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ANALYSIS OF SEA ICE DYNAMICS

by

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The ongoing work (FY86, FY87, FY88) has established the basis for using multiyear sea ice concentrations from SMMR passive microwave for studies of large-scale advection and convergence/divergence of the Arctic sea ice pack. Comparisons have been made with numerical model simulations and buoy data showing qualitative agreement on daily to interannual time scales. Analysis of the 7-year SMMR data set shows significant interannual variations (15-20%) in the total area of multiyear ice.

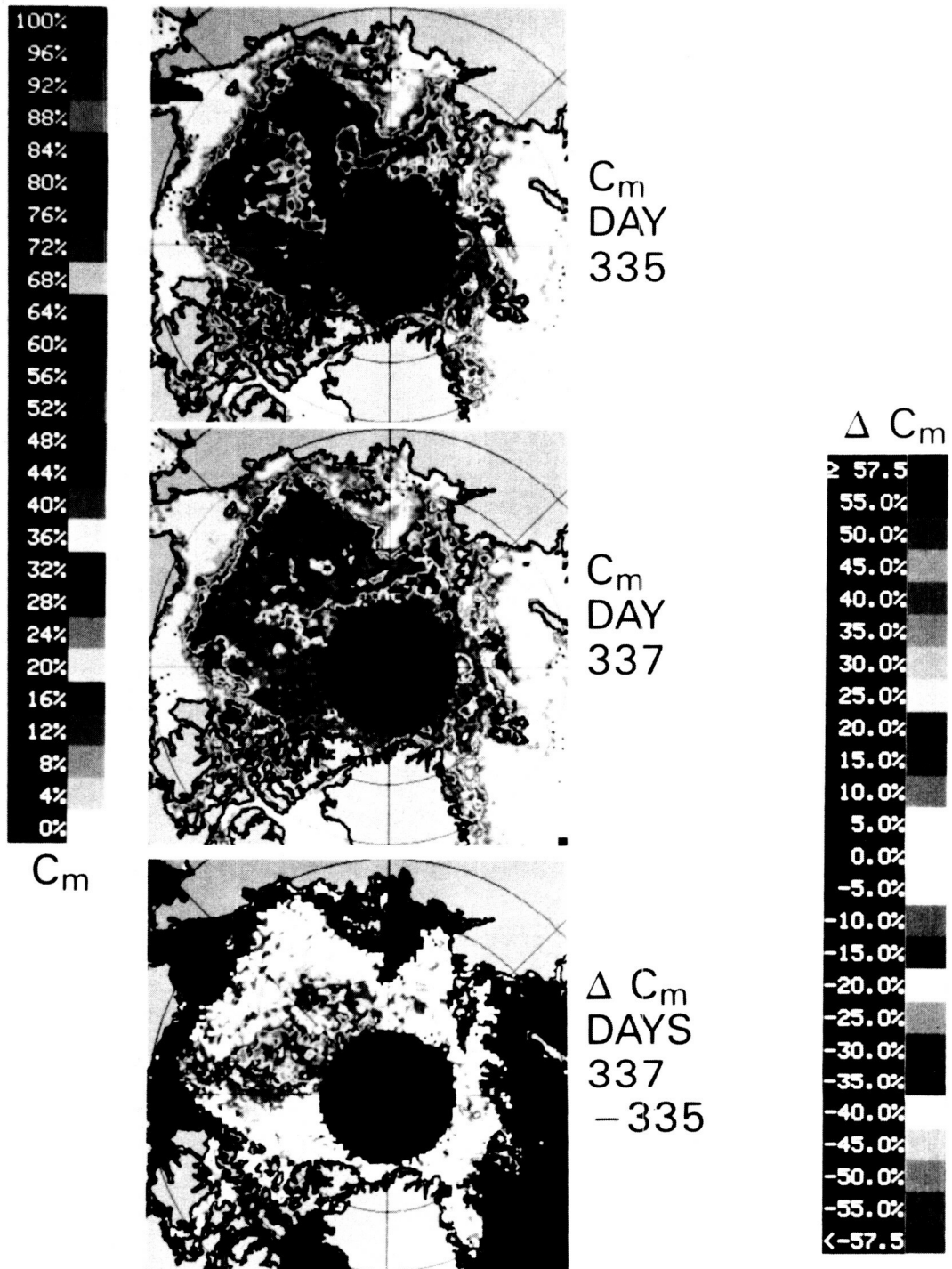
The scientific objective is to investigate the dynamics, mass balance, and interannual variability of the Arctic sea ice pack. The research emphasizes 1) the direct application of sea ice parameters derived from passive microwave data (SMMR and SSMI) and 2) collaborative studies with John Walsh using a sea ice dynamics model.

The 7-year time series of multiyear sea cover from SMMR is being analyzed on an interactive computer and compared with Arctic buoy data and sea ice modeling results. SSMI data will be added, as it becomes available, and will be used to examine SMMR/SSMI modifying his version of the Hibler sea ice dynamics model to incorporate the fractional concentrations of multiyear and first

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year ice, so that more direct comparisons can be made with the SMMR data.

The possible causes of observed interannual variations in the multiyear ice area are being examined. The relative effects of variations in the large-scale advection and convergence/divergence within the ice pack on a regional and seasonal basis are investigated. The effects of anomalous atmospheric forcings are being examined, including the long-lived effects of synoptic events and monthly variations in the mean geostrophic winds. Estimates to be made will include the amount of new ice production within the ice pack during winter and the amount of ice exported from the pack.



SHORT-TERM MULTIYEAR CONCENTRATION CHANGES

Figure 1. SMMR images of multiyear sea-ice concentration for 30 November (day 335, top) and 2 December (day 337, center) 1980. Field of change of multiyear concentration between 30 November and 2 December is shown at bottom.

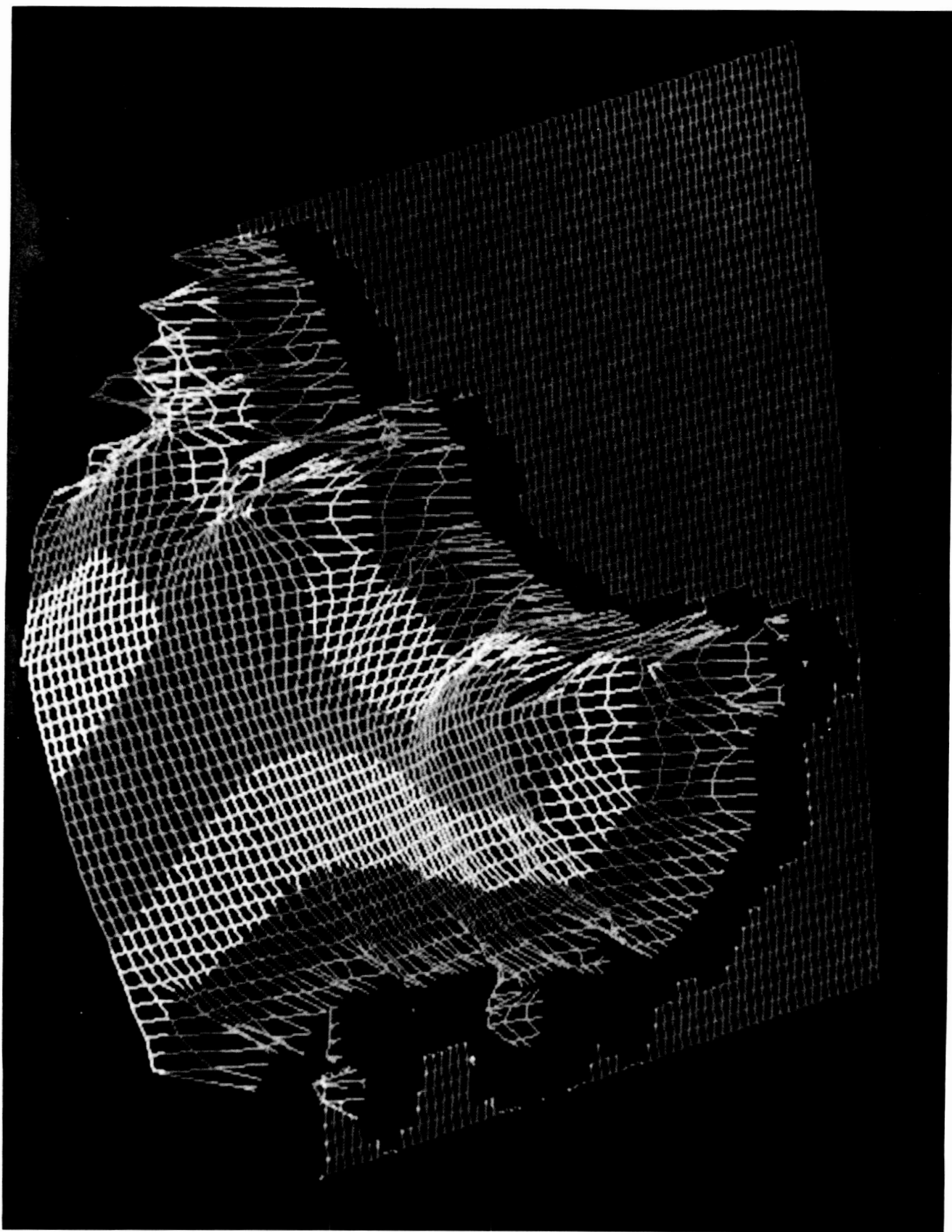


Figure 2. Color Coded Height Contours of the Southern Greenland Ice Sheet.