilation case study in the South East Asian Seas. The distribution of error forecasts over the entire model domain were performed using steady gain vectors derived from the ensemble of spatial error covariances. The improvements in the prediction of wave characteristics are highlighted.

**Presentation Mode:** Oral

**Keywords:** Wave modelling, Data assimilation, forecasting

**Status:** Pending.

## Co-Authors

| No. | Title | First Name | Family Name | Organization |
|---|---|---|---|---|
| 1 | Prof. | Eng Soon | Chan | National University of Singapore |