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The Horizontal Coherency of the Motion of Summer Arctic Sea Ice

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ABSTRACT

Four ice floes in the permanent arctic ice pack were instrumented during the summer of 1975. Spectral and cross-spectral analysis of the complex time series of the ice motion and of the surface winds are given. The results show that the local low-frequency surface motion is linearly related to the local low-frequency winds. The higher frequency surface motion, including the significant inertial motion, cannot be entirely described by a linear model forced by the local winds. Cross-spectral analysis of the motion of floes separated by a hundred kilometers reveals a high coherency of the inertial motions.

Two simple mathematical models are studied to explain observed cross spectra between stations. The spectral properties of these models are determined directly from the spectral properties of the winds. Qualitative agreement between the models and observations suggest that some coupling mechanism is at work in the ice pack even during summer.

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