

**JPSS Short Course**  
**NOAA Environmental Satellite Enterprise: Applications and Opportunities**

**Monitoring and Predicting the Opening of the Northwest Passage**

**Yinghui Liu, Jeff Key, Kyle Obremski**  
**with assistance from Scott Lindstrom**

**27 June 2023, 13:00-15:00 EDT, Virtual**

**Agenda**

**Description:** The area covered by Arctic sea ice during the summer months has declined dramatically over the last few decades. In 2016, the cruise ship *Crystal Serenity* successfully traversed the Northwest Passage. If the decreasing trend in sea ice cover continues, we can expect more commercial activity in the Arctic Ocean in the coming years. Can we use satellite data to monitor ice conditions in and around the NW Passage? Better yet, can we use satellite-derived information about sea ice with numerical weather prediction models to forecast conditions in the Passage weeks in advance? This session will address these questions through hands-on work with satellite-derived ice products in years where the Passage was open and years when it was impassable.

*All times are U.S. Eastern Daylight Savings Time (EDT; UTC -4).*

**13:00-13:30    Remote Sensing of the Cryosphere and JPSS Products (30 min)**

- What is the cryosphere and what are its impacts?
- How do we monitor the cryosphere from space?
- JPSS Cryosphere Products - VIIRS
  - Sea and lake ice: ice cover, concentration, temperature, thickness, and motion
  - Snow: snow cover and fraction
- JPSS Cryosphere Products – AMSR2
  - Sea ice: ice concentration and type
  - Snow: snow cover, depth, and snow water equivalent (SWE)
- Resources
  - Reading list
  - Data

**13:30-14:45    Northwest Passage Hands-On Activity (1 hr 15 min)**

- Background (15 min)

- What is sea ice?
- The cruise of the Crystal Serenity
- What/where is the Northwest Passage (NWP)?
- Why is it important?
- Economic Impact
- Remote Sensing of the NWP
- Open vs. Closed: A case study (30 min)
  - Satellite and reanalysis products for the 2013 and 2016 NWP
  - Contributing factors
- Breakout groups (30 min)

14:45-15:00 **Summary and Final Questions** (15 min)