Towards a High Spatial High Temporal Synthesis of Sea-Ice Kinematics

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in collaboration with
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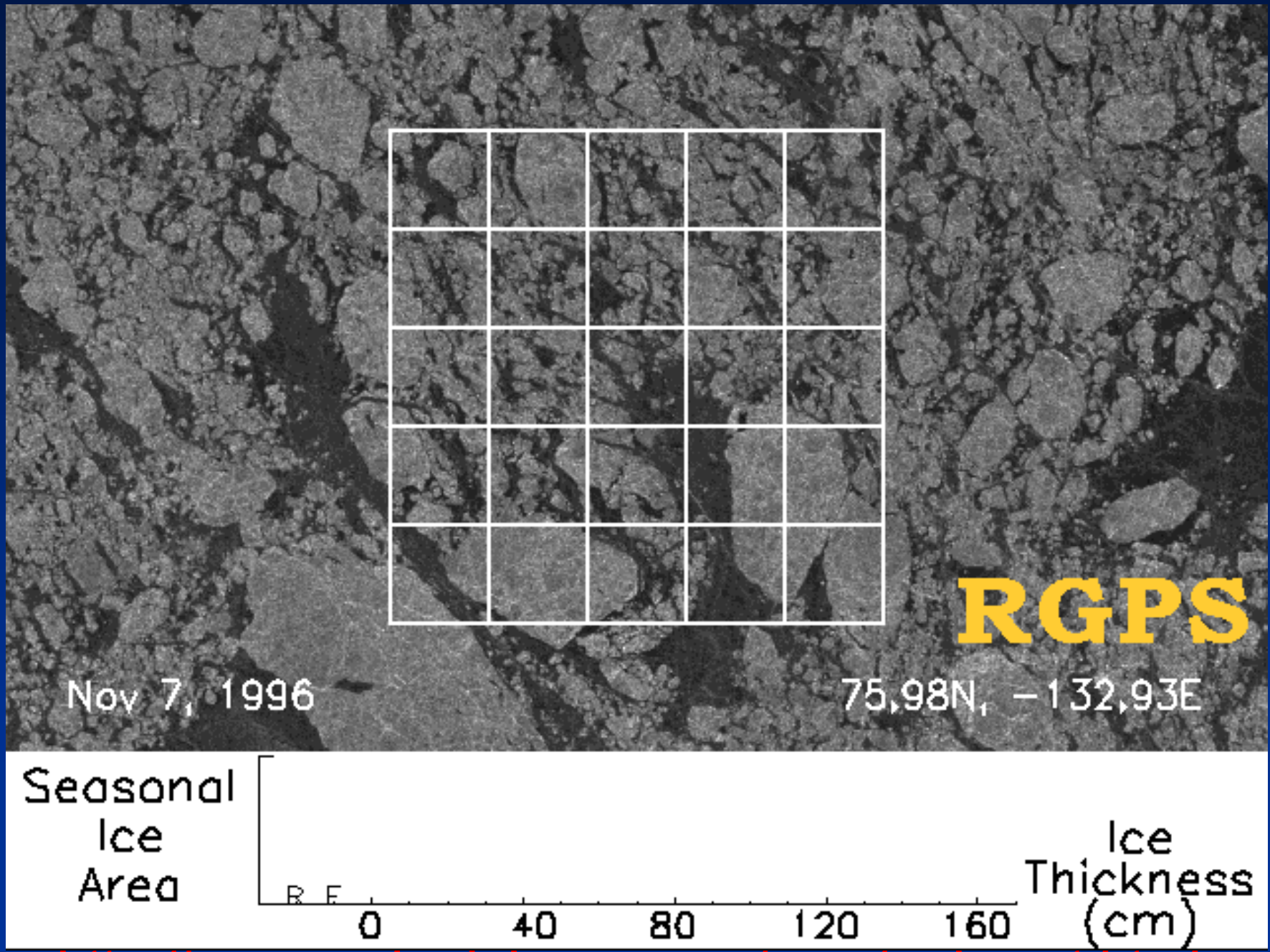


http://www-radar.jpl.nasa.gov/rgps/radarsat.html

Key Questions

- How to make use of this technology to enhance the capabilities of regional ice-tethered buoys?
- What improvements are needed?

Considerations for Image Analysis Improvement

1. Don’t assume that one scale is sufficient to resolve such a complex system
2. Don’t assume a continuum
3. A low correlation does not necessarily mean a wrong answer

Hypothesis: Motion can be extracted from imagery in a scaled hierarchy

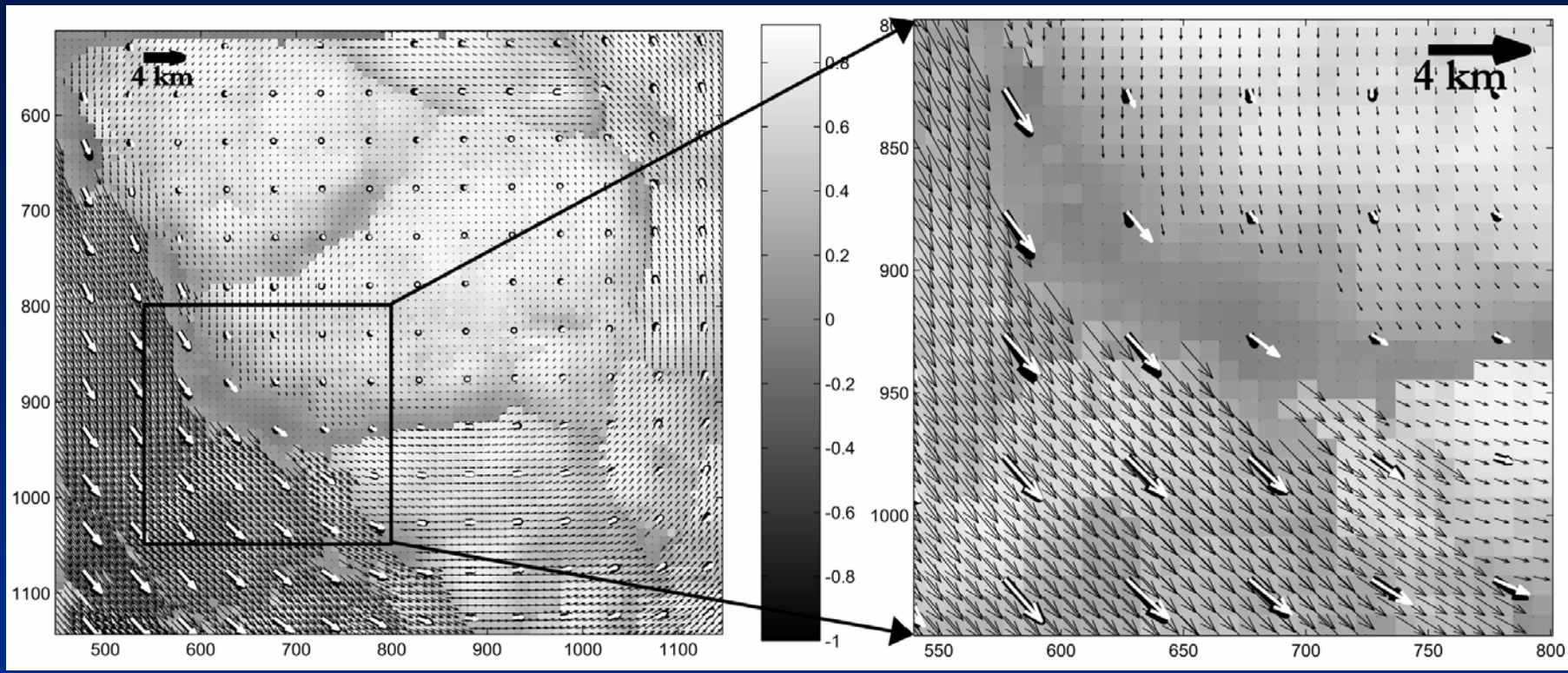
coarse resolution of images

- resolve large global translation
- using linear methods

finer resolution of images

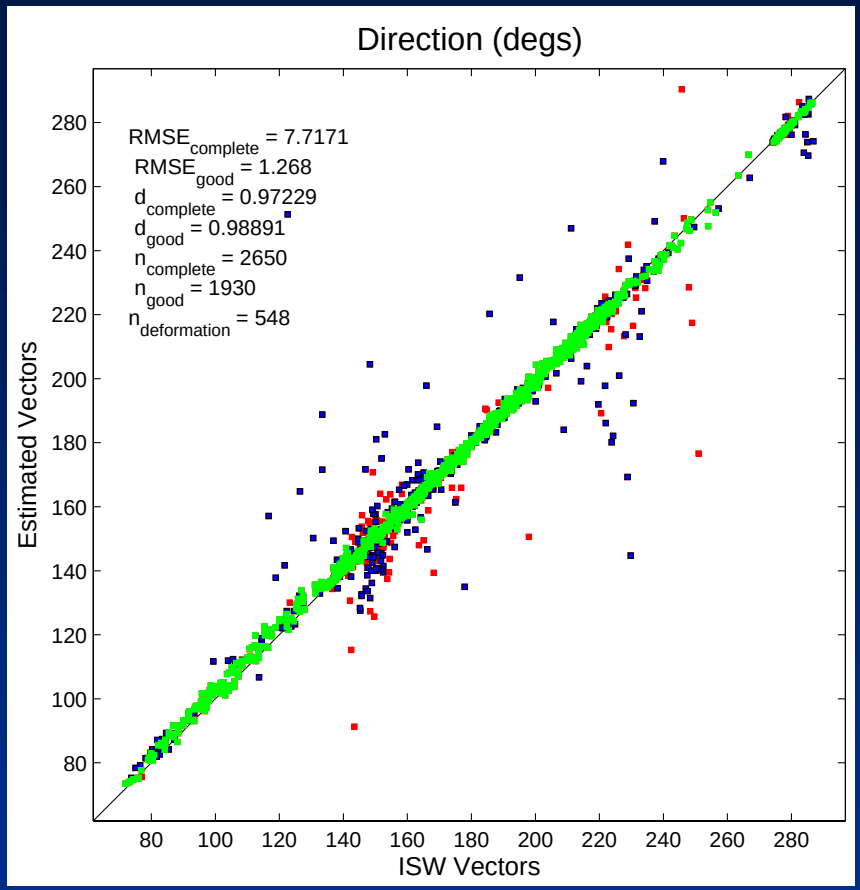
- resolve smaller local non-rigid dynamics
- using higher order parametric motion models (affine, quadratic,...)

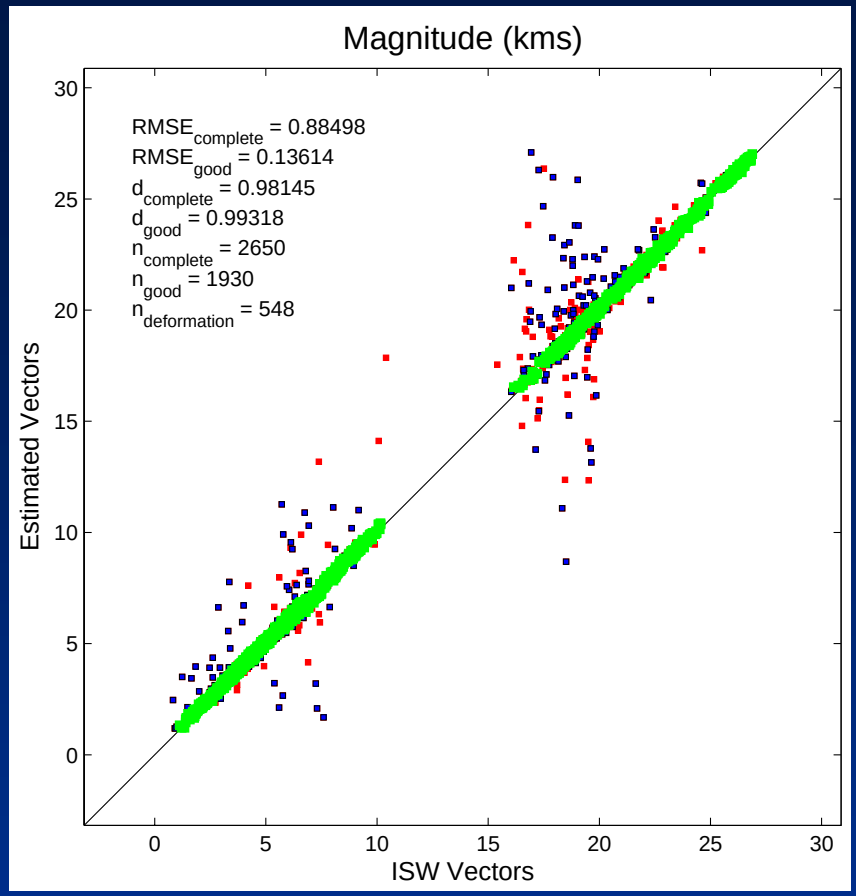
Motion resolved including linear deformation



Relative motion from two ERS-1 images from the Weddell Sea.
Grey-scale correlation map.
Thin black arrows 0.8km product.
Thick black arrows 5 km product
Thick white arrows validation vectors (Mark Drinkwater, JPL now ESA)

Source: recently accepted IEEE paper by Thomas, Geiger, and Kambhamettu, in press.



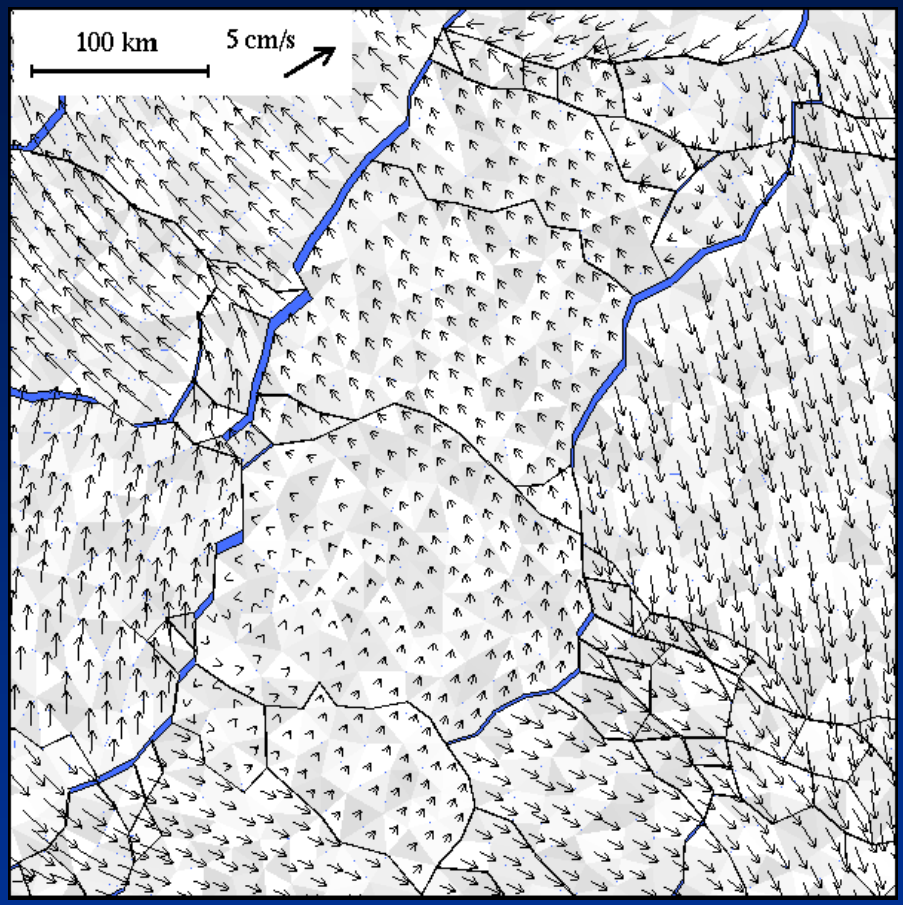


73% of pixel displacements compare to within 400m of validation data set

20.5% of pixels in deforming regions

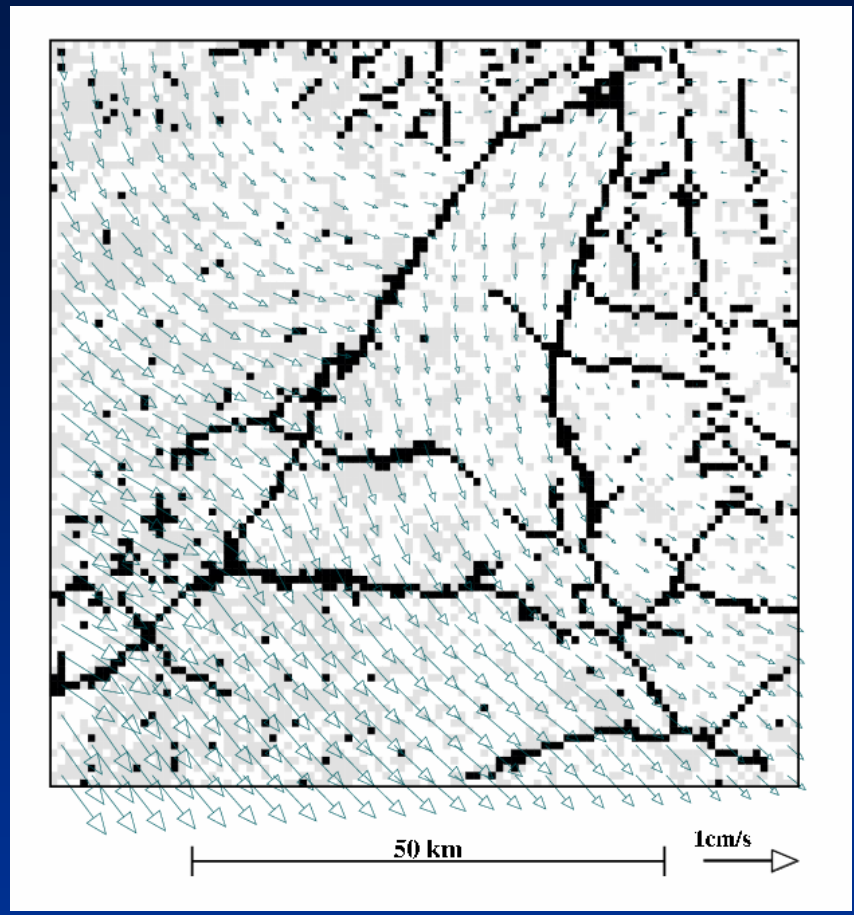
6.5% of pixels currently remain unaccounted

Model: Jan 20, 1998



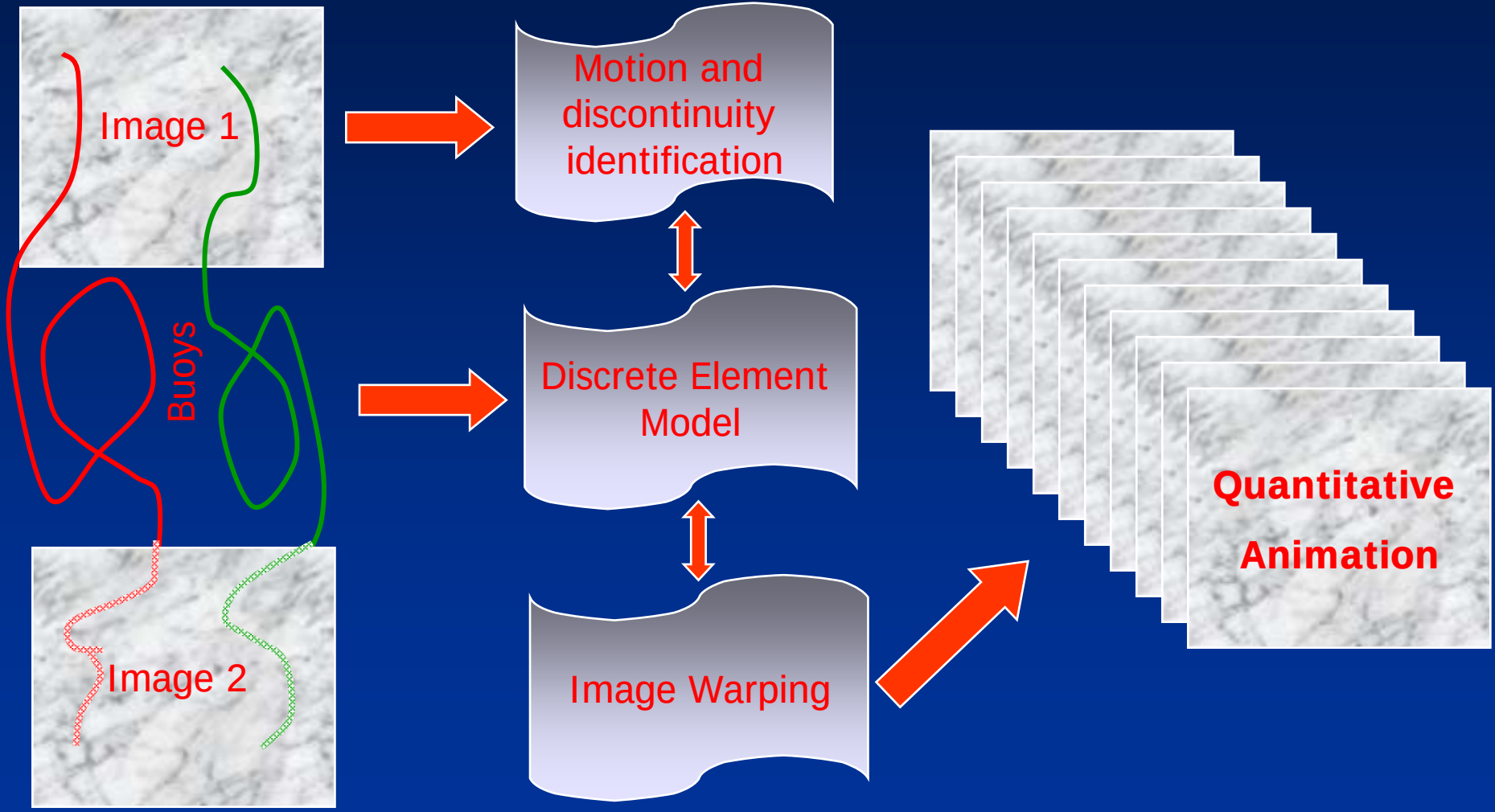
CRREL Discrete Element Model

RADARSAT: Jan 14 & 17



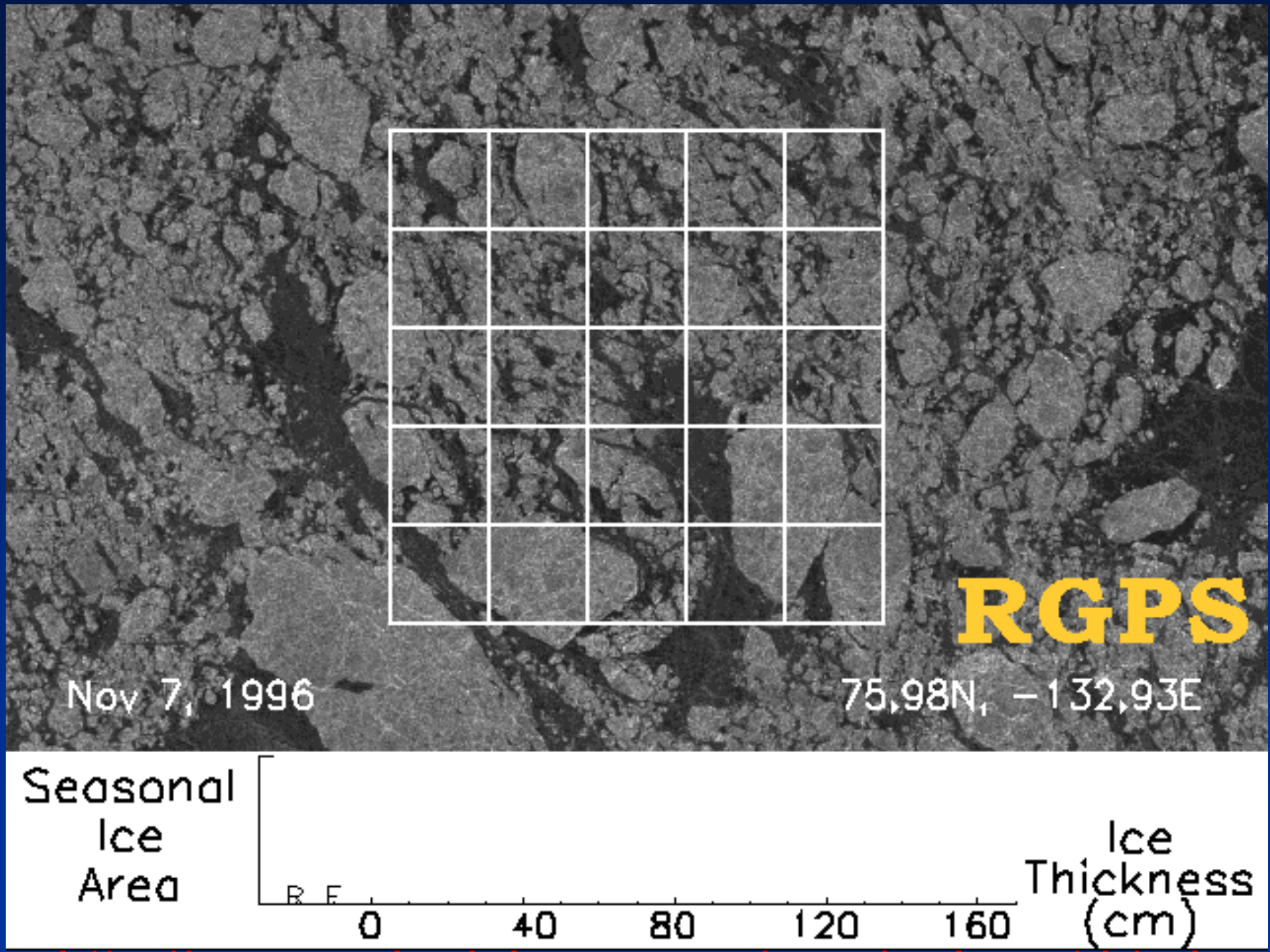
Every 4th velocity vector is shown.

GOAL
Quantitative Image Animation



Usefulness to Ice-Tether Buoys?

- Lagrangian 400 m resolution satellite-derived sea-ice motion products including deformation
- Have each of the synthesis pieces needed
- Great tool for surface flux determination.
- Proposals submitted to attempt synthesis.



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