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Wave/Current Interaction Model

by

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The objective of the first task is to model the wave-current interaction for the application to remote sensing data via numerical simulations and data comparison. Using the field data of surface current shear, wind condition and ambient wave spectrum, the numerical simulations of directional wave spectrum evolution have been used to interpret and to compare with the aircraft data from Radar Ocean Wave Spectrometer (ROWS) and Surface Contour Radar (SCR) across the front during Frontal Air Sea Interaction Experiment (FASINEX). Depending on the wavelength, angle of attack, current speed and the detailed current meandering structure, these waves may penetrate the front and refract to form a shadow zone in the south side of front. A parametric study for various current meandering profiles and incident wave spectrum under FASINEX environmental conditions is being performed to investigate the sensitivity of wave-current interaction. The wave-current interaction model will be used to assess the background current effects on the wave evolution for the Surface Wave Dynamics Experiment (SWADE) pre-test sensitivity study.

The second task of wave-ice interaction was inspired by the observation of large amplitude waves hundreds of kilometers inside the ice pack in the Weddell Sea, resulting in breakup of

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the ice pack. The developed analysis of processes includes the refraction of waves at the pack edge, the effects of pack compression on wave propagation, wave train stability and buckling stability in the ice pack. Sources of pack compression and interaction between wave momentum and pack compression are investigated. Viscous damping of propagating waves in the marginal ice zone are also studied. The analysis suggests an explanation for the change in wave dispersion observed from the ship and the sequence of processes that cause ice pack breakup, pressure ridge formation and the formation of open bands of water. Surface signatures of swell, wind, and eddies are observed in the marginal ice zone by SAR from satellite and airborne radars. It will be an excellent opportunity to study the ocean-ice interaction processes in the MIZ using Alaska SAR Facility.

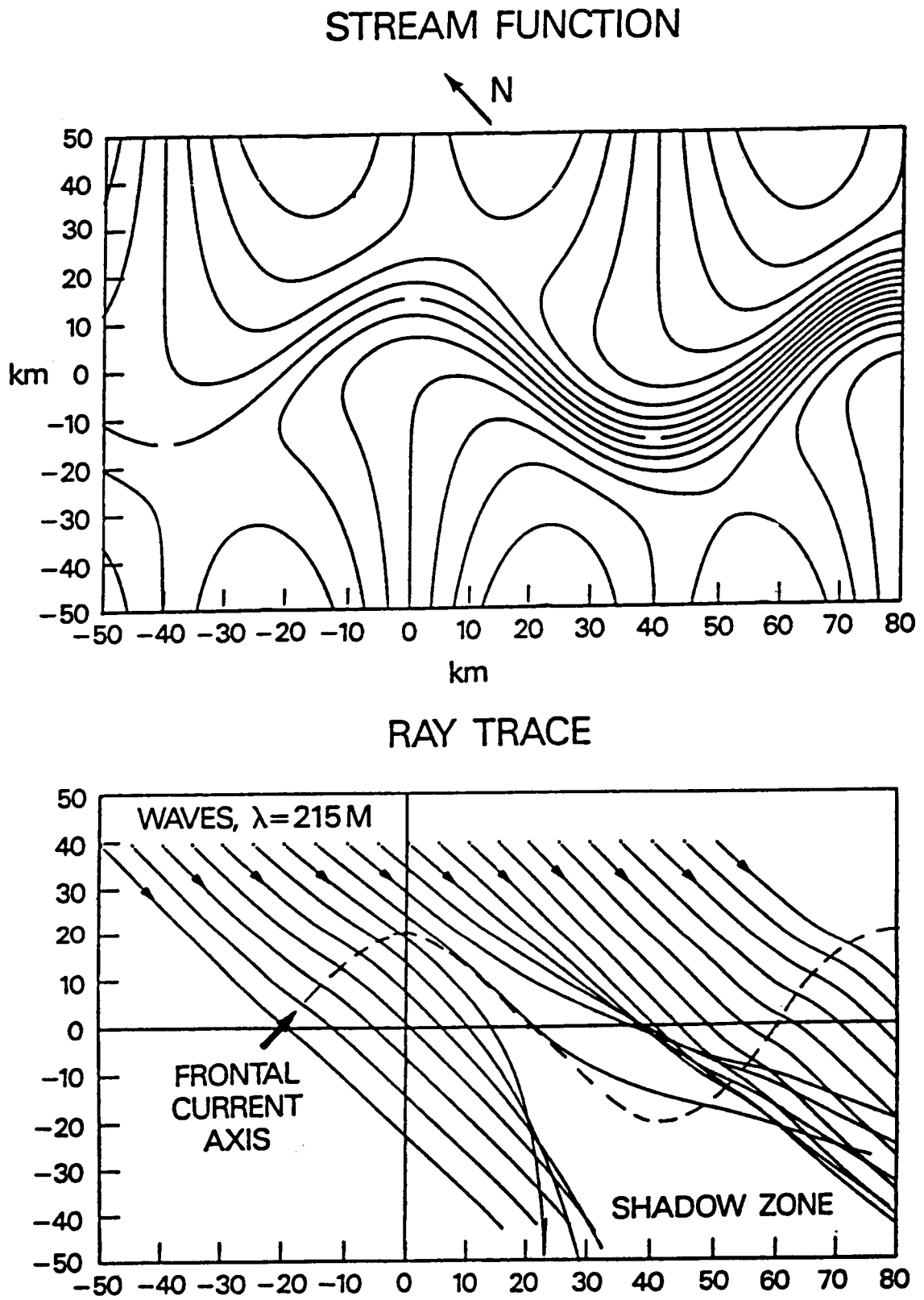


Figure 1. Wave/Current Interaction Model