AmLight ExP
Americas Lightpaths Express & Protect

AmLight Express and Protect (AmLight-ExP)
NSF #OAC-1451018

# 2020 SAACC Meeting:
## *AmLight-ExP: International Links*

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**Florida International University**

# News since 2019 SAACC meeting

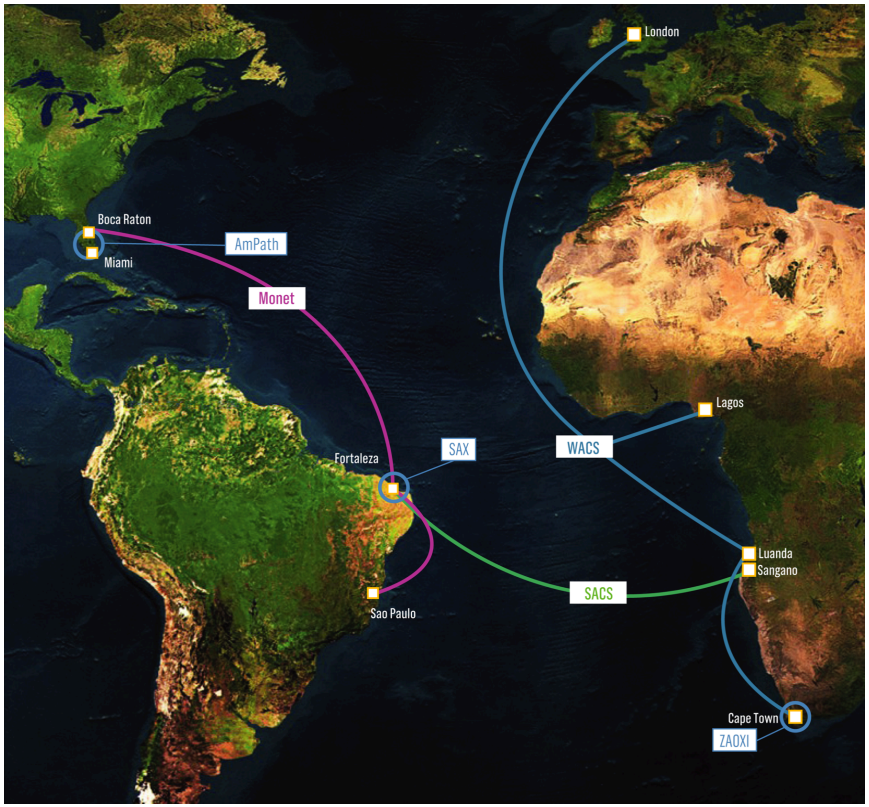
- **September 2019:**

1) Using Monet cable system (in pink), we activated:
  - 2x100G from Boca Raton to Sao Paulo
  - 2x100G from Boca Raton to Fortaleza
  - 2x100G from Sao Paulo to Fortaleza

2) Using new dark fiber from Boca Raton to Miami, 2x 400Gbps transponders were installed:
  - 6x100G activated

- **February 2020:**

Using SACS (in green) and WACS cable systems (in blue), 1x100G was activated between SAX/Fortaleza and ZAOXI/Cape Town

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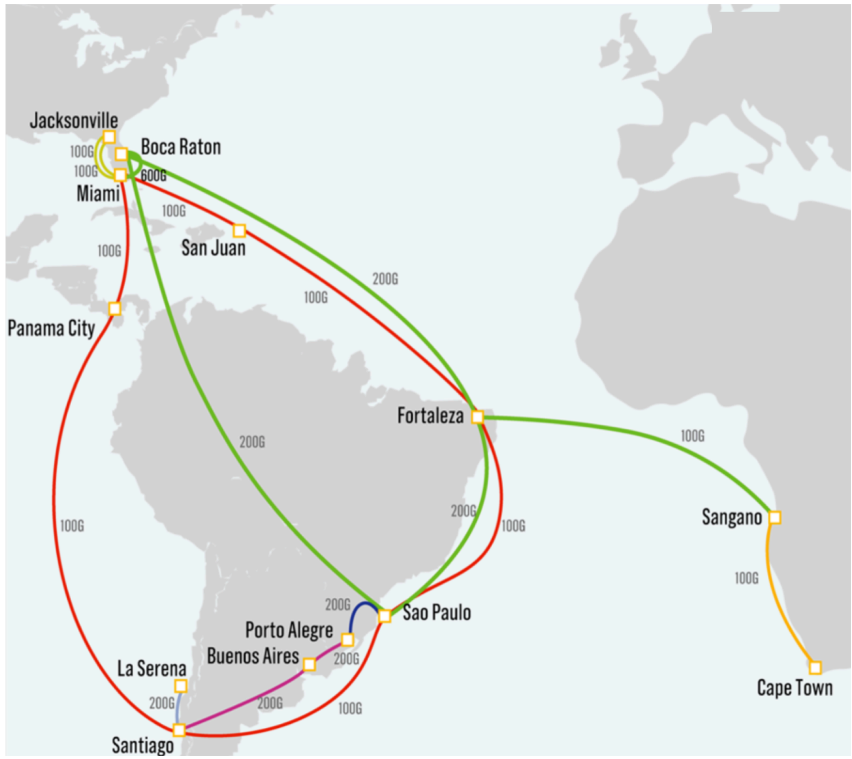
# Current Network Infrastructure

- (NEW) Using Monet cable system (in green), 600Gbps were activated:
  - 200G from Boca Raton to Sao Paulo
  - 200G from Boca Raton to Fortaleza
  - 200G from Sao Paulo to Fortaleza
- (NEW) Using SACS and WACS cable systems (in green), 100G was activated between Fortaleza and Cape Town
- 100G ring Miami-Fortaleza, Fortaleza-Sao Paulo, Sao Paulo-Santiago, Santiago-Panama, and Panama-Miami (solid red)
- 10G ring from Miami-Sao Paulo-Miami and 10G Miami-Santiago for protection (not shown)
- 100G and 10G rings are diverse, operating on multiple submarine cables:
  - Ready for the Hurricane Season!!
- Total network capacity presently at 1.2 Tbps!




*AmLight is collaboration between FIU, NSF, ANSP, AURA, RNP, REUNA, and RedCLARA*

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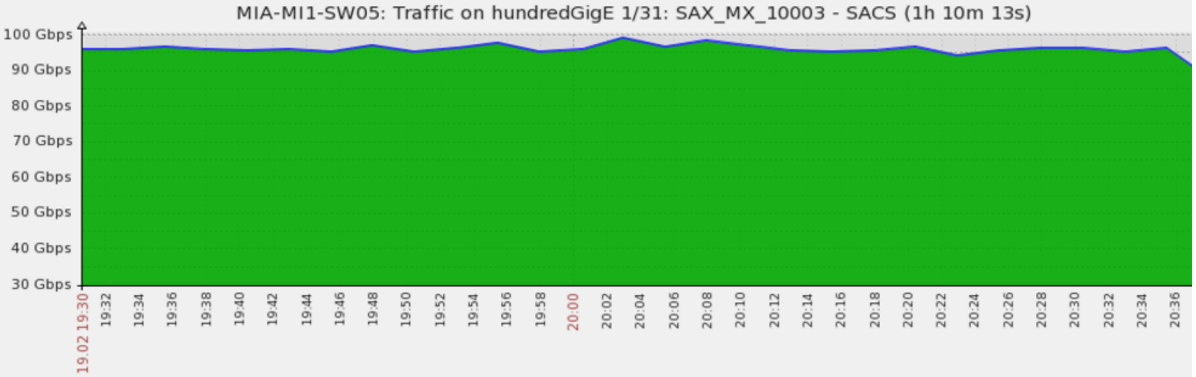
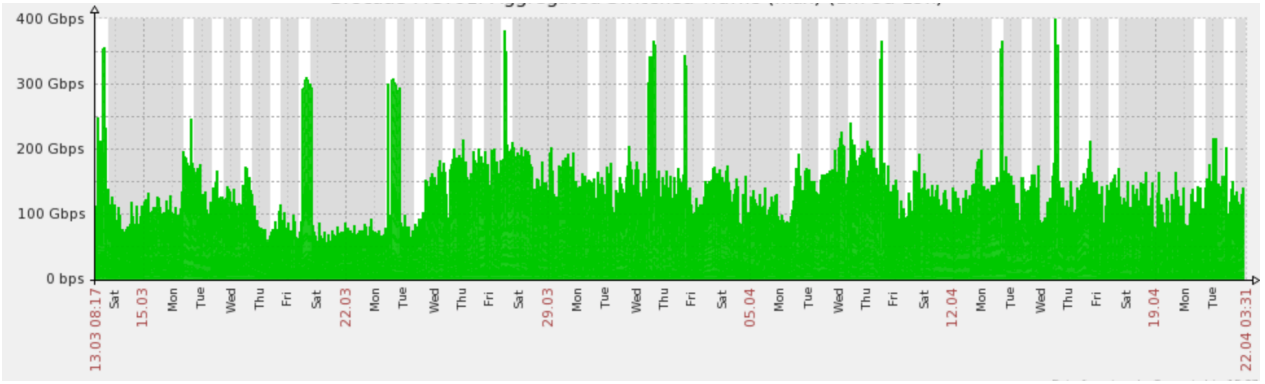
# AmLight-ExP: Network Utilization

Testing from the U.S. to Africa:




AmLight aggregated traffic (last 40 days):

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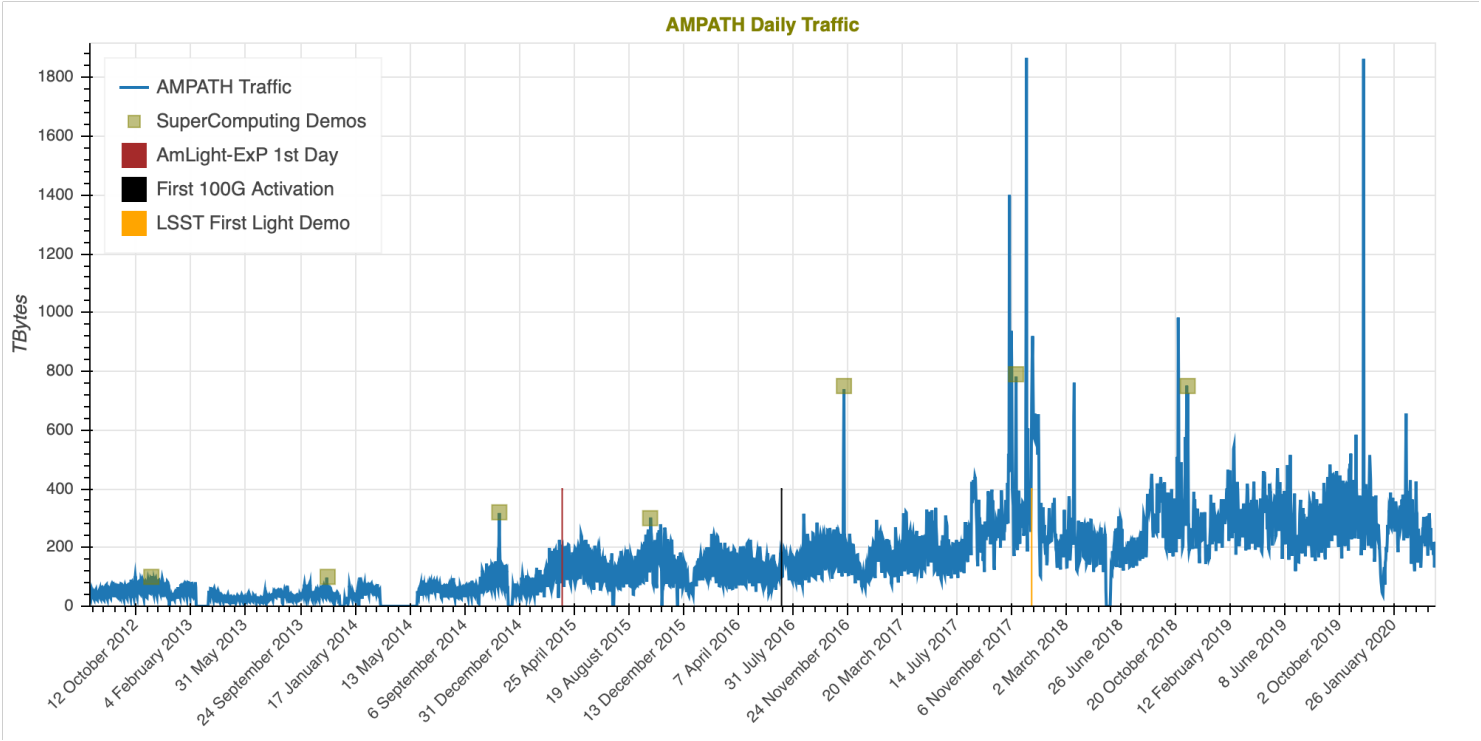
# AmLight-ExP: Network Utilization [2]

AmLight traffic from 2012 to 2020: from avg 40 TB to 360 TB/day (9x)

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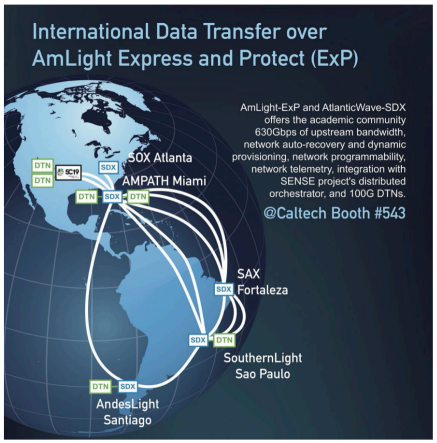
*What can we do with all this bandwidth?*

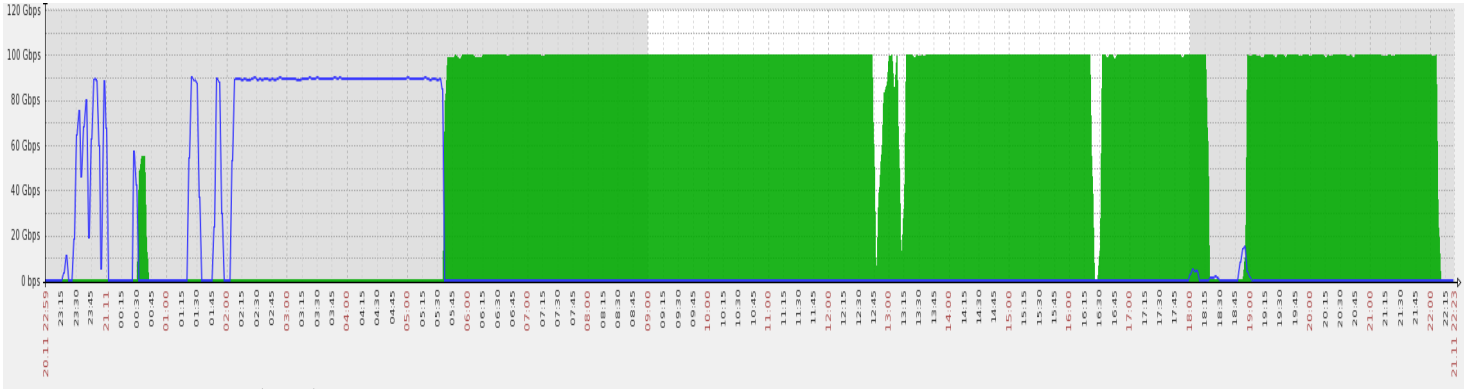
# Evaluating the network: SC19 demo!

## Goal: Demonstrate the new capacity using spectrum on Monet!

International Data Transfer over AmLight Express and Protect (ExP) at Supercomputing Conference (SC19)




The AmLight-ExP Network Engineering Team participated in multiple collaborative SC19 Network Research Exhibitions at the Supercomputing Conference (SC19) which took place on November 17-22, 2019 at the Colorado Convention Center, in Denver, Colorado. AmLight-ExP and AtlanticWave-SDX offered the academic community 630Gbps of upstream bandwidth,

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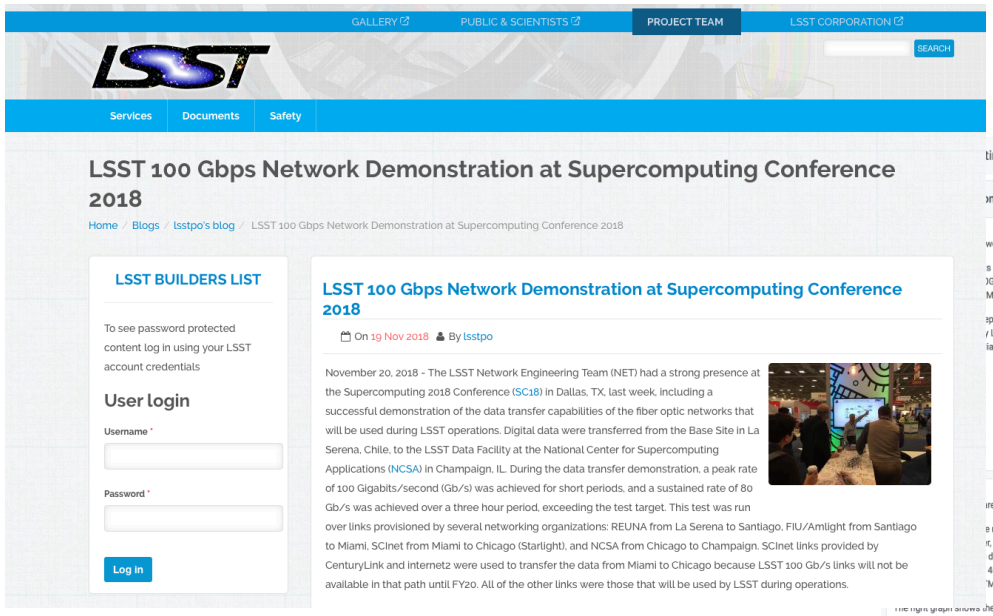
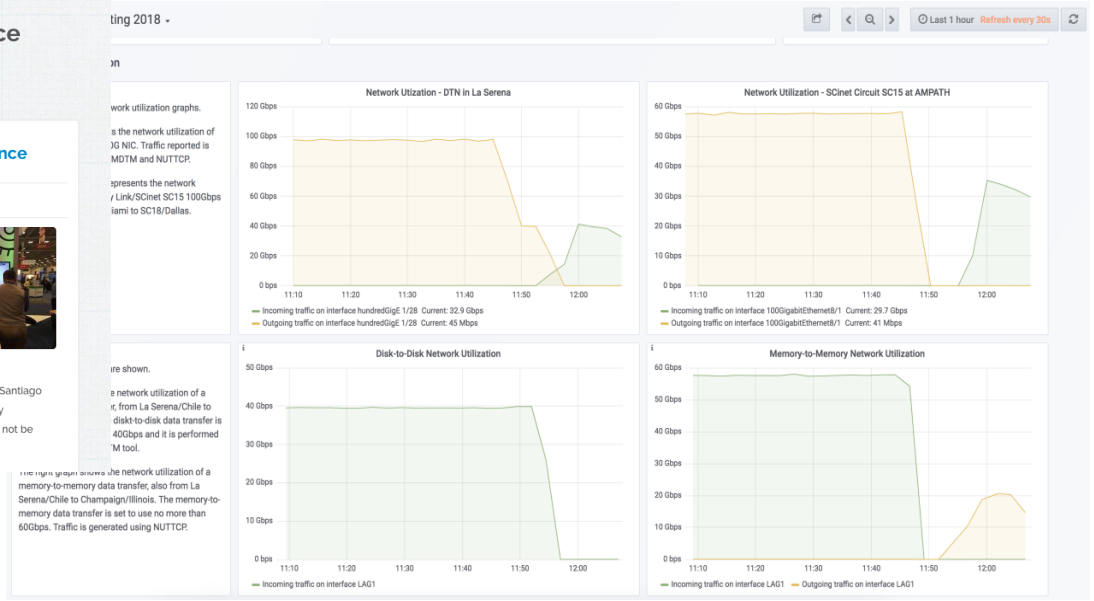
# Evaluating the network: SC18 demo!

Goal: Demonstrate the new Vera Rubin Obs. 100G capacity from La Serena to NCSA!

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# Evaluating the network: SC17 demo!

Goal: Introduce the new AmLight 100G ring and DTNs!

Amlight-Exp Network Infrastructure Demonstrate Large Data-Sets Transfer at SC17

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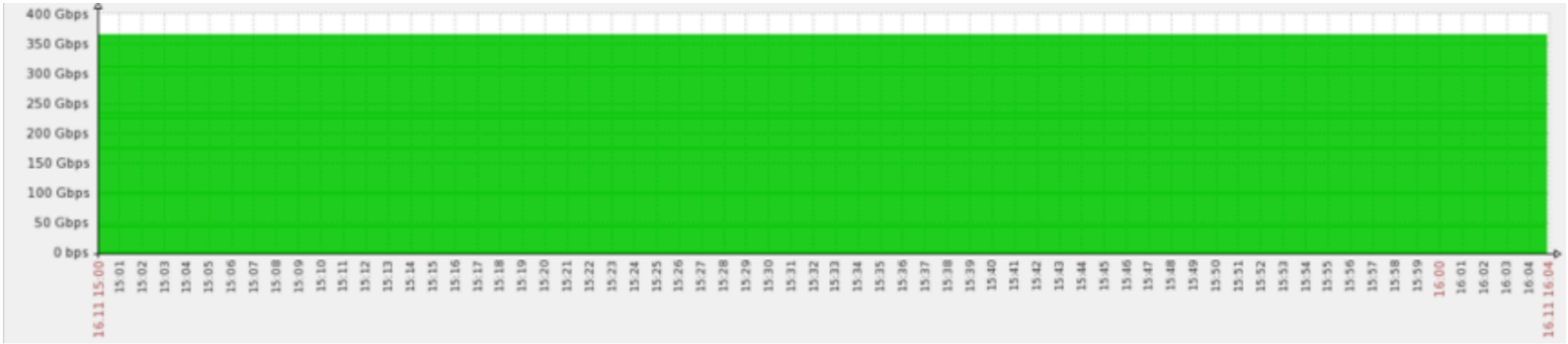

# Future

- 2020:
  - Miami – Jacksonville (Internet2): +100Gbps
  - Sao Paulo – Santiago: +200Gbps (RNP & RedCLARA)
    - 100Gbps to support Vera Rubin Observatory
    - 100Gbps for AmLight users

- 2021:
  - Boca Raton to Atlanta (ESnet): 300Gbps
    - 100Gbps to support Vera Rubin Observatory
    - 100Gbps for AmLight users
    - 100Gbps for FABRIC testbed

# Future [2]

- AmLight Data Plane refreshment:
  - Increase the number of 100G ports for users and links
  - NoviFlow 100G Tofino/Tofino 2 switches as the new switching fabric:
    - 32 x 100G ports, 64 x 100G ports, and 32 x 400G ports
    - Supports SDN, programmable data planes, and In-band Network Telemetry

- AmLight Control Plane refreshment:
  - New SDN controller being rolled out this year
    - Developed by AmLight members and open source community (Kytos)
  - Focused on the Vera Rubin Observatory and AmLight's needs
  - Integrated solution for intra (SDN) and inter-domain (SDX) provisioning and INT

# THANK YOU!

## *Next: Monitoring @ AmLight*

NSF
FIU FLORIDA INTERNATIONAL UNIVERSITY
AMLIGHT RESEARCH · EDUCATION COLLABORATION
AMPATH PATHWAY OF THE AMERICAS
AmLight ExP International Distributed Exchange Point
AtlanticWave SDX INTERNATIONAL DISTRIBUTED SOFTWARE-DEFINED EXCHANGE
AARCLight Americas Africa Research & eduCation Lightpaths