USE OF SATELLITE SYNTHETIC APERTURE RADAR IMAGERY IN ARCTIC MARINE DESIGN AND SEA-ICE STUDIES
(Abstract only)

by

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ABSTRACT

Digitally processed Seasat synthetic aperture radar images from the Beaufort Sea, recorded during August 1978, were analyzed to determine ice-floe displacements and floe-size distributions. Combining data on displacements with those on floe area and thickness yields floe kinetic energies which can then be used as input into design criteria for offshore Arctic structures. Floe-size distributions are needed to determine probablistically the "design" mass of ice for an offshore structure.

Vectors of floe movement show the influence of surrounding floes and the compactness of the ice. Floes nearer to more open water showed more movement in the prevailing wind direction while floe movement within the ice pack was primarily affected by floe interaction.

Different cutoff criteria in terms of number of resolution cell sizes were applied to the data on floe size. It was found that the numbers of floes dropped by up to 50% of the original count at ten resolution cells (250 m). Exponential and log-normal probability distributions were fitted to the original counts of floe size. The log-normal fit was better but this is based on one dataset at one time of year in one location. More datasets need to be analyzed to investigate this further. If a probability distribution to floe size can be generalized then only a subset of all the floes would need to be analyzed to determine numbers of floes in each size range. This would greatly speed up a tedious task and be beneficial for design and operational purposes.

MEASUREMENT OF SNOW CREEP PRESSURES ON AN AVALANCHE DEFENCE STRUCTURE
(Abstract only)

by

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ABSTRACT

This study presents estimates of snow creep pressures from the centre section of an avalanche defence structure in western Norway. The structure is 15 m long and is erected on a 25° slope characterized by deep snow covers. Two methods of measurement are described: (1) direct estimates from earth pressure cells, and (2) construction of force, shear and moment diagrams from strains measured using vibrating wire strain gauges mounted on the steel beams of the structure.

In addition to the estimates of pressure, relevant snowpack data were measured, including snow depth, density, temperature and rammsonde hardness profiles as well as snow crystal stratigraphy. Snow gliding was also measured, and was found to be negligible. The snowpack measurements were made at approximately monthly intervals during each of the four winters which yielded useable data for the study.

Analysis of the pressure distributions along with the snowpack data yielded the following results: (1) the average pressure on the structure is linearly proportional to the product of average density times snow depth, (2) the average pressures are predicted fairly accurately by a linear, viscous creep model, (3) the maximum pressure depends strongly on the snowpack stiffness and decreases rapidly when warming and melt soften the snowpack, and (4) the maximum pressures are of the order of 25% higher than predicted by a linear, viscous creep model.

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