Reconfigurable Sensor Networks for Fault-Tolerant In-Situ Sampling

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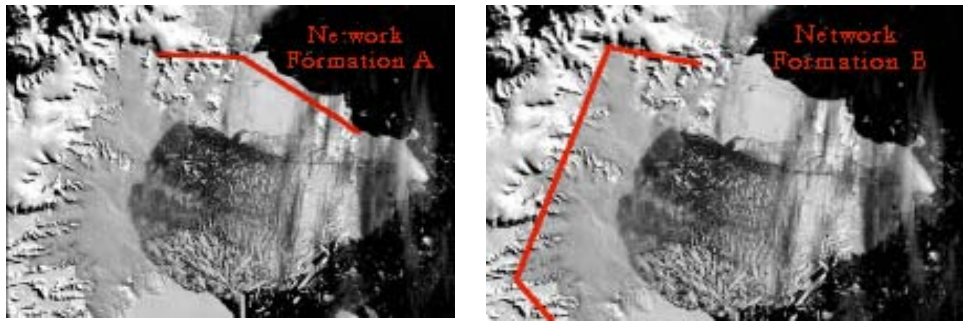
Objective

- Develop sensor reconfiguration capability that changes network topology, in effect establishing a self-adapting sensor network.
- Develop sensor diagnostic capability that identifies and communicates necessary changes in network topology required to achieve science goals and compensate for sensor failure or communication dropouts.
- Validate and demonstrate the method in which integrated Earth sensing can be improved using the concepts of fault-tolerant in-situ sampling.



Defining desired science formations for the sensor network to realize

Approach

- Modeling the network - use graph formalisms to model local interactions between sensors to obtain desired global properties of the network formation
- Topological reconfiguration of sensor networks - use decentralized control strategies to achieve global reconfiguration of the sensor network
- Science-driven sensor network diagnosis – continuously determine the optimal network formation necessary to maintain a desired science-driven configuration

Co-I's/Partners

- Magnus Egerstedt / Georgia Institute of Technology
- Derrick Lampkin / Pennsylvania State University

Key Milestones

- Develop connectivity graph conversion methods to convert science objectives to formations to graphs 3/2007
- Develop sensor reconfiguration methods to achieve science formations in real-time 9/2007
- Develop sensor diagnosis method to identify and communicate changes in network topology 9/2008
- Demonstrate and validate the methodology applied to a relevant ice sheet science investigation 9/2009

$TRL_{in} = 3$