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CHARACTERISTICS OF RADIO ATTENUATION COEFFICIENT ON THE SØR RONDARNE ICE SHEET, ANTARCTICA (ABSTRACT)

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The depth-averaged attenuation coefficients are calculated from the echo pattern measurements from internal ice. The attenuation coefficients around the Sør Rondane Mountains, Antarctica were mapped from the 179 MHz airborne radio-echo sounder, which made observations during 1986. The map shows a tendency of decreasing attenuation as the surface altitude of the ice sheet increases. This result is interpreted by using the relationship between attenuation coefficients and ice temperature. In addition, a cosine relationship was found between attenuation coefficients and the angle of the radar polarization from the topographic contour. The dynamic range of the variety of the attenuation coefficients is 1.2 dB/100 m. If the ice flow is perpendicular to the topographic contour, the ice flow direction will be derived from the polarimetric radar observation.

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DEVELOPMENT OF AUTOMATIC ICE FABRIC ANALYZER (II) (ABSTRACT)

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An automatic ice fabric analyzer using an image processing method has been developed which determines the c-axis orientations of individual grains in a thin polycrystalline ice section. The computer-controlled device makes it possible to label each crystal and determine its c-axis orientation quickly without any manual operation. In our earlier studies, it was found that this method often gives a miscalculated c-axis orientation whose azimuth angle differs 90 degrees from the true one and also gives no solution in some cases. In order to improve the analysis accuracy, the method based on Light Analysis with Inclined CCD-cameras (LAIC) is improved and an automated analysis instrument has been developed.

According to LAIC, while the crossed polarioids are being rotated, an ice thin section placed between crossed polarioids is photographed with three cameras, of which one is set in a vertical position, the other two are inclined 15 degree with respect to the vertical axis, The orientations of the optic axes of every individual ice crystal are calculated on a personal computer with the relation of the extinction position angles about three cameras which are calculated from the shift of the image's gray tone.

A new method of Lightness Analysis has been attempted to improve the analysis accuracy. Two similar procedures are involved; however, between the two procedures, the thin sections need to be rotated 90 degree around a vertical axis, to obtain three extinction position angles. By comparing values of the two extinction position angles about the inclined cameras in both procedures, the azimuth angle can be determined accurately. It was shown that the orienting results of quartz and ice thin sections with the new method are in comparative agreement with those obtained by using a Rigsby stage, and the reproducibility of the new method is better. Over 80 percent of orienting results of thin ice sections show that the variation between the automated analysis result and that obtained by using a Rigsby stage is not over ± 10 degree.

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