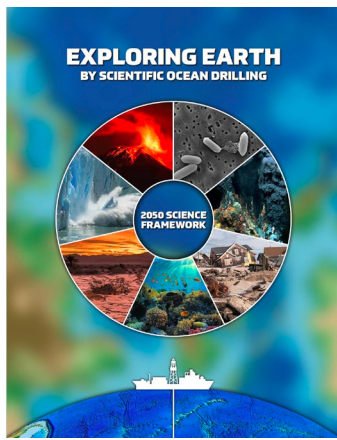
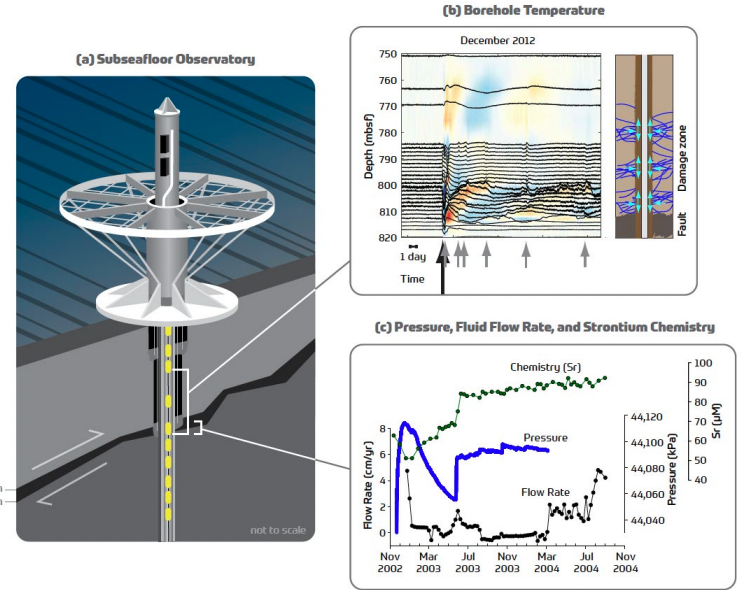
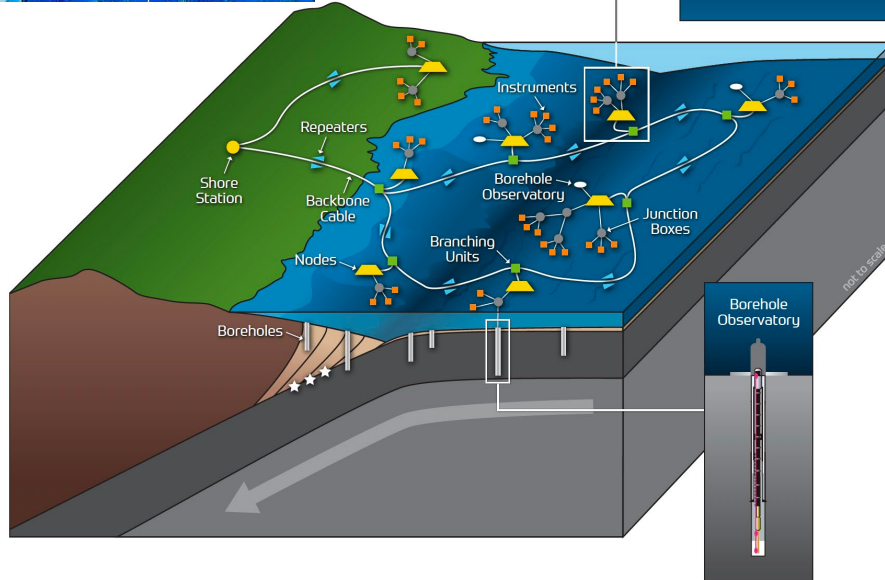
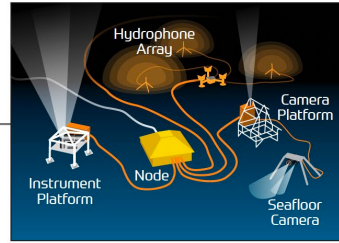


*IODP<sup>3</sup> proposal and planned submission for  
new NSF Scientific Ocean Drilling Program*





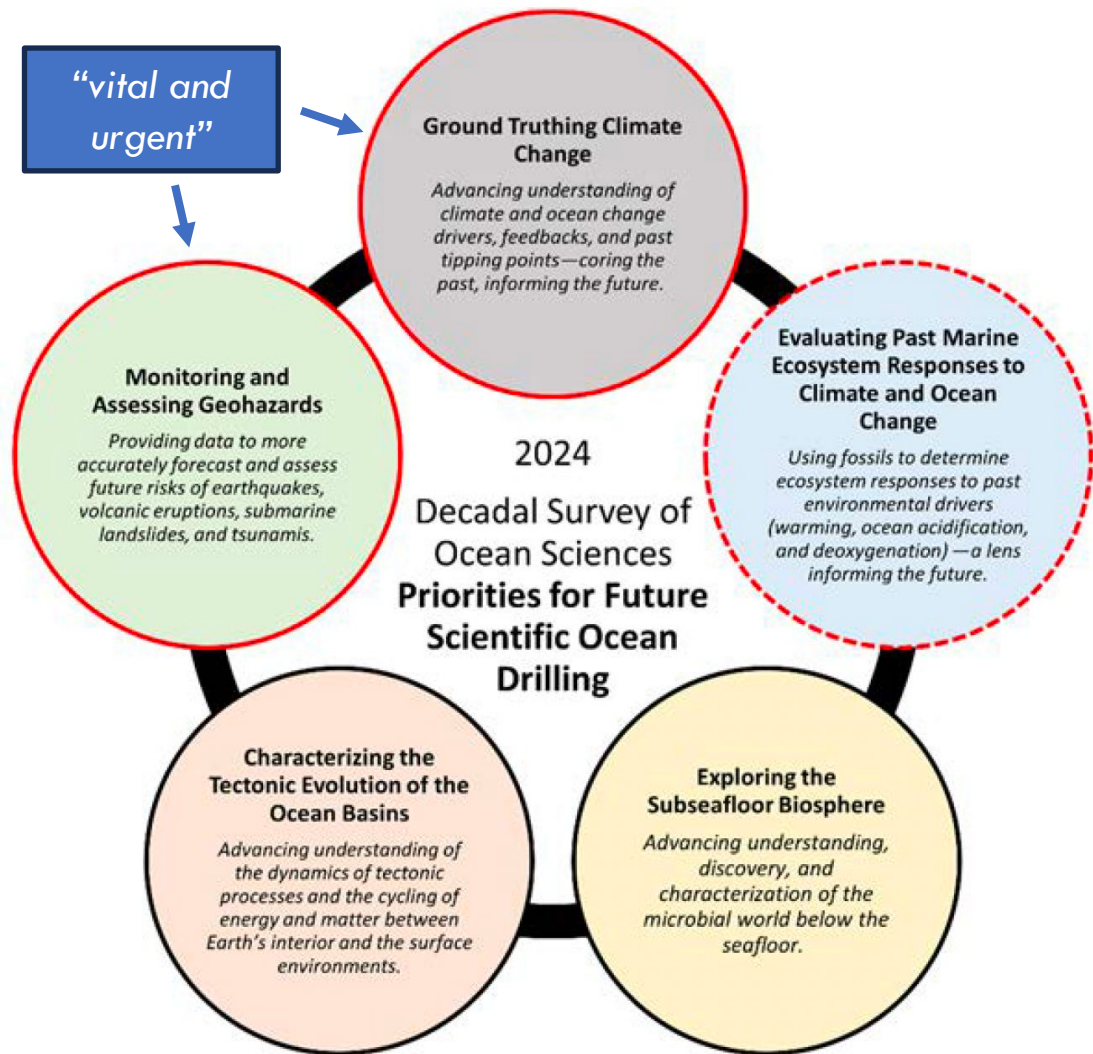
# Scientific Ocean Drilling 25-year plan has prioritized **borehole observatories** for EQ & tsunami hazard study (a *Flagship Initiative*)



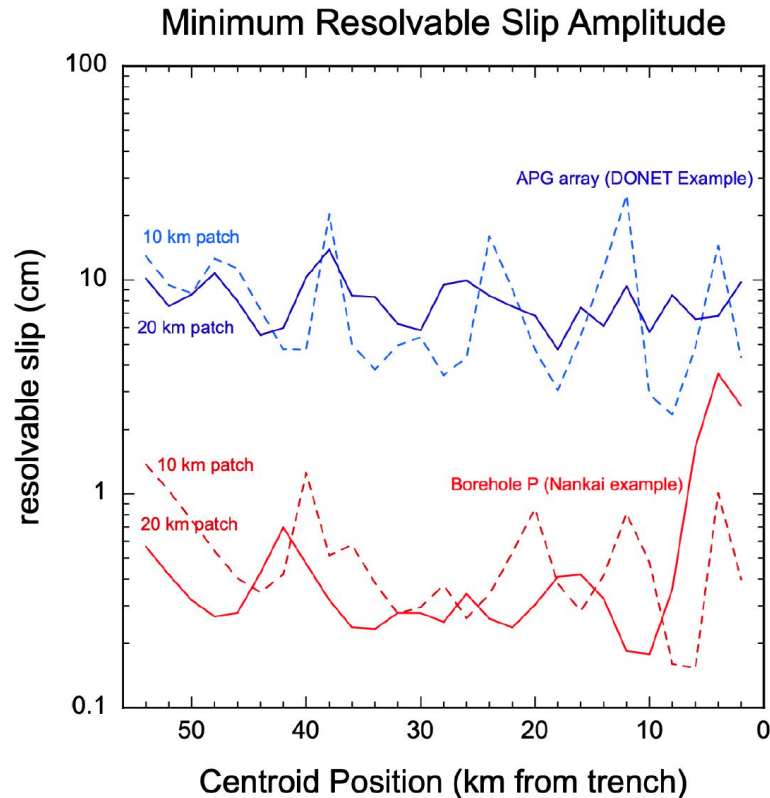
Scientific ocean drilling can provide a sustained subseafloor observational presence through installation of networks of borehole observatories in numerous fault zones around the globe.

# National Academy 2024 Report on Priorities for scientific ocean drilling

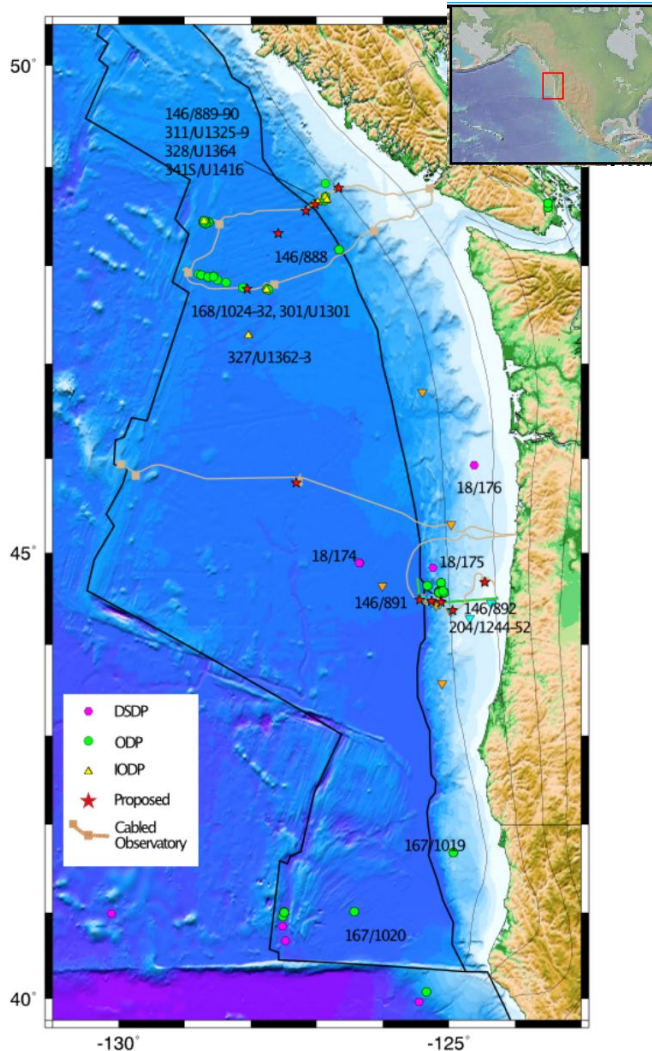
Made *Monitoring and  
Assessing Geohazards* the  
highest level of priority



# Monitoring: Ultra high-fidelity offshore Geodesy



- Borehole sensors – lower noise, volumetric strain sensitivity → detection of mm-scale slip offshore (!!!!)
- Highly complementary (even for small n) to seafloor geodetic arrays.
- Order of magnitude improvement in detection.
- Well-suited for detection of transient slow deformations over timescales of days to ~months.



## ***CCBO: Cascadia Cabled Borehole Observatories to Investigate Plate Boundary Mechanics and Test Potential for Earthquake and Tsunami Early Warning (IODP Proposal 947-MDP)***

**Harold Tobin**, University of Washington, **William Wilcock** (UW), Earl Davis (ONC), Martin Heesemann (ONC), **Eiichiro Araki** (JAMSTEC), Suzanne Carbotte (LDEO), John Collins (WHOI), Shuoshuo Han (UTIG), Deborah Kelley (UW), Masa Kinoshita (ERI), Heidrun Kopp (Geomar), Kate Moran (ONC), Emily Roland (WWU), **Demian Saffer** (UTIG), David Schmidt (UW), Evan Solomon (UW), **Tian Sun** (NRCan), Anne Tréhu (OSU), Kelin Wang (NRCan), **Mark Zumberge** (SIO)

### Scientific objectives

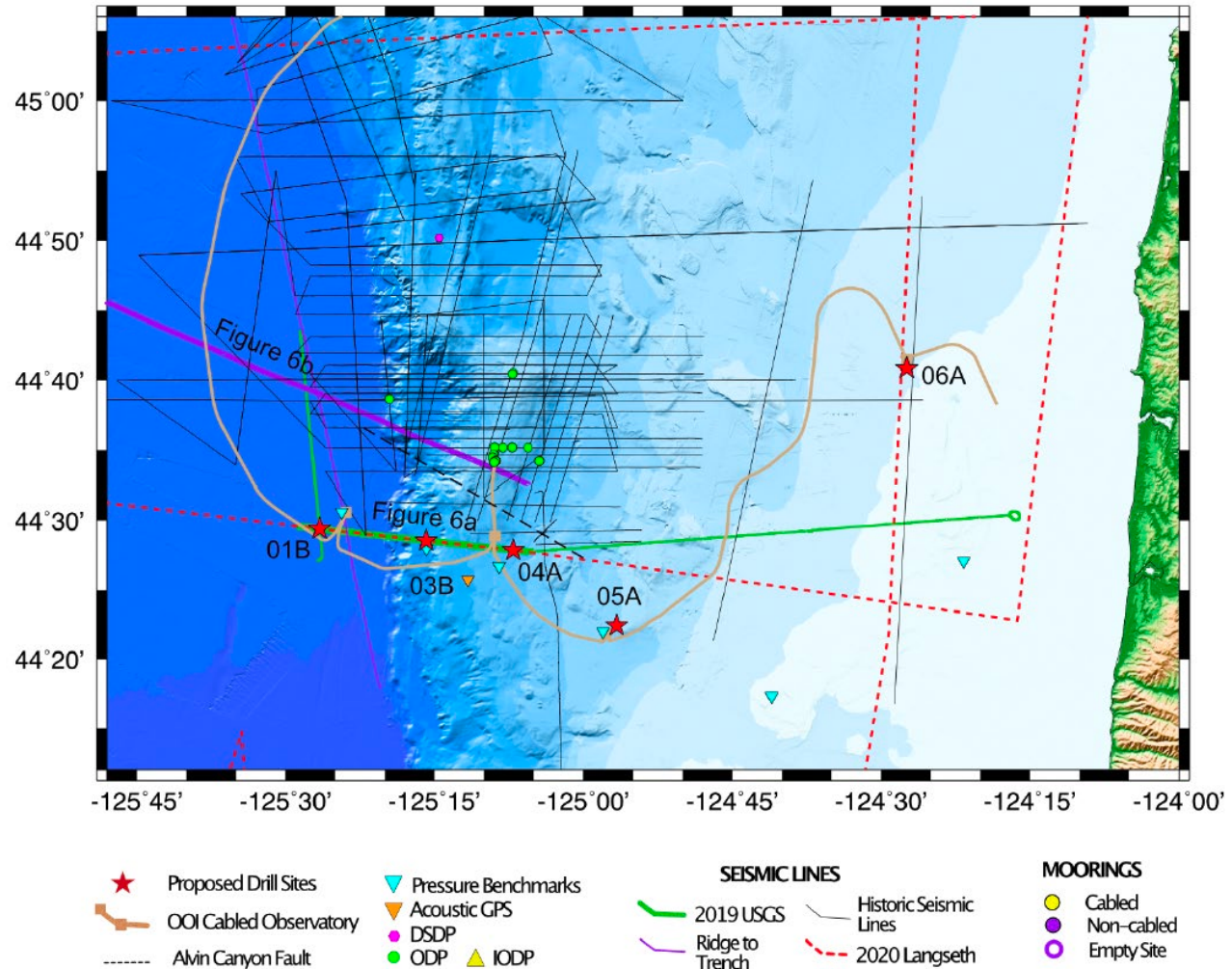
- Drill and instrument 2 transects of 3-5 borehole observatories on the northern and central Cascadia subduction zone, to be connected to cabled systems as real-time seismogeodetic observatories
- Monitor seismicity, geodetic strain, pore fluid pressure, and temperature to detect transients and assess state of fault locking and strain accumulation, testing hypotheses for controls on fault locking
- Evaluate prevalence of slow slip, tremor, and other features in the shallow subduction system and identify along-strike variability



# Central Cascadia (off Oregon)

3-5 proposed  
observatory sites  
tied to the OOI  
Cable

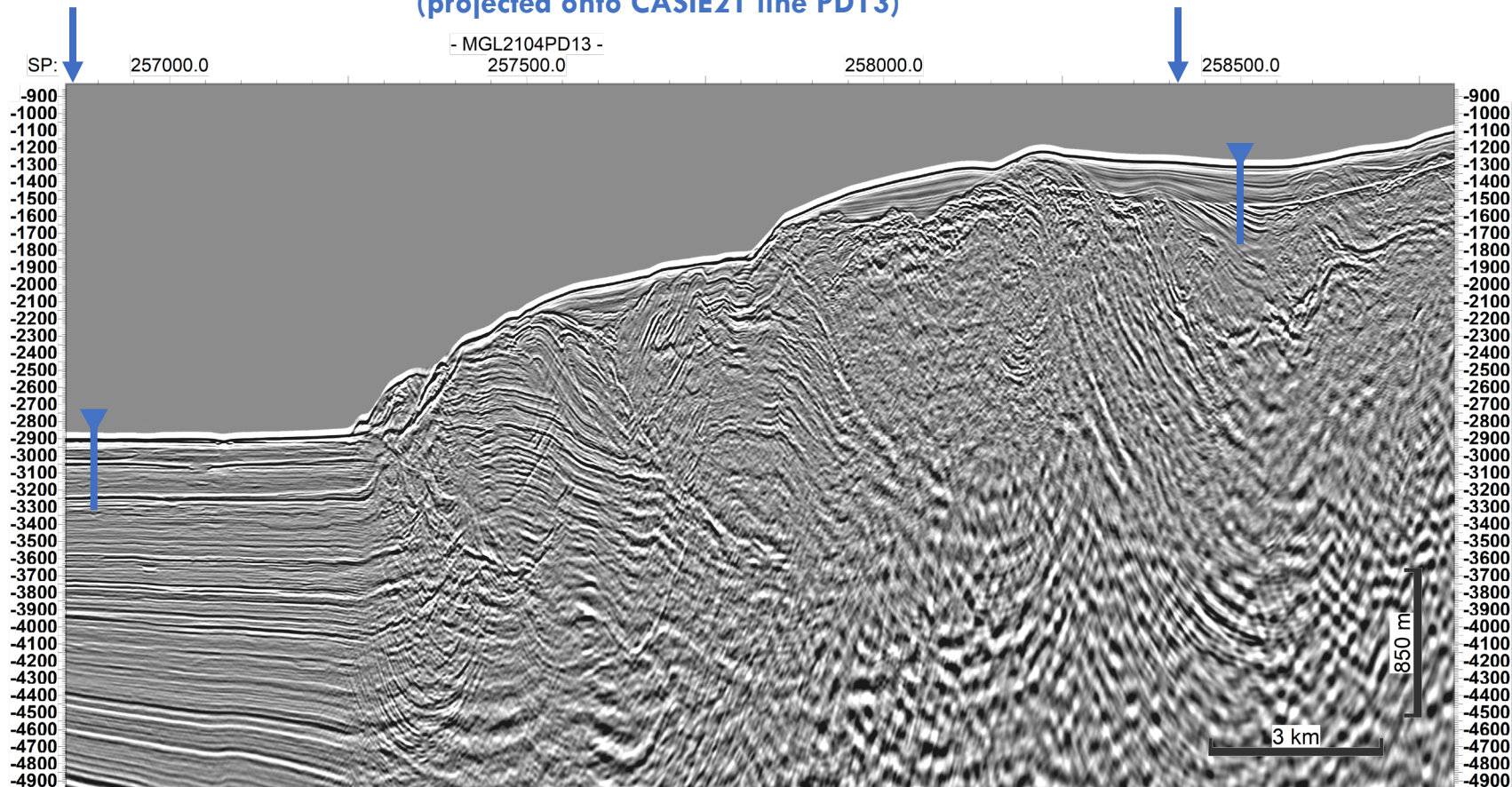
~500 meters below  
seafloor boreholes  
in slope basin  
settings (not fault  
zone drilling)



PN01-A primary node site

Notional locations  
(projected onto CASIE21 line PD13)

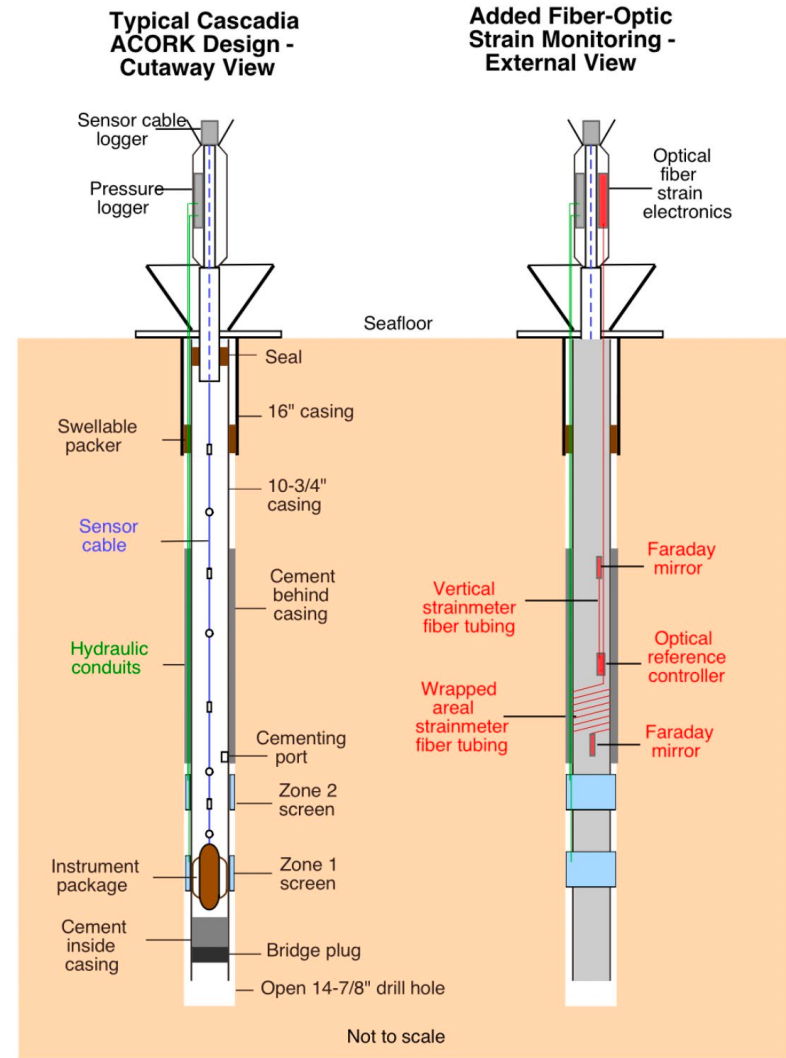
PN01-B primary node site



Vertical Exaggeration ~3x

# Cascadia Cabled Borehole Observatories

- ❖ ~500 meter deep boreholes, cased and completed for observatories
- ❖ Both science & early warning objectives
- ❖ Seismology, strain, and pore fluid pressure using a range of discrete and fiber-optic sensors - design is not complete
- ❖ Connected to the cables for power and real-time data transfer
- ❖ Originally conceived as an IODP2 *JOIDES Resolution* proposal (IODP 947-MDP) ...
  - Chikyu?
  - Some other ship-for-hire?





*D/V Chikyu*  
JAMSTEC deepwater  
scientific research  
drilling vessel

Length: 210 m  
Beam: 38 m  
Displacement: 57,000 tons  
Height of derrick: 130 m  
Accommodation: 200



# *The International Ocean Drilling Programme - IODP<sup>3</sup>*

*Gilbert CAMOIN*

*Director of the ECORD Managing Agency  
and  
the IODP<sup>3</sup> Planning Working Group*

Two new scientific ocean drilling programs to replace IODP

- IODP<sup>3</sup> – a Europe & Japan coalition
- As-yet unnamed US program, run by NSF



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