



INFORMATION TECHNOLOGY

# GOEX: Guam Open Research & Education eXchange

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University of Guam

**Updates with PacNOC 21**

Nuku'alofa, Tonga

December 4<sup>th</sup>, 2017

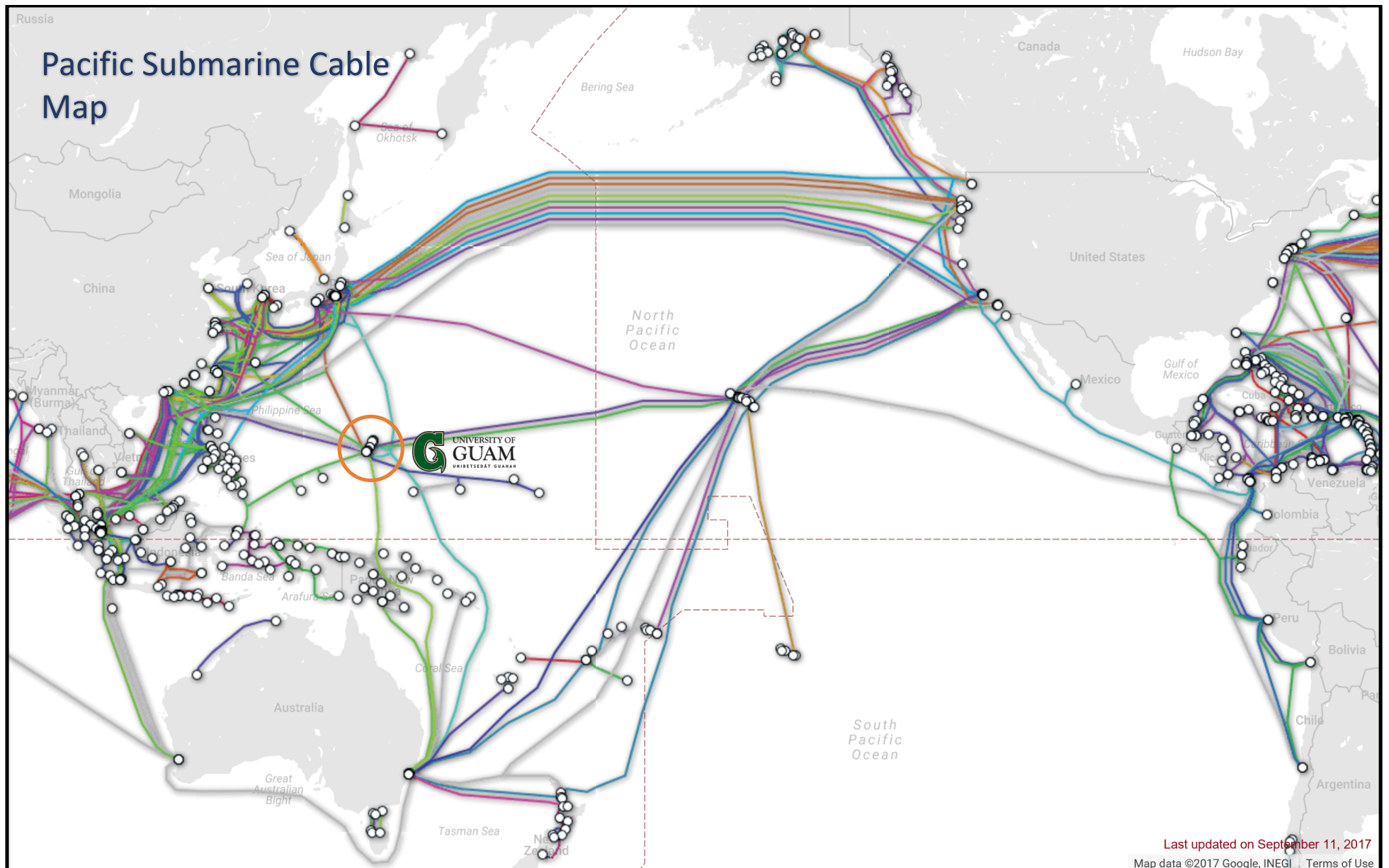


# Updates and Discussion Items

- ☐ GOREX Updates / Research and Education Network Connectivity
- ☐ Univ. of Guam Cyber-Team Activities
- ☐ Updates from Visitors and Possible Collaborations



# **Research & Education Network Connectivity**

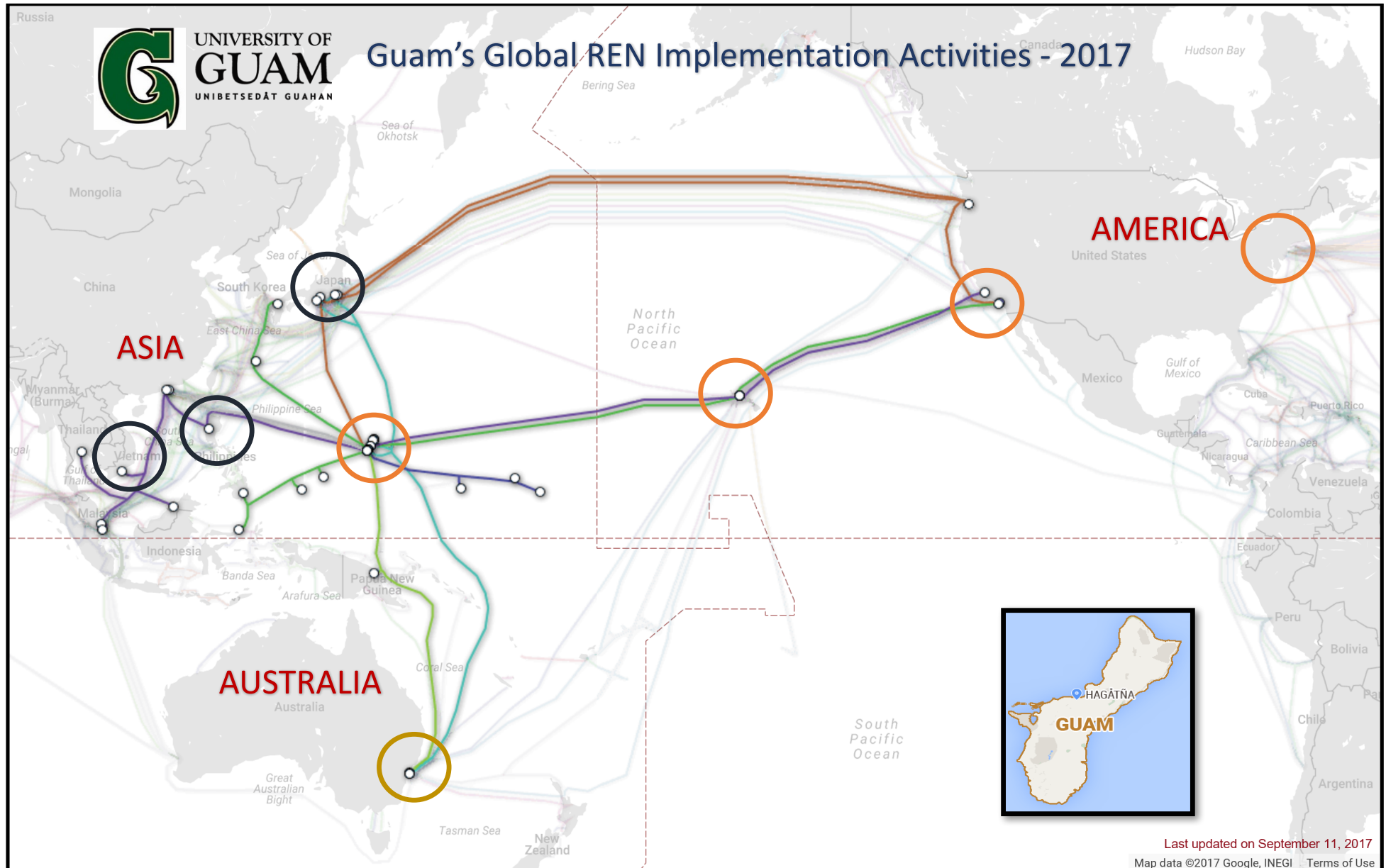






UNIVERSITY OF  
**GUAM**  
UNIBETS DAT GUAHAN

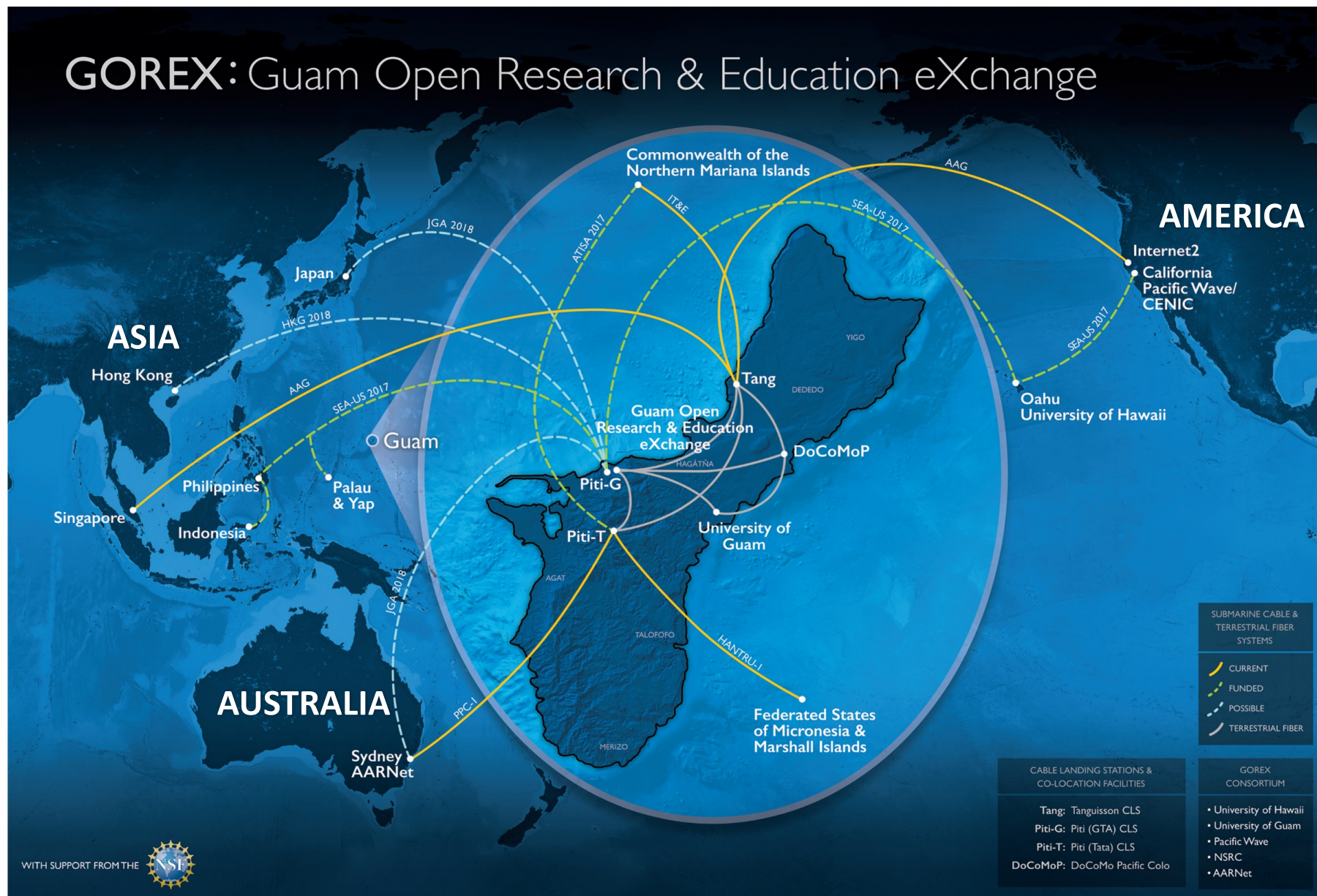
## Guam's Global REN Implementation Activities - 2017



Last updated on September 11, 2017

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# GOREX: Guam Open Research & Education eXchange





# GOREX: Guam Open Research & Education eXchange



UNIVERSITY of HAWAII®

**NSRC**

Network Startup Resource Center



**aarnet**

Australia's Academic  
and Research Network

**PACIFIC WAVE**



UNIVERSITY OF  
**GUAM**  
UNIBETSEDĀT GUAHAN

Internet2  
California  
Pacific Wave/  
CENIC

**CENIC**

Connecting California

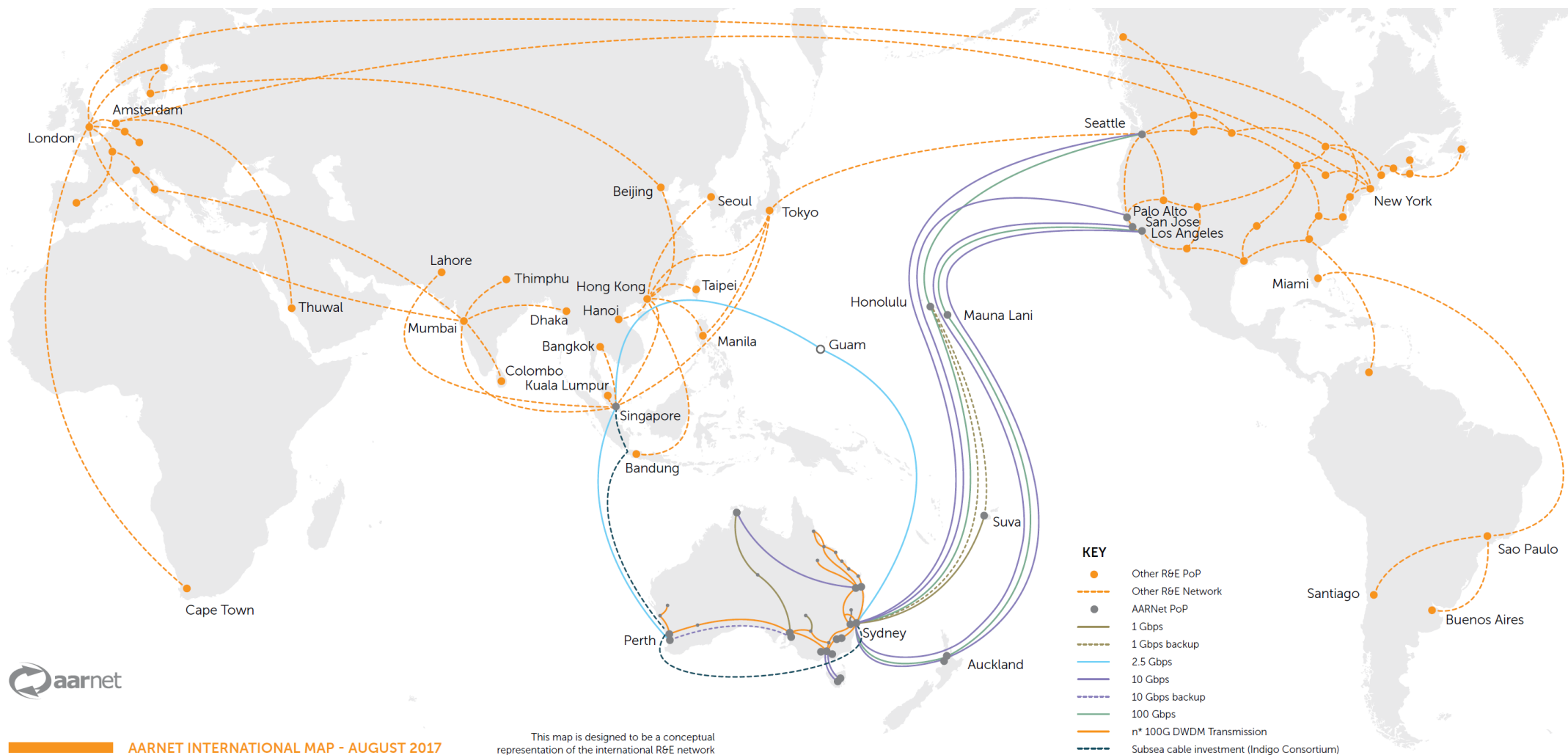
**INTERNET®**

MEMBER



National Science Foundation  
WHERE DISCOVERIES BEGIN

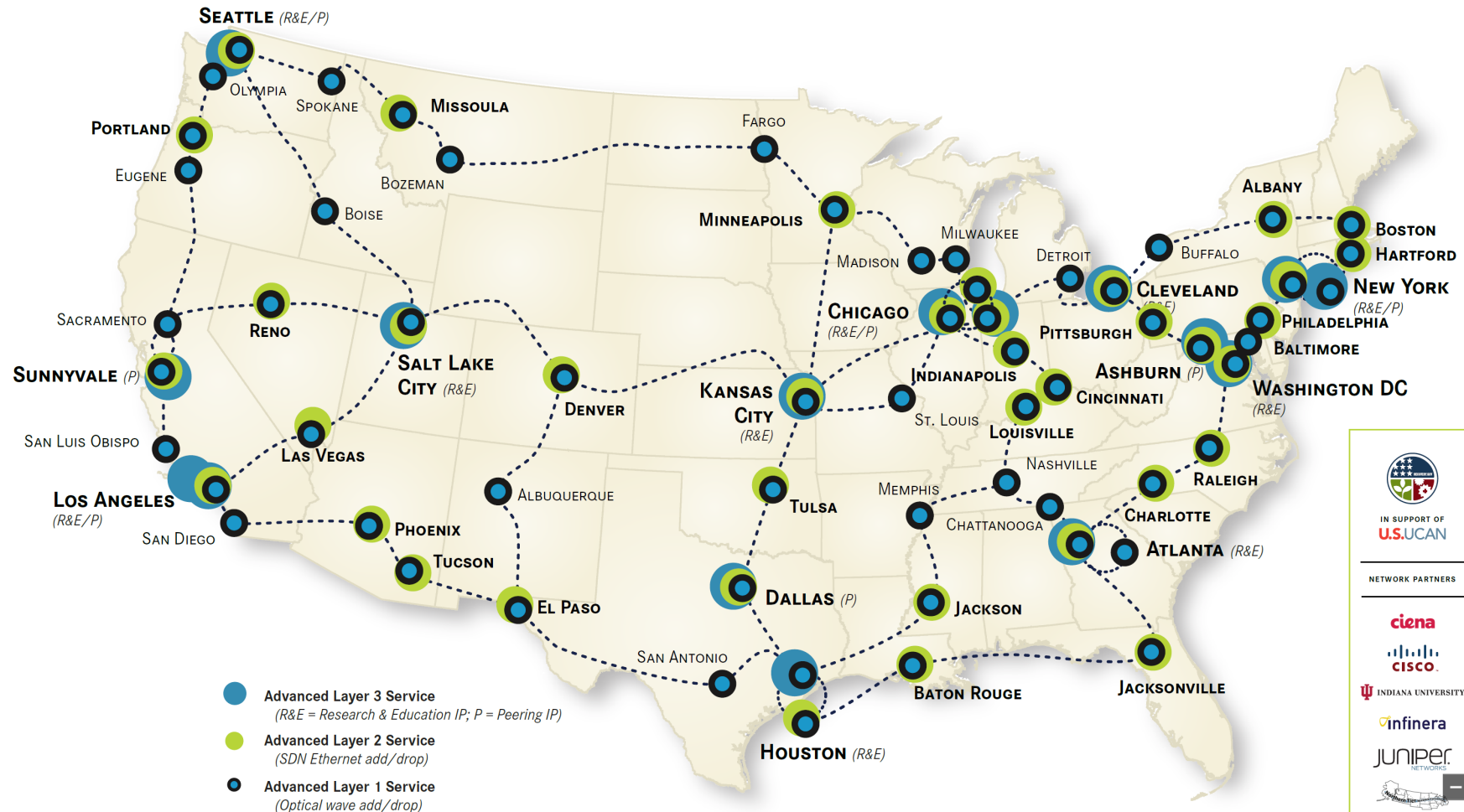
REANNZ



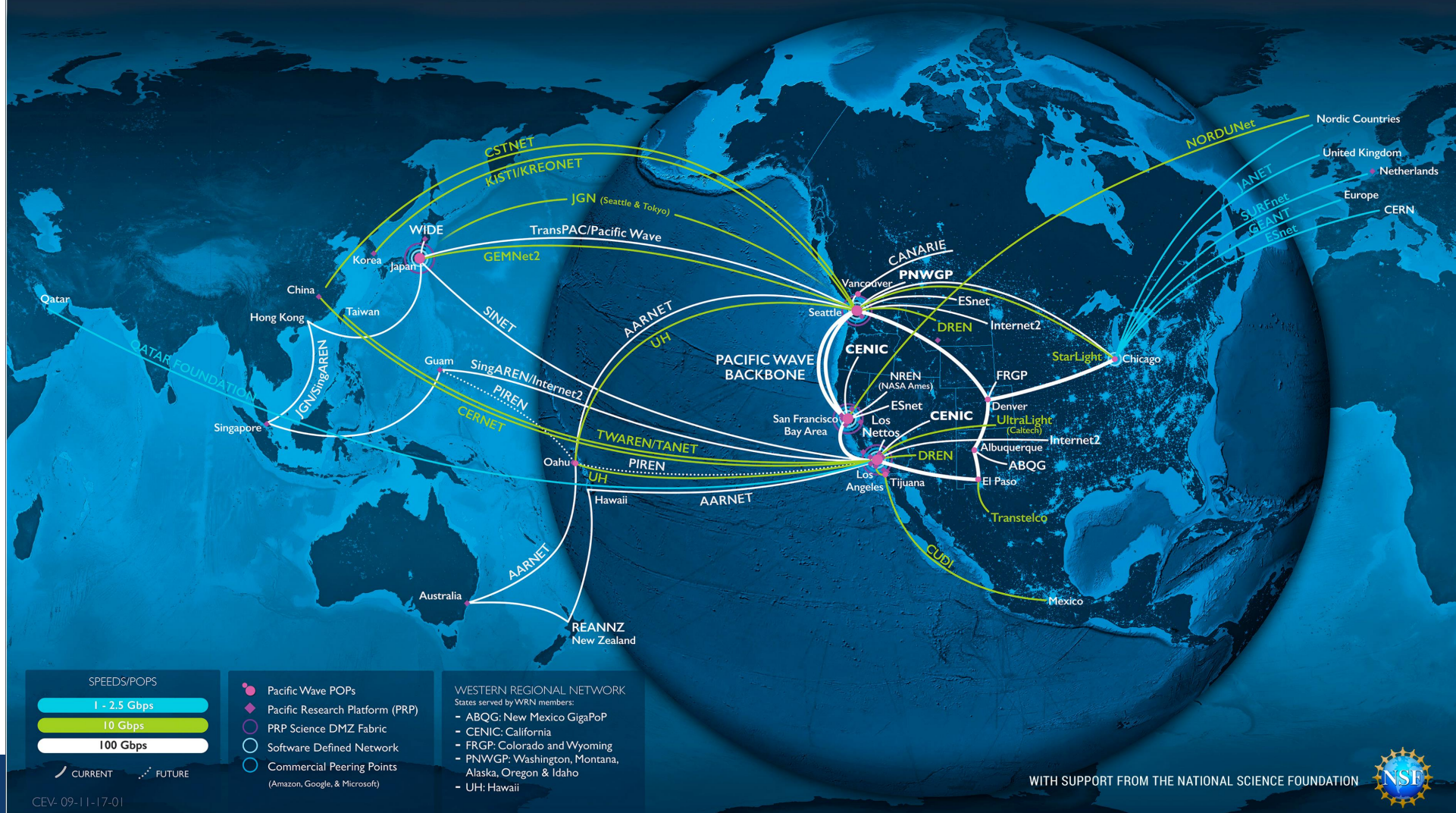


# INTERNET2 NETWORK INFRASTRUCTURE TOPOLOGY

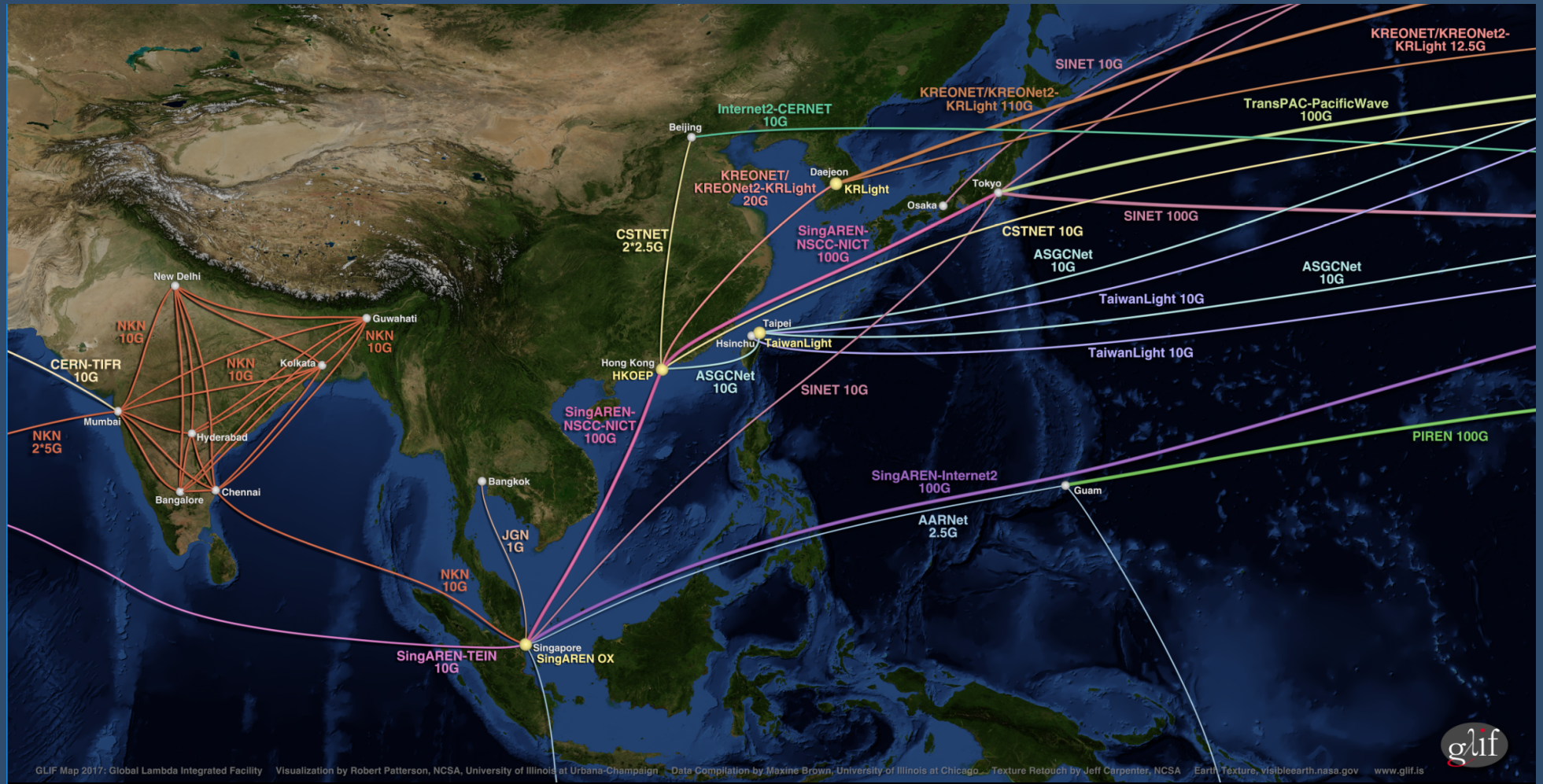
APRIL 2016











# GOREX GOALS

- ❑ Leverage strategic geographic location of Guam
- ❑ Establish Open R&E Exchange
  - Inter-Connect existing, funded, and planned high capacity R&E trans-pacific circuits
- ❑ Improve Pacific-wide transport **diversity** and **resilience**
  - Support global R&E networks
  - Facilitate greater access to global R&E networks by Pacific Island nations and communities
- ❑ Overarching Goal:
  - Promote increased growth and effectiveness of data-intensive and highly collaborative research and education activities engaging the Asia-Pacific region with the global R&E community.



# GOREX Implementation

- ❑ University of Hawai'i
  - 100Gb (SEA-US): Guam, Hawai'i, California – 25 year IRU
  - Approximately 4 racks in SEA-US Guam Co-Lo Facility
- ❑ Operated on a pure non-profit cost recovery basis
  - Costs will be shared fairly and transparently among participants
- ❑ Partners investing in GOREX will provide oversight and lead any governance activities
  - Initial costs to be borne by current consortium members: UH, Pacific Wave, CENIC, AARNet, and others
- ❑ Univ. of Guam CyberTeam will operate as local-hands for GOREX
  - UoG Data Center will be connected to GOREX Co-Lo Facility

# GOREX Updates

## ☐ **GOREX / PIREN**

- Plan is to install Juniper MX-480 at GTA Upper Tumon Co-Lo Facility
- Tentative Install date is mid-Jan. (before PTC '18 / TPRE Discussions)

## ☐ **GOREX Local Hands – NOC Training**

- NSRC and UH are helping to develop the technical capabilities on Guam needed to support GOREX
- Co-Training with the NSRC:
  - 1) Dec. 2018 @ PacNOG in Tonga 2) Feb. @ APRICOT '18 in Nepal
- NSRC is a Co-Leadership Institute in UoG's NSF CC\* Grant (OAC-1659182)

## ☐ **Guam continues to Engage with the Global REN Community**

- Recent Activities:
  - 1) GLIF '17 @ Sydney 2) NSF CC\* / Quilt / ES.Net @ Albuquerque 3) I2 TechEx @ San Fr.
- Upcoming Activities: **PacNOG @ Tonga**; **PTC '18 @ Hawaii**; **APRICOT '18 @ Nepal**; **Internet2 Global Summit '18 @ San Diego, CA**



# **Research & Education Network Activities**

# Univ. of Guam Cyber-Team Activities: 2017

- Jan. 2017 - PTC 2017 – Trans-Pacific REN & GOREX Discussions at University of Hawaii
- Feb. 2017 - APRICOT 2017 - Ho Chi Minh City
- Mar. 2017 - **PhNOG** and IN@IU PerfSONAR / Science DMZ Training at University of Philippines
- Mar. 2017 - CENIC 2017 Conference, San Diego, CA
  - **NSRC / CENIC Fellowship**

# Univ. of Guam Cyber-Team Activities: 2017

- Apr. 2017 - National Science Foundation **EPSCoR** (Guam Ecosystems Collaboratorium)
  - Reverse Site Visit, Washington, D.C. - GOREX Highlights
- Apr. 2017 - Internet2 Global Summit, Washington, D.C.
- May 2017 - **NSRC Direct Engineering Assistance #2** w/CENIC
  - *CyberInfrastructure Improvements*
  - *Science DMZ and DTN test case setup (FIONette) w/John Hess from CENIC*
  - *CNMI - Northern Marianas College participated*

# Univ. of Guam Cyber-Team Activities: 2017

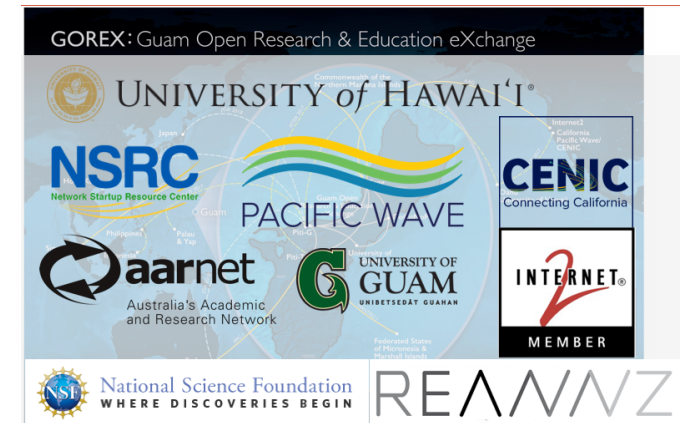
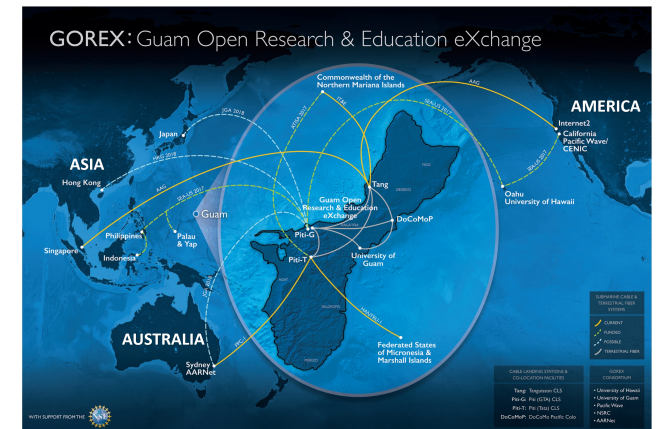
- Jun 2017 - **Received National Science Foundation CC\* Award** (OAC-1659182): **\$250,000**
  - *CC\* Network Design: Upgrading the University of Guam Network to Connect to Internet2 and Create a Science DMZ*
  - CyberPlan – CI Best Practices, CyberConnectivity, CyberTeam
  - **Leadership Institutes:** University of Hawaii, NSRC
- Sep. 2017 - GLIF 2017, Sydney, Australia
- Oct. 2017 - NSF CC\* PI Workshop (with the Quilt and ES.net), Albuquerque, New Mexico
- Oct. 2017 - Internet2 Technology Exchange, San Francisco, CA
- Dec. 2017 - **NSRC Co-Training** at PacNOG in Tonga (*Planned*)



NSF Campus Cyberinfrastructure PI and  
Cybersecurity Innovation for Cyberinfrastructure PI Workshop  
October 3-4, 2017 | Albuquerque, NM

## *CC\* Network Design: University of Guam Solutions*

- **CyberInfrastructure Plan** – Work with leadership institutes to implement best practices
- **CyberConnectivity** – Work with leadership institutes to establish ultra-high-speed global REN connectivity through GOREX
- **CyberTeam** – Work with leadership institutes to develop the skillsets

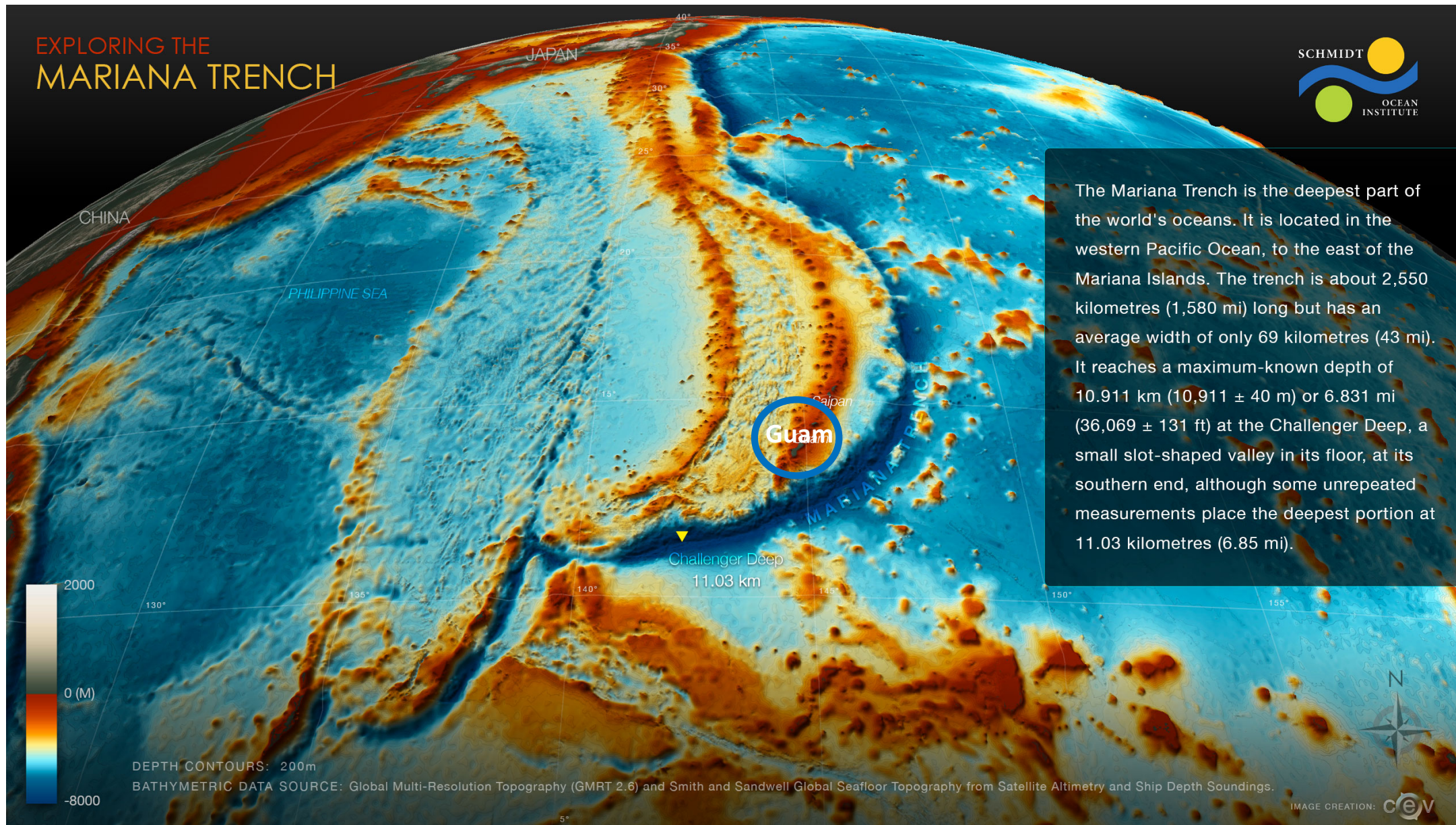


# Univ. of Guam Cyber-Team Activities: 2018

- Jan 2018 - HICSS 51 (Hawaii International Conference on System Sciences) (*Tentative*)
- Jan. 2018 - Installation of Juniper MX480 at GTA Collocation Facility in Upper Tumon (***Planned***)
- Jan. 2018 - PTC '18 – Trans-Pacific R&E Collaboration Updates at the University of Hawaii (***Planned***)
- Feb. 2018 - APRICOT '18 Participation and **NSRC Co-Training**, Kathmandu, Nepal (***Planned***)
- Mar. 2018 - CENIC '18 Conference, Monterey, CA (*Tentative*)
- May 2018 - Internet2 Global Summit / TPRE PTC '18 Follow Ups, San Diego, CA (***Planned***)
- Sept. 2018 - GLIF '18 Conference, Helsingor, Denmark (*Tentative*)
- Oct. 2018 - Internet2 Technology Exchange 2018, Orlando, FL (***Planned***)
- Nov. 2018 - SuperComputing 2018, Dallas, TX (*Tentative*)



# EXPLORING THE MARIANA TRENCH



The Mariana Trench is the deepest part of the world's oceans. It is located in the western Pacific Ocean, to the east of the Mariana Islands. The trench is about 2,550 kilometres (1,580 mi) long but has an average width of only 69 kilometres (43 mi). It reaches a maximum-known depth of 10.911 km ( $10,911 \pm 40$  m) or 6.831 mi ( $36,069 \pm 131$  ft) at the Challenger Deep, a small slot-shaped valley in its floor, at its southern end, although some unrepeated measurements place the deepest portion at 11.03 kilometres (6.85 mi).

DEPTH CONTOURS: 200m

BATHYMETRIC DATA SOURCE: Global Multi-Resolution Topography (GMRT 2.6) and Smith and Sandwell Global Seafloor Topography from Satellite Altimetry and Ship Depth Soundings.

IMAGE CREATION: crev



## Mariana Region Geology

5 times vertical exaggeration

125 m bathymetric compilation

- Earthquakes
- Volcanoes
- Hydrothermal Vents
- Cold Seeps
- Biggest Mud Volcanoes
- Mariana Trench - Deepest Place on the Planet

Remnant-Arc

Back-Arc

Volcanic-Arc

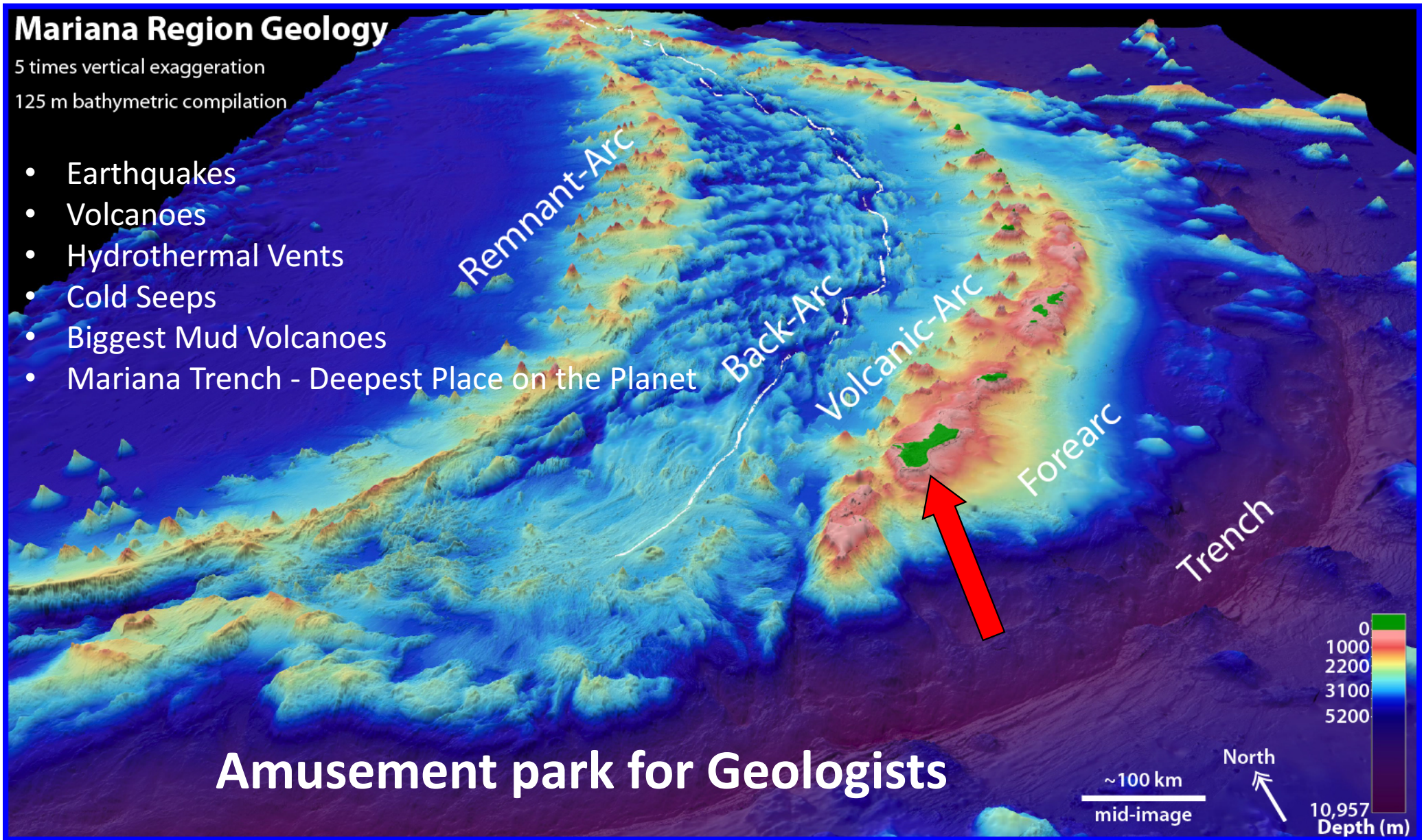
Forearc

Trench

**Amusement park for Geologists**

~100 km  
mid-image

North







UNIVERSITY OF GUAM

**EPSCOR**



**\$6 Million - Initial Grant**

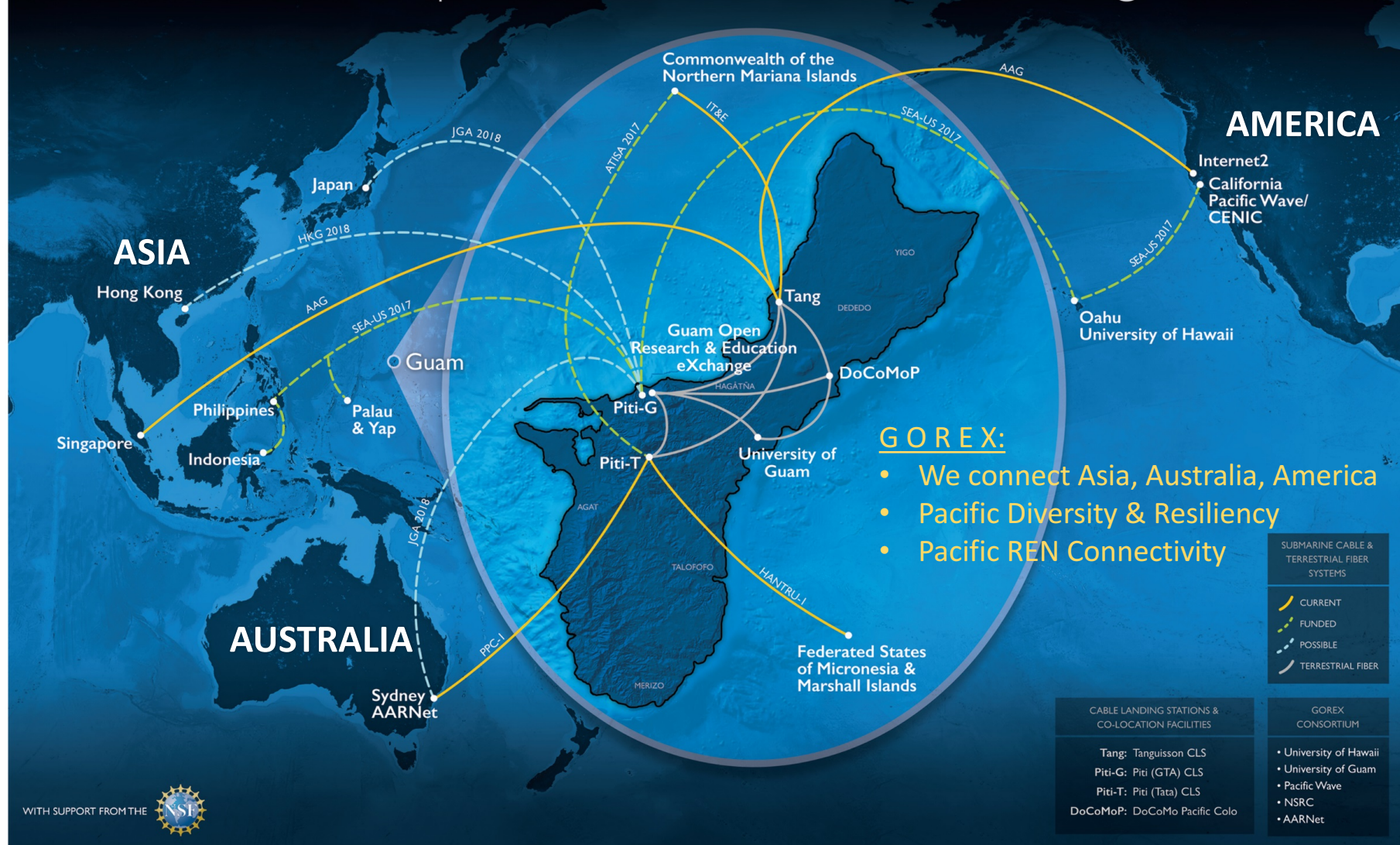
- **Oceanography**
- **Coral Reef Resiliency**

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# QUESTIONS ?

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