

U.S DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
OCEAN PRODUCTS CENTER

TECHNICAL NOTE

THE EDITING AND AVERAGING OF ALTIMETER WAVE AND WIND DATA

DINORAH C. ESTEVA

JANUARY 1987

THIS IS AN UNREVIEWED MANUSCRIPT, PRIMARILY INTENDED FOR INFORMAL
EXCHANGE OF INFORMATION

OPC Contribution No. 11

OPC CONTRIBUTIONS

- No. 1. Burroughs, L. D., 1986: Development of Forecast Guidance for Santa Ana Conditions. National Weather Digest. (in press).
- No. 2. Richardson, W. S., D. J. Schwab, Y. Y. Chao, and D. M. Wright, 1986: Lake Erie Wave Height Forecasts Generated by Empirical and Dynamical Methods -- Comparison and Verification. Ocean Products Center Technical Note, 23pp.
- No. 3. Auer, S. J., 1986. Determination of Errors in LFM Forecasts of Surface Lows Over the Northwest Atlantic Ocean. Ocean Products Center Technical Note/NMC Office Note No. 313, 17pp.
- No. 4. Rao, D. B., S. D. Steinrod, and B. V. Sanchez, 1986: A Method of Calculating the Total Flow from a Given Sea Surface Topography. NASA Technical Memorandum. (in press).
- No. 5. Feit, D. M., 1986 Compendium of Marine Meteorological and Oceanographic Products Center. NOAA Technical Memorandum NWS NMC 68, 98pp.
- No. 6. Auer, S. J., 1986: A Comparison of the LFM, Spectral, and ECMWF Numerical Model Forecasts of Deepening Oceanic Cyclones During One Cool Season. Ocean Products Center Technical Note/NMC Office Note No. 312, 20pp.
- No. 7. Burroughs, L. D., 1986: Development of Open Fog Forecasting Regions. Ocean Products Center Technical Note/NMC Office Note No. 323. (in press).
- No. 8. Yu, T., 1986: A Technique of Deducing Wind Direction from Altimeter Wind Speed Measurements. Mon. Wea. Rev. (Submitted).
- No. 9. Auer, S. J., 1986: A 5-Year Climatological Survey of the Gulf Stream and Its Associated Ring Movements. Journal of Geophysical Research. (Submitted).
- No. 10. Chao, Y. Y., 1987: Forecasting Wave Conditions Affected by Currents and Bottom Topography. Ocean Products Center Technical Note, 11pp.
- No. 11. Esteva, D. C., 1987: The Editing and Averaging of Altimeter Wave and Wind Data. Ocean Products Center Technical Note, 4pp.

The Editing and Averaging of Altimeter Wave and Wind Data.

Dinorah C. Esteva

1. Introduction

Satellite borne altimeters provide estimates of significant wave height (SWH) and wind speed over the global oceans. These estimates are typically available for one second intervals at the nadir point of the satellite track, and constitute a valuable data set for studies of both ocean wave and marine boundary layer dynamics.

SWH estimates from altimeters flown on board GEOS-3 and SEASAT proved to be within 0.5 m of NOAA Data Buoy Center (NDBC) buoy estimates for SWH under 6 m (Fedor and Brown, 1982). Wind speed estimates were within 2 m/s and 1 m/s of the buoy winds for GEOS-3 and SEASAT respectively for wind speeds under 12 m/s (Tapley et al., 1979, 1982). Presently a space borne altimeter is available on board the U.S. Navy satellite GEOSAT. Pickett, Burns and Boome (1986) suggest the GEOSAT wind and SWH are within 1.8 m/s and 0.5 m, respectively, of the buoy estimates. Thus these SWH are perhaps the most reliable existing source of data available to validate the performance of global ocean wave forecast models. Potentially, these estimates may be used in initializing ocean forecast models along the lines followed by the numerical weather prediction community.

For these reasons, it is desirable to develop systematic procedures to edit the SWH and wind speed retrievals from satellite altimeters and archive the resulting data set. For most practical purposes a one every second estimate is too high a frequency, and these individual values tend to be too noisy; hence a time averaging procedure is advisable.

This note describes the error checking and averaging procedures used in processing the GEOSAT data. With suitable modifications, these procedures should be applicable to data from all satellite borne altimeters.

2. THE GEOSAT SATELLITE

GEOSAT is a Navy satellite launched on March 12, 1985. Although the first phase of its mission is classified the Navy agreed to unclassify the SWH and wind speed estimates and make them available to the scientific community. GEOSAT carries only an altimeter and was placed in a non repeating polar orbit until October 1, 1986. Adjustments to the orbit started on this date and were completed by November 8, leaving GEOSAT on a seventeen day repeat orbit approximately duplicating that of SEASAT.

Fleet Numerical Oceanographic Center, Monterey, California transmits the unclassified portion of the data in near real time over a dedicated 1200 baud line, to the computer facility of the National Meteorological Center in Suitland, Md. The transmitted data have been subjected to limited gross error checks.