Abstract - CEOS WGCV SAR Workshop 2001

Oral Presentation

Science and Application Requirements

Arctic Sea Ice Thickness from SAR-derived Kinematics: Current Status

Ron Kwok, Jet Propulsion Laboratory, Mail Stop 300-235,
4800 Oak Grove Drive, Pasadena CA 91109 USA, Phone 818-354-4519,
email: Ron.Kwok@jpl.nasa.gov

Benjamin Holt*, Jet Propulsion Laboratory, Mail Stop 300-323,
4800 Oak Grove Drive, Pasadena CA 91109 USA, Phone 818-354-5473,
Fax 818-393-6720, email: ben@pacific.jpl.nasa.gov

*Corresponding author and presenter

The RADARSAT synthetic aperture radar is currently providing repeat surveys of the
Arctic Ocean sea ice on a near 3-day basis with its wide-swath ScanSAR mode. For the
first time, we can produce basin-scale estimates of sea ice age and thickness from
observations of ice motion derived from sequential SAR images of the Arctic Ocean. The
direct observations we extract from the SAR imagery are the deformation of Lagrangian
elements (cells) which are areas enclosed by polygons defined by vertices on the ice
cover. The time-dependent deformation of these cells are computed from the motion of
the vertices obtained by tracking these points in SAR imagery. From the record of
deformation, we estimate the ice age and thickness within each of these cells. Each cell
covers an initial area of approximately 10 km by 10 km. More than 60,000 of cells are
used to cover the entire Arctic Ocean. These high-resolution observations give us an
unprecedented view of the sea
ice cover and are suitable for supporting polar investigations as well as operational
applications.

Estimates of sea ice deformation, thickness and age from two entire winters (1996/1997
and 1997/1998) of SAR maps of the Arctic have been produced. We have also produced
results from the summer of 1998. Here, we describe this dataset, and present an overview
of current results from studies ultilizing these products. We will also discuss the
continuation of these observations into the future using Envisat ASAR and RADARSAT-
1. These data products and a description of their format are available at a Web site at the
Jet Propulsion Laboratory (http://www-radar.jpl.nasa.gov/rgps).