The Cascadia Offshore Subduction Zone Observatory (COSZO)

An NSF Mid-Scale Infrastructure 1 Project

William Wilcock

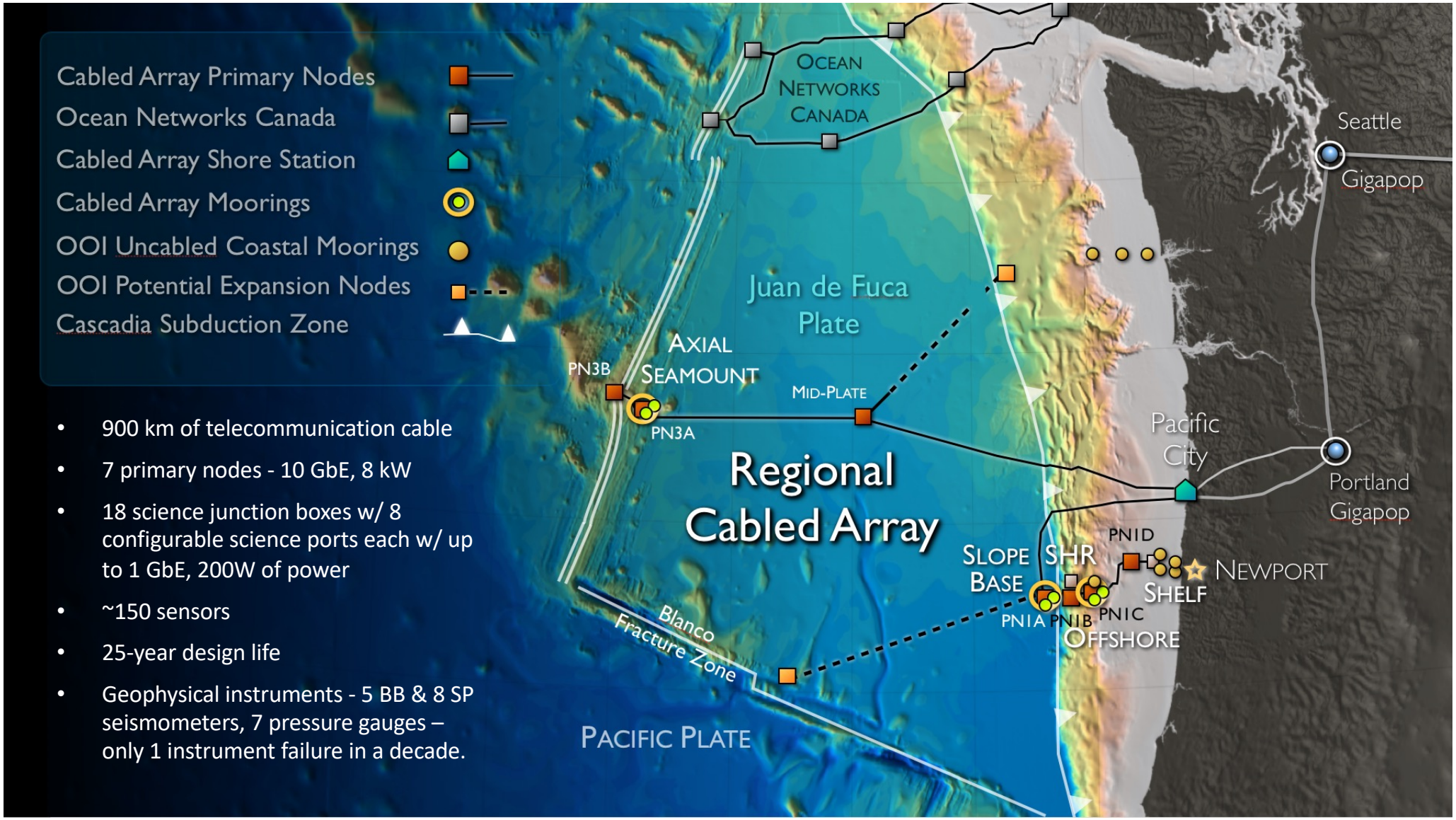
University of Washington

UW Team: William Wilcock, Mike Harrington, David Schmidt, Deborah Kelley, Harold Tobin, Marine Denolle, Mika Thompson, Dana Manalang, Geoff Cram, Chuck McGuire, James Tilley, Chris Murray, Amanda Labrado, Matthew Khoo, Yoichiro Dobashi, Keith Blood, Grant Dunn, Ken Feldman, Steve Geffner, Hunter Hadaway, Larry Nielson, Kellen Rosburg, Austin Smith, Kira Smith, Shawn Thomas, Joel White, Matt Duke, Trina Litchendorf

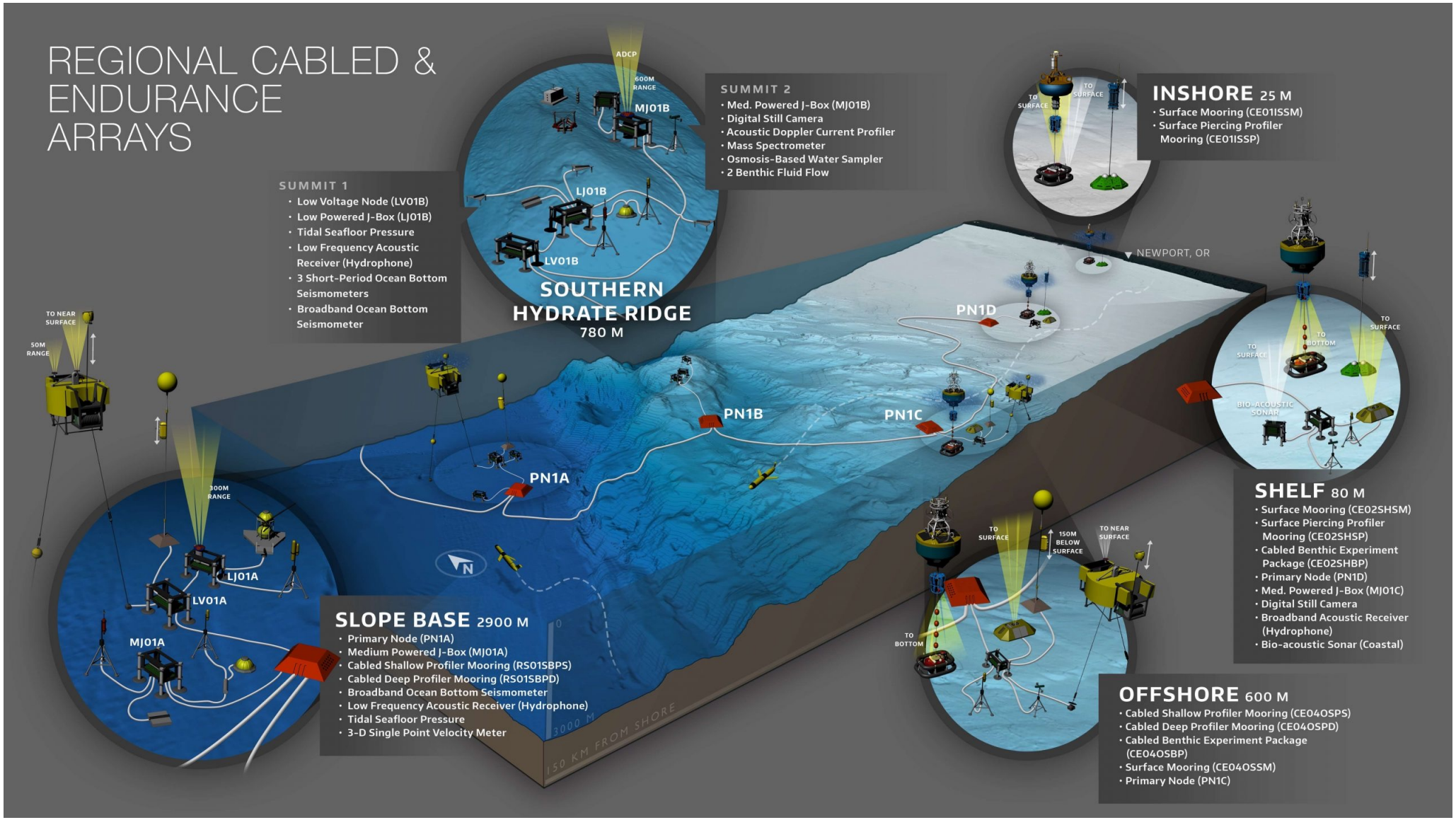
SIO Team: Mark Zumberge, Glenn Sasagawa, Matthew Cook

Offshore Observations | CRESCENT Topical Workshop

October 27, 2025



- 900 km of telecommunication cable
- 7 primary nodes - 10 GbE, 8 kW
- 18 science junction boxes w/ 8 configurable science ports each w/ up to 1 GbE, 200W of power
- ~150 sensors
- 25-year design life
- Geophysical instruments - 5 BB & 8 SP seismometers, 7 pressure gauges – only 1 instrument failure in a decade.


REGIONAL CABLED & ENDURANCE ARRAYS
SUMMIT 1
• Low Voltage Node (LV01B)
• Low Powered J-Box (LJ01B)
• Tidal Seafloor Pressure
• Low Frequency Acoustic Receiver (Hydrophone)
• 3 Short-Period Ocean Bottom Seismometers
• Broadband Ocean Bottom Seismometer
ADCP
600M RANGE
MJ01B
LJ01B
LV01B
SOUTHERN HYDRATE RIDGE
780 M
SUMMIT 2
• Med. Powered J-Box (MJ01B)
• Digital Still Camera
• Acoustic Doppler Current Profiler
• Mass Spectrometer
• Osmosis-Based Water Sampler
• 2 Benthic Fluid Flow
INSHORE 25 M
• Surface Mooring (CE01ISSM)
• Surface Piercing Profiler Mooring (CE01ISSP)
TO SURFACE
TO SURFACE
NEWPORT, OR
PN1D
PN1B
PN1C
PN1A
TO NEAR SURFACE
50M RANGE
300M RANGE
LJ01A
LV01A
MJ01A
SLOPE BASE 2900 M
• Primary Node (PN1A)
• Medium Powered J-Box (MJ01A)
• Cabled Shallow Profiler Mooring (RS01SBPS)
• Cabled Deep Profiler Mooring (RS01SBPD)
• Broadband Ocean Bottom Seismometer
• Low Frequency Acoustic Receiver (Hydrophone)
• Tidal Seafloor Pressure
• 3-D Single Point Velocity Meter
0
3000 M
150 KM FROM SHORE
TO SURFACE
TO BOTTOM
TO SURFACE
TO BOTTOM
BIO-ACOUSTIC SONAR
SHELF 80 M
• Surface Mooring (CE02SHSM)
• Surface Piercing Profiler Mooring (CE02SHSP)
• Cabled Benthic Experiment Package (CE02SHBP)
• Primary Node (PN1D)
• Med. Powered J-Box (MJ01C)
• Digital Still Camera
• Broadband Acoustic Receiver (Hydrophone)
• Bio-acoustic Sonar (Coastal)
TO SURFACE
150M BELOW SURFACE
TO NEAR SURFACE
TO BOTTOM
OFFSHORE 600 M
• Cabled Shallow Profiler Mooring (CE04OSPS)
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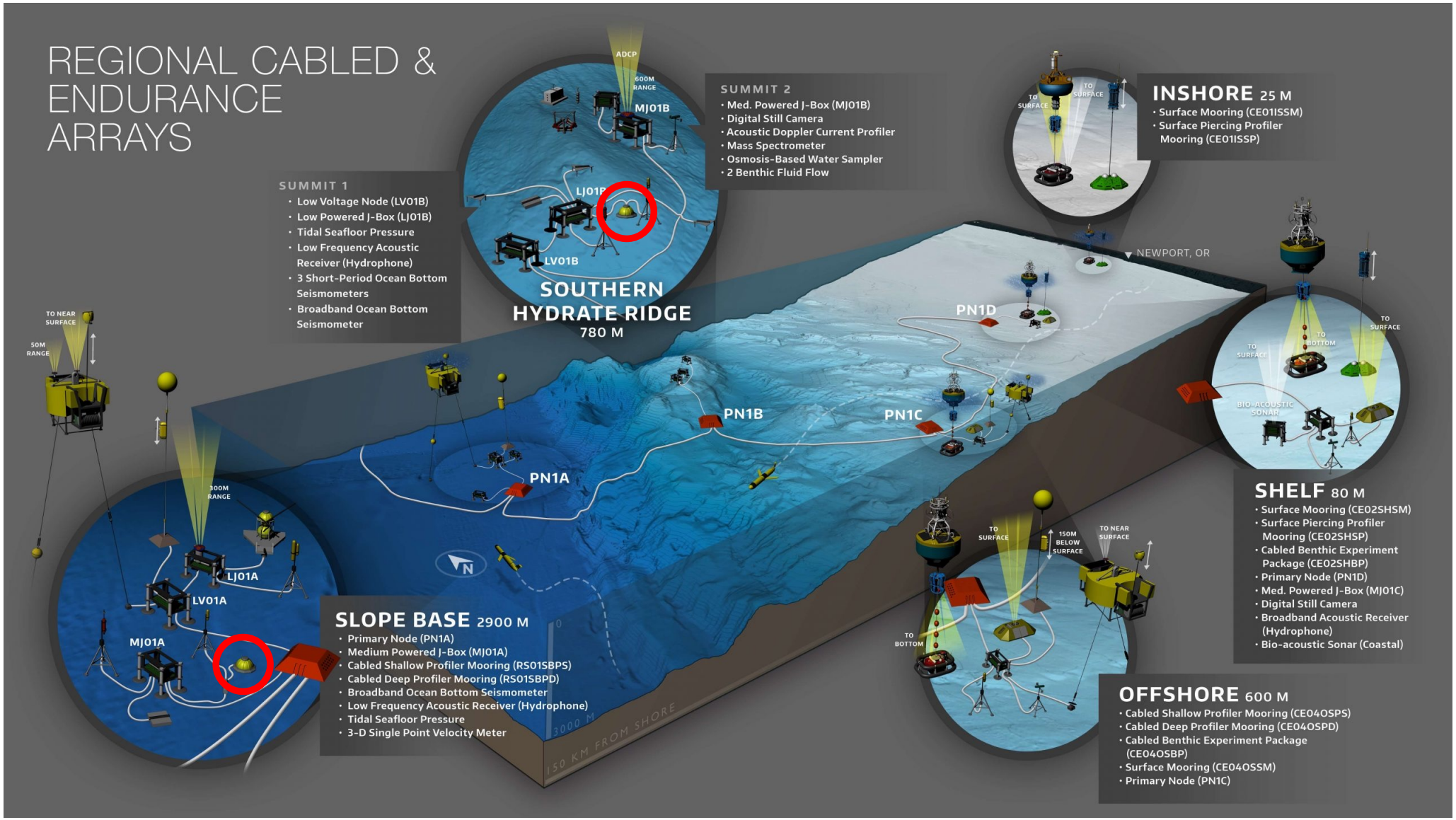
• Cabled Benthic Experiment Package (CE04OSBP)
• Surface Mooring (CE04OSSM)
• Primary Node (PN1C)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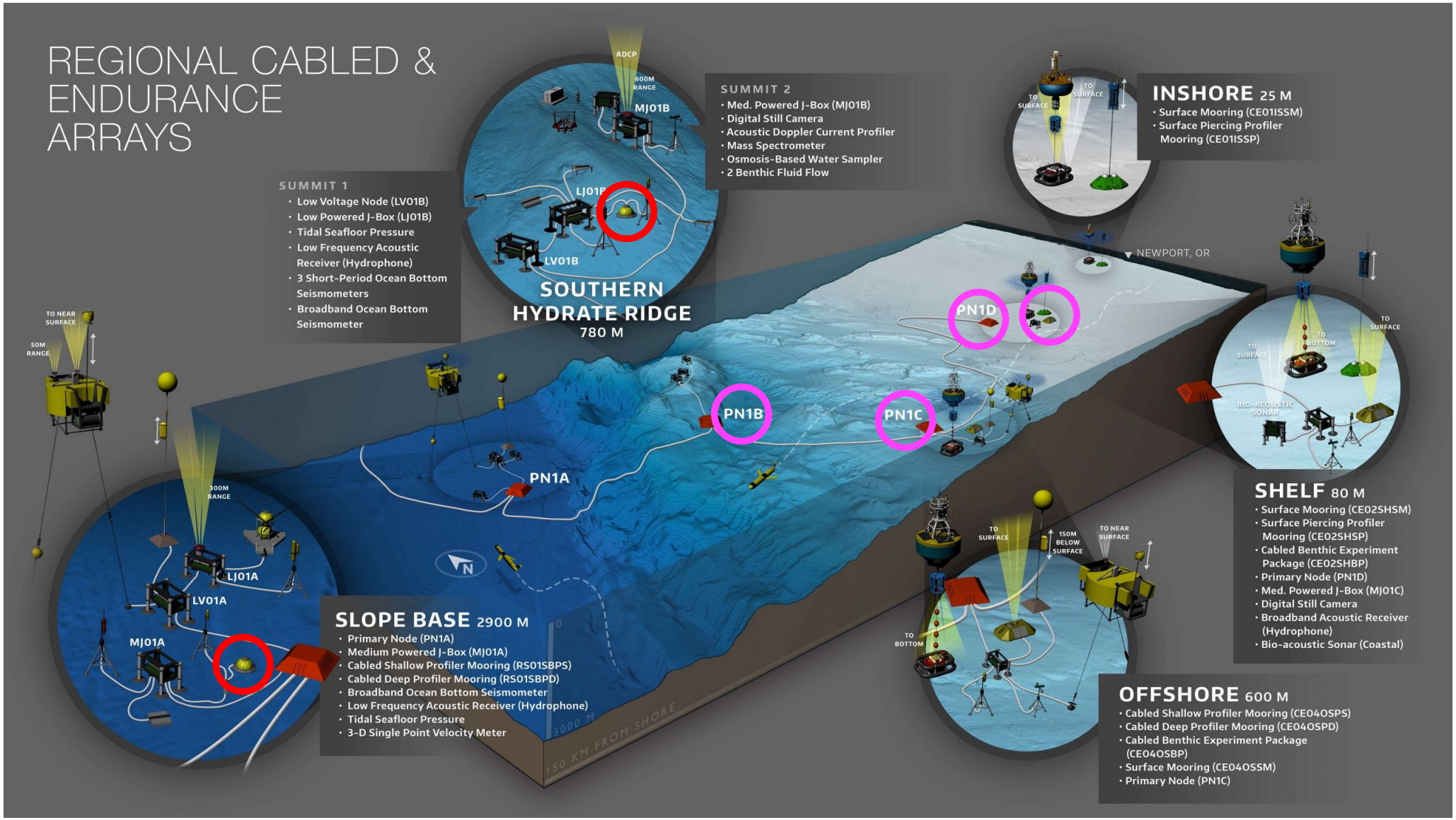
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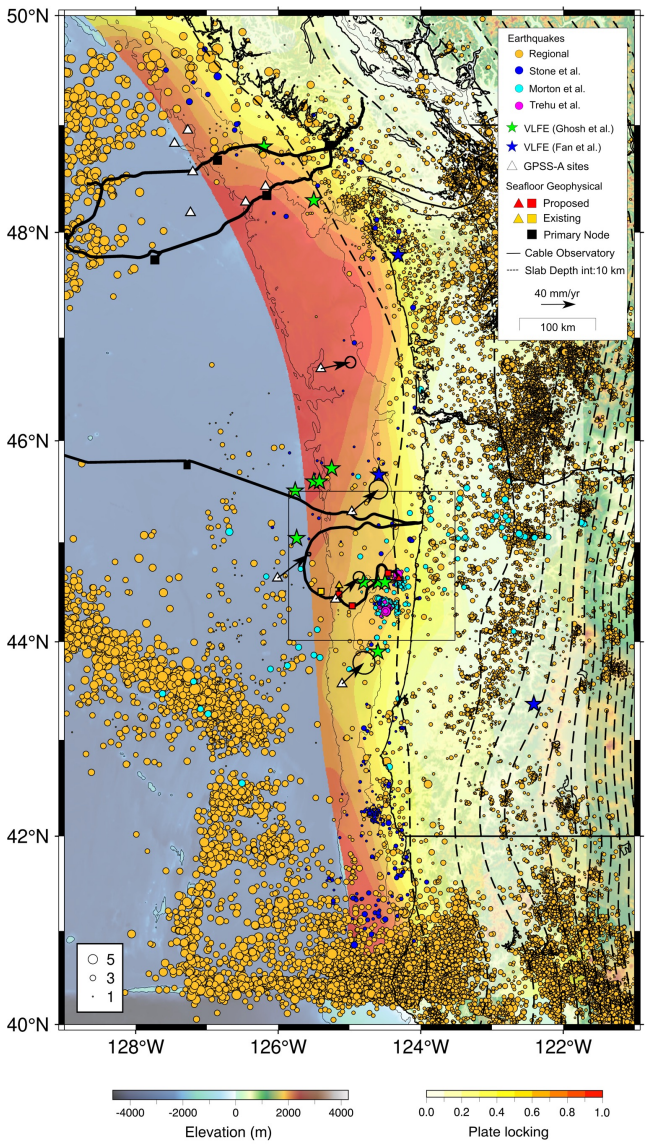
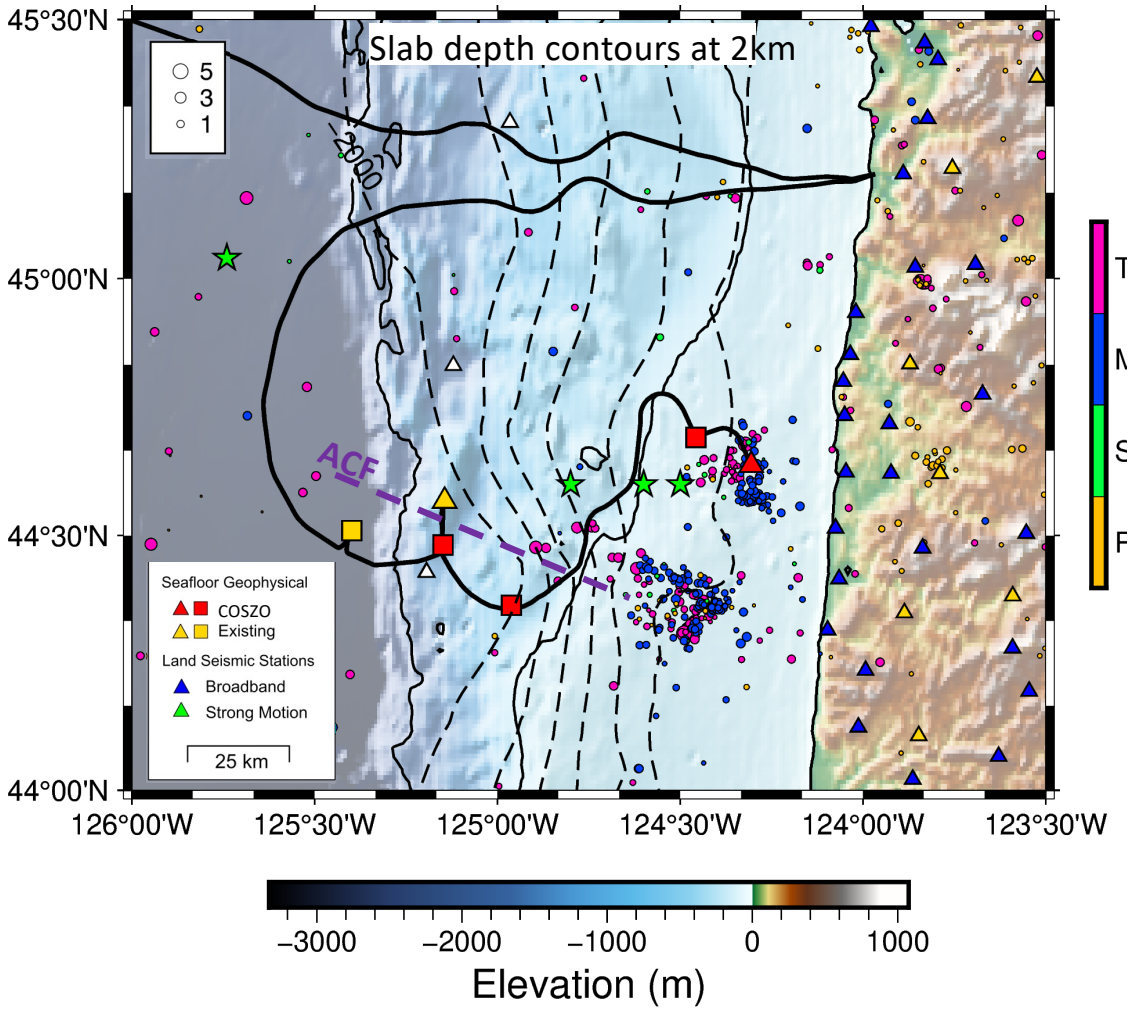
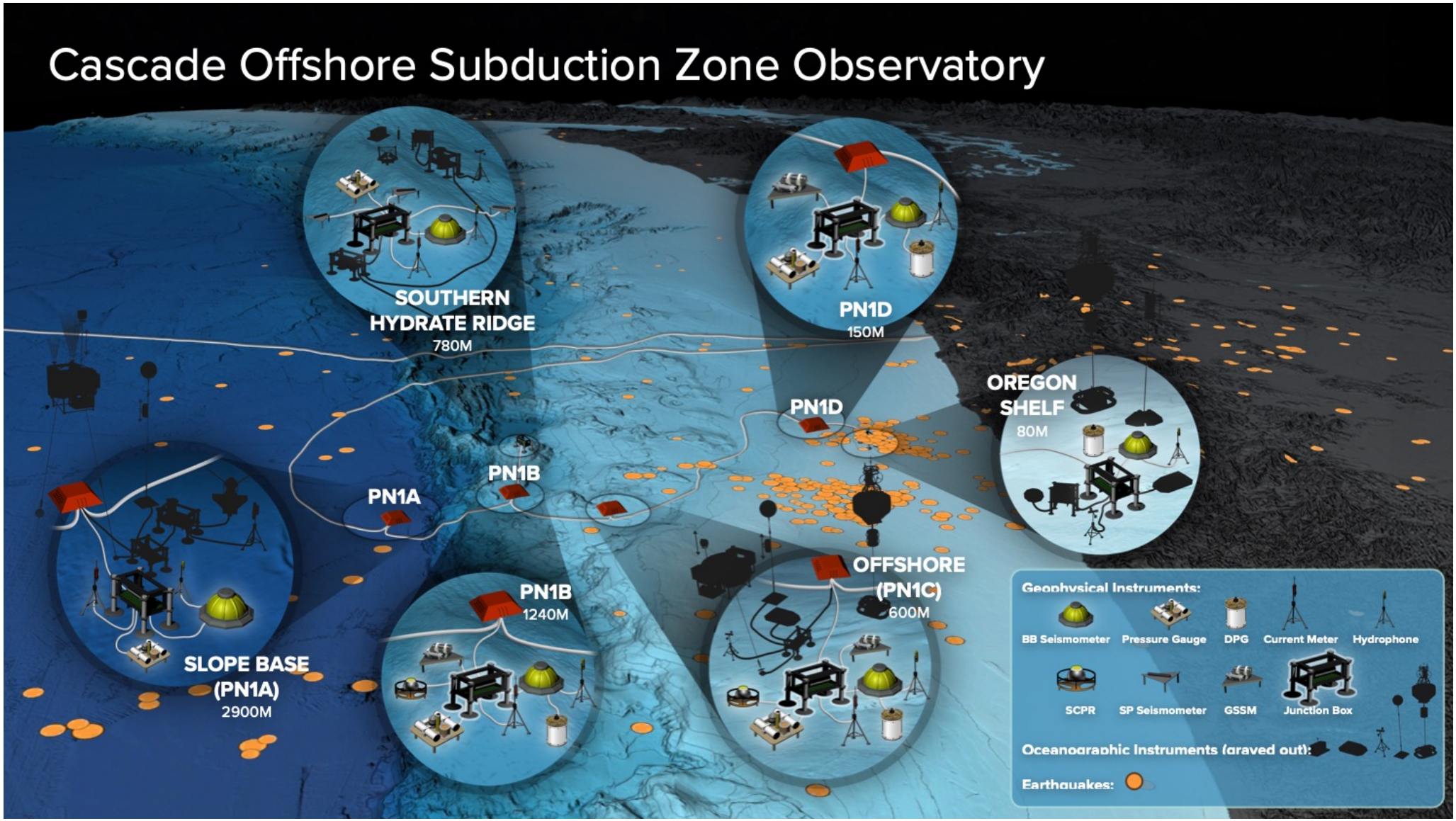


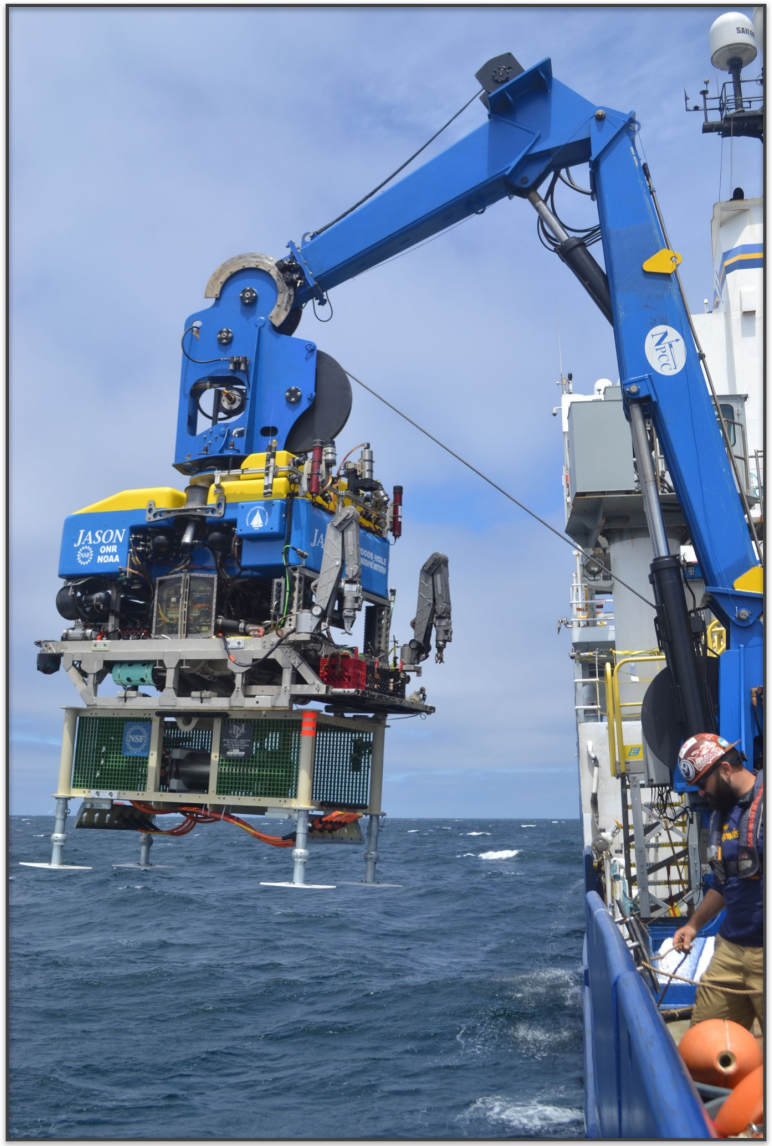


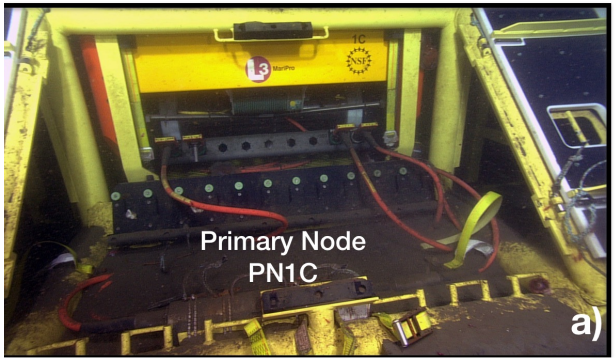
Figures courtesy of M. Kidiwela & Z. Krauss

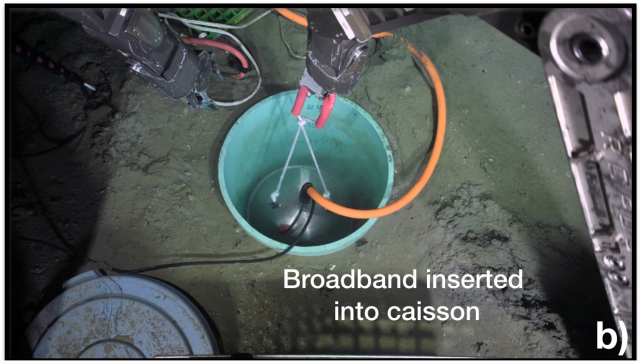
COSZO Science Questions

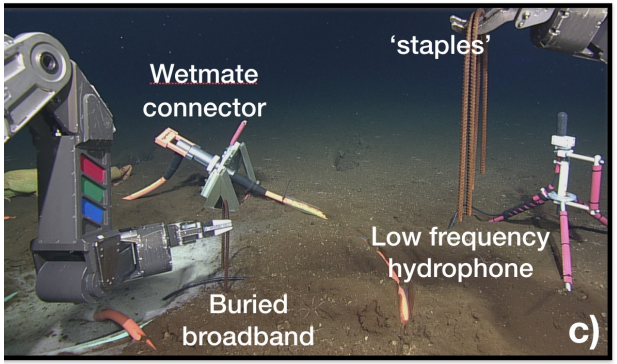
1. How does the locking of the Cascadia megathrust transition between the deformation front and the coastline off central Oregon?
2. Is there transient slip behavior – slow slip, tremor, and/or very low frequency earthquakes – offshore spanning the locked zone and its downdip transition? If so, might this be used to track the redistribution of stress on the megathrust, and possibly provide insight into precursory fault behavior?
3. How are the clusters of shallow earthquakes offshore linked to the megathrust?
4. What is the baseline deformation rate and fault slip behavior of the accretionary prism? This baseline information is critical for properly interpreting future transient deformation as precursory phenomena.

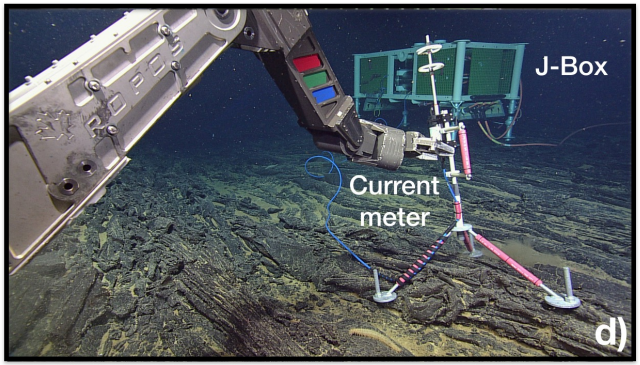

Cascade Offshore Subduction Zone Observatory
SOUTHERN HYDRATE RIDGE
780M
PN1D
150M
OREGON SHELF
80M
PN1D
PN1B
PN1A
PN1B
1240M
OFFSHORE (PN1C)
600M
SLOPE BASE (PN1A)
2900M
Geophysical Instruments:
BB Seismometer
Pressure Gauge
DPG
Current Meter
Hydrophone
SCPR
SP Seismometer
GSSM
Junction Box
Oceanographic Instruments (graved out):
Earthquakes:

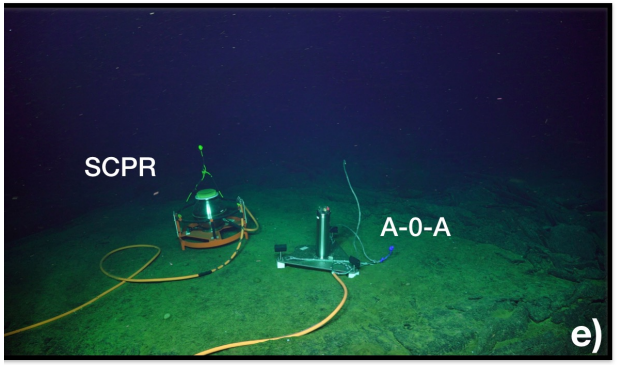

JASON
ONR
NOAA

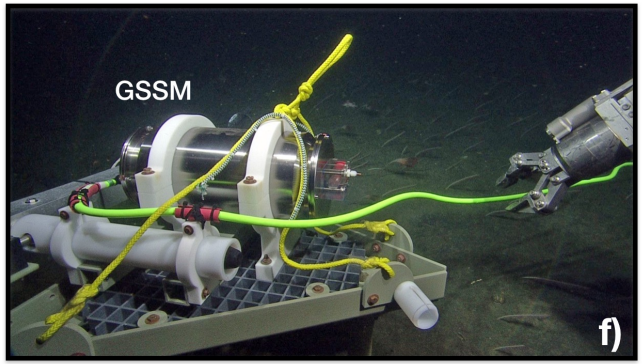

Primary Node
PN1C
a)


Broadband inserted
into caisson
b)


‘staples’
Wetmate
connector
Low frequency
hydrophone
Buried
broadband
c)

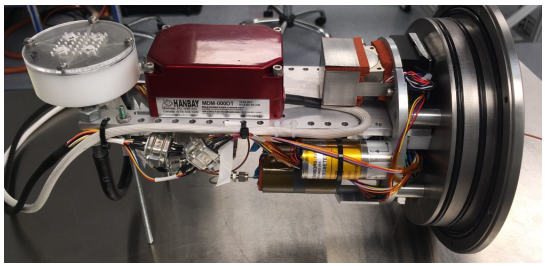

J-Box
Current
meter
d)

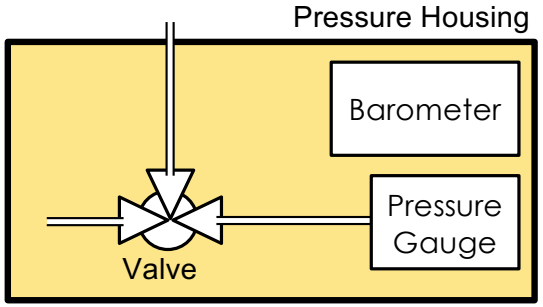

SCPR
A-0-A
e)

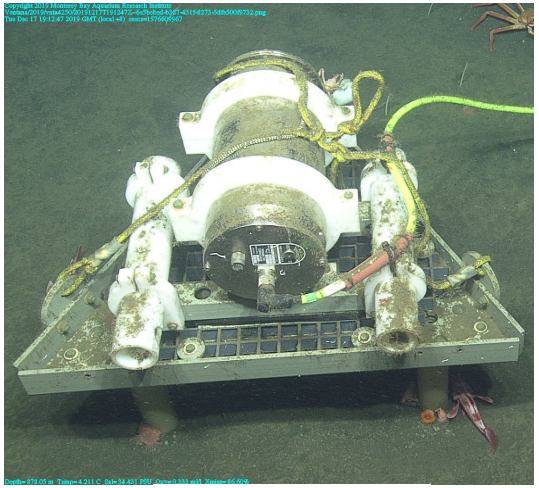

GSSM
f)

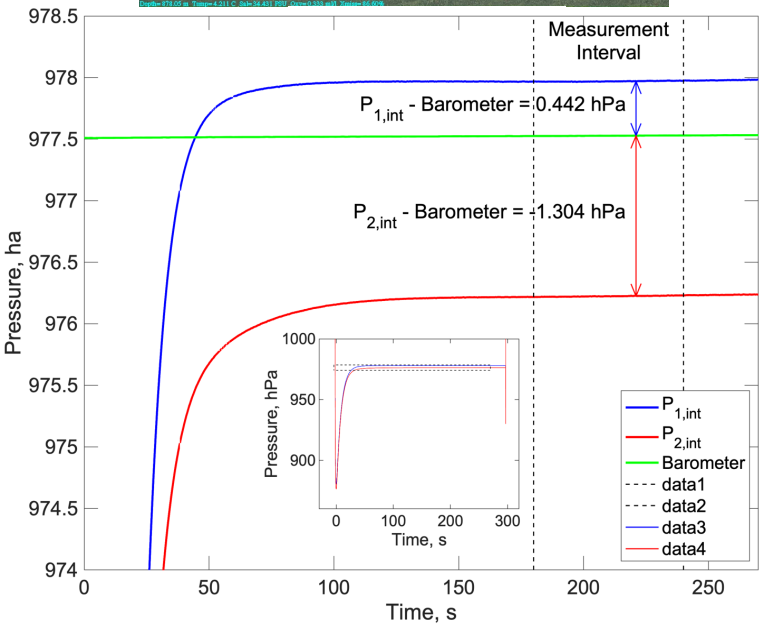
Removing Drift from Pressure Gauges for Geodesy

UW Geodetic and Seismic Sensor Module (GSSM) : A-0-A

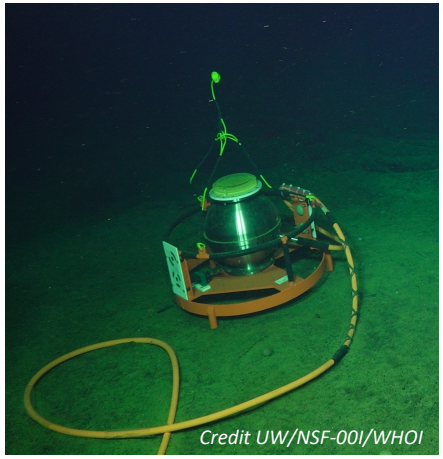


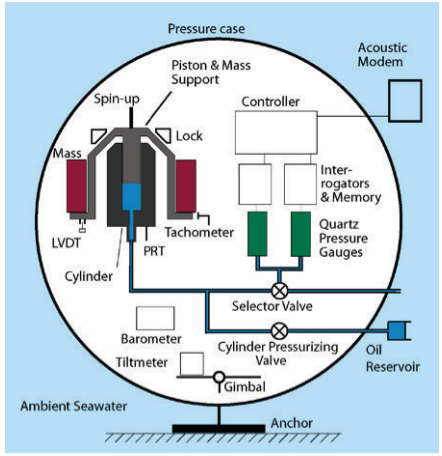




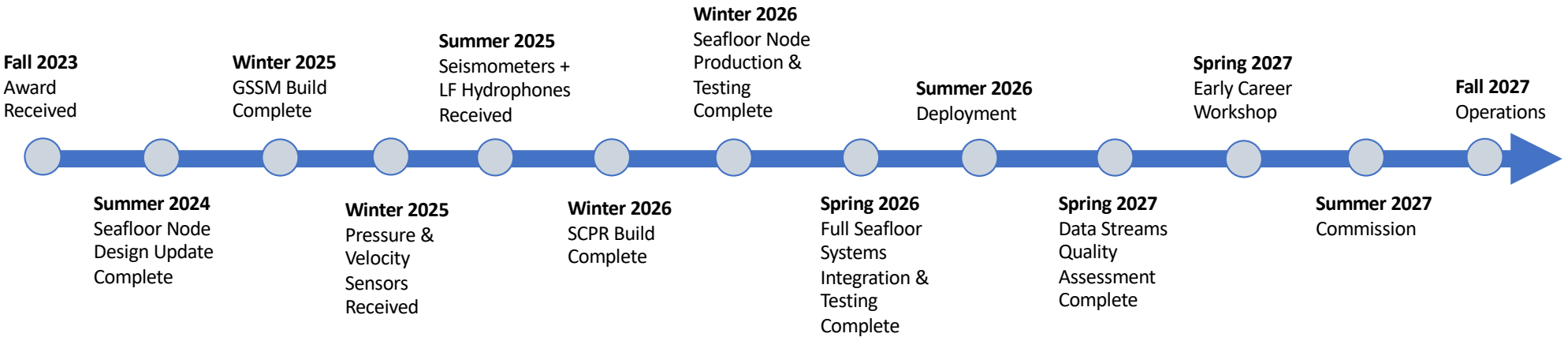


SIO Cabled Self Calibrating Pressure Recorder (CSCPR)





COSZO Project Timeline



GSSM – Geodetic and Seismic Sensor Module
SCPR – Self-calibrating Pressure Recorder

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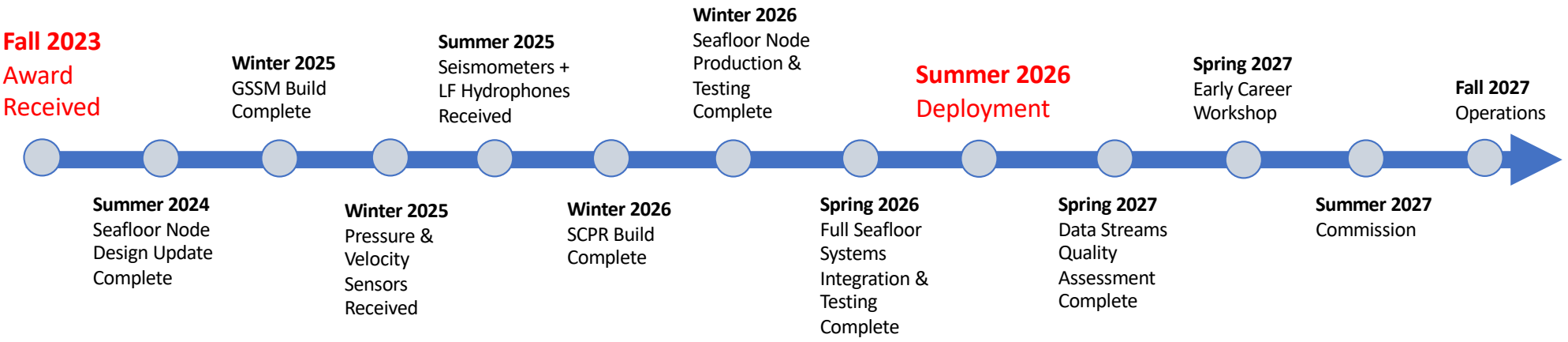

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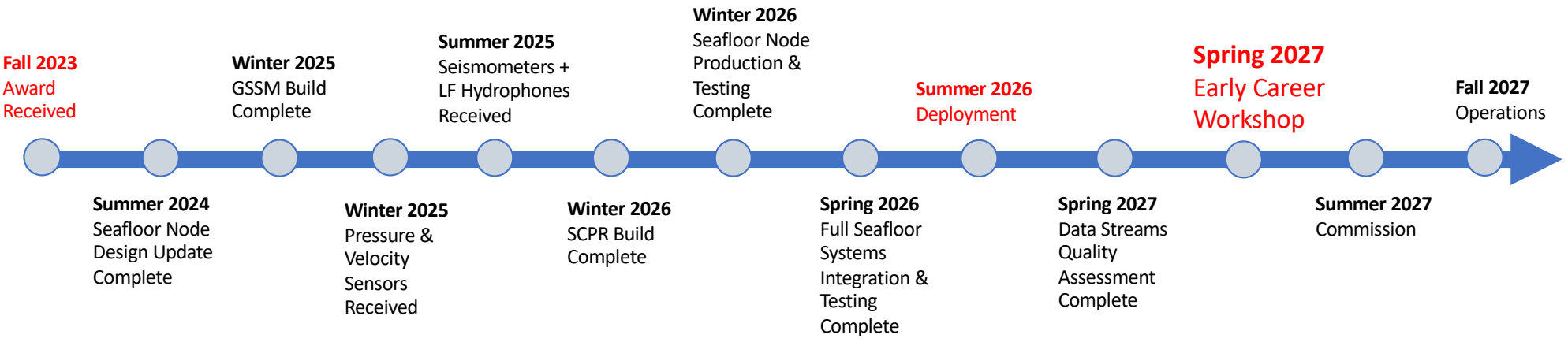

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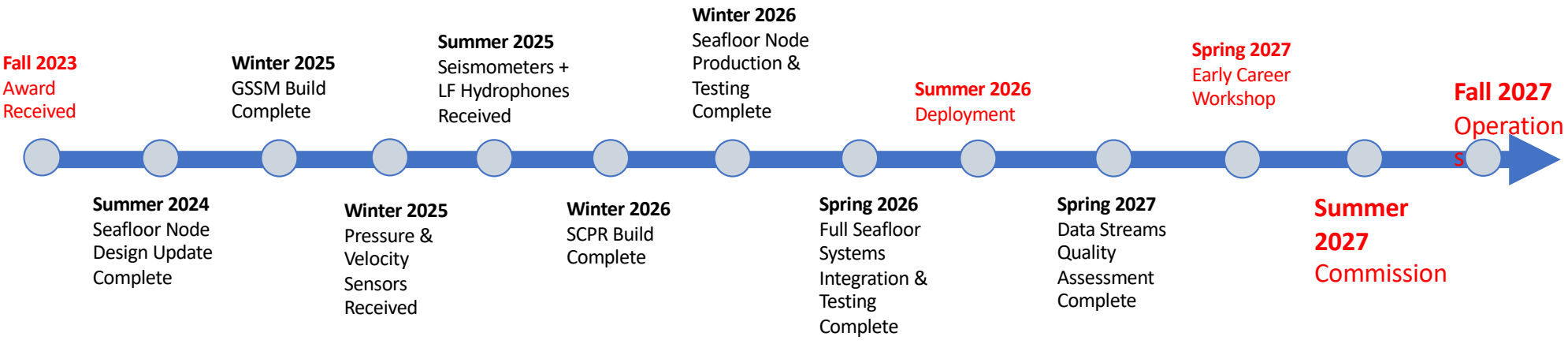

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