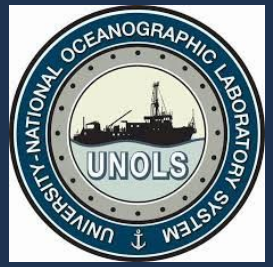


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Telecommunications and change in the US Academic Research Fleet
2020-03-12

Jon C. Meyer, Information Systems Manager, Shipboard Technical Support, Scripps Institution of Oceanography

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Telecommunications and change in the US Academic Research Fleet

Topics:

- 2020 is a year of change for ARF
- Fleet Xpress Transitions
- Ku Transitions to Marlink Sealink
- C/Ku Marlink Sealink pilot program
- HiSeasNet Ground Station future plans

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Fleet Xpress Transitions

- The Inmarsat contract with World-link was extended beyond Dec 2019 and is coming to a close in 2 weeks. We are transitioning to Marlink, the #1 satcoms provider, worldwide
- All ARF (and 2 USAP) ships will have Fleet Xpress at the end of this transition. No more pay-by-the-byte FleetBroadband
- We are adding 10 radomes to the fleet in Q1-Q2 2020 to accomplish this. Most operations are in Q1 2020 and take 2 days with Marlink personnel on site
- We are buying *Intellian* brand radomes for new installations. Availability and shipments from Korea have been challenges. As of Monday, all new radomes are stateside
- Ships with more than 40 berths are getting double the throughput (CIR: 1Mbps ship->shore, 512 kbps shore -> ship)

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Fleet Xpress Transitions

February transitions

R/V Endeavor (failed due to weather), R/V Robert Gordon Sproul, R/V Sally Ride, R/V Neil Armstrong, R/V Atlantic Explorer

March transitions

9-11 ships starting this weekend until end-of-month!

Awaiting US shipping details for R/V Pelican and R/V Rachel Carson

Q2 Transitions

R/V Blue Heron

R/V Endeavor re-attempt

R/V Kilo Moana, R/V Marcus G. Langseth, R/V Roger Revelle as part of a Pilot Program (more on this later)

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Ku Transitions to Marlink Sealink

- Sealink is a commercial service much like HiSeasNet, with some notable differences (some good, some bad)
  - More jitter -- worse for telepresence
  - Approximately double the bandwidth for the money
  - Many more satellites available -- big improvements for uptime, but also more complex
  - Less capability for high-performance throughput should funding allow
- After trying other solutions that were more expensive, In 2019, R/V Oceanus was converted to use Marlink Sealink and this worked well
- R/V Endeavor and R/V Atlantic Explorer now on Marlink Sealink
- R/V Walton Smith is being converted to Fleet Xpress-only
- HiSeasNet Ground Station Ku service remains available for incidental use, but is no longer transmitting 24/7/365

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C/Ku Marlink Sealink pilot program

- We were approved to conduct a Pilot Program for the ARF wherein we lease satellite equipment
- Leasing spreads out costs over ~5 years -- essentially 20%/year
- Leasing enforces lifecycle maintenance due to length of the lease -- something we have been asking for in order to increase reliable operations
- When done through Marlink, leased equipment must contain an airtime plan (Marlink Sealink)
- We started off with the plan to do this solely aboard R/V Roger Revelle, coming out of midlife
- Reported equipment failures aboard ships with aging installs (R/V Kilo Moana and R/V Marcus G. Langseth) forced us to add these ships
- Come May, Armstrong will be the only C-band ship in the Atlantic for some time. This disrupts affordability of leaving HiSeasNet's C-band transmission to IS-23 (Atlantic). As a result, we are converting Armstrong to a blended C/Ku "airtime only" Marlink Sealink plan

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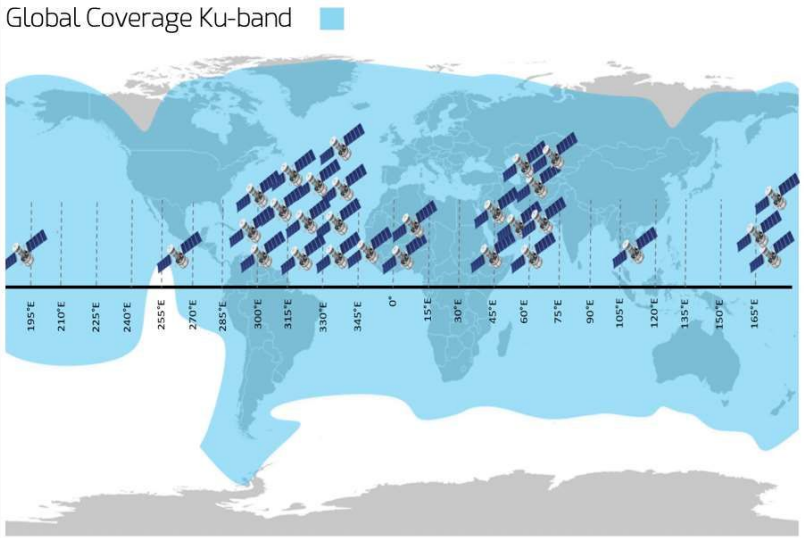
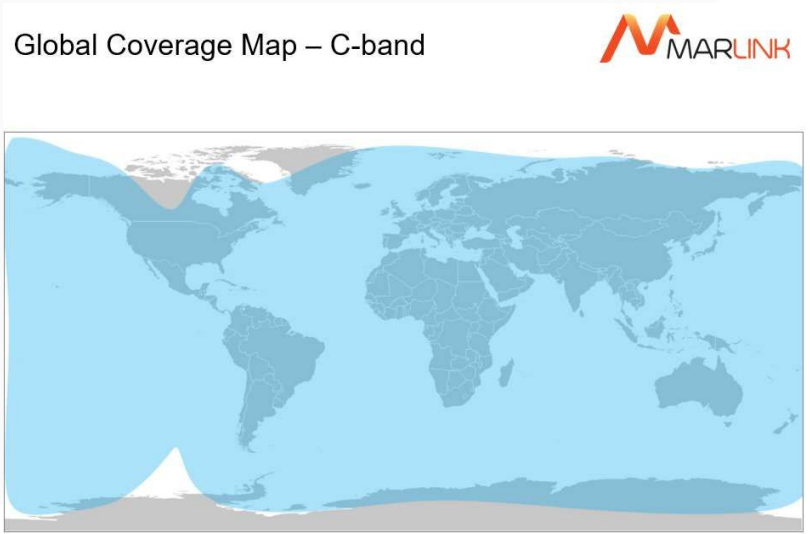
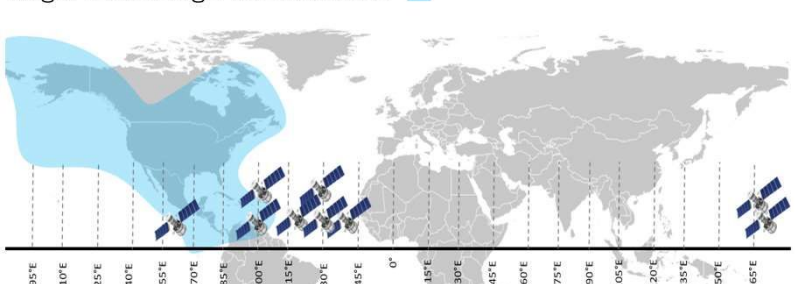
C/Ku Marlink Sealink pilot program

Coverage







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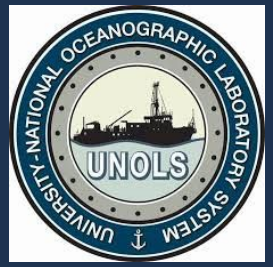
HiSeasNet Ground Station future plans

- If the Pilot Program goes well, we anticipate converting R/V Sally Ride, R/V Sikuliaq and R/V Thompson to Marlink Sealink in Q1 2021
- This will see us shut off 24/7/365 transmission of our third and final satellite dish at the HiSeasNet Ground Station
- HiSeasNet plans to have the ground station remain available for expansion work
- If high-performance throughput is needed, 24/7/365 operations will need to resume
- More downtime means upkeep can happen
- A point of presence at our ground station allows us to consider a conversion to a Low Earth Orbit ground station in the foreseeable future



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Thanks!