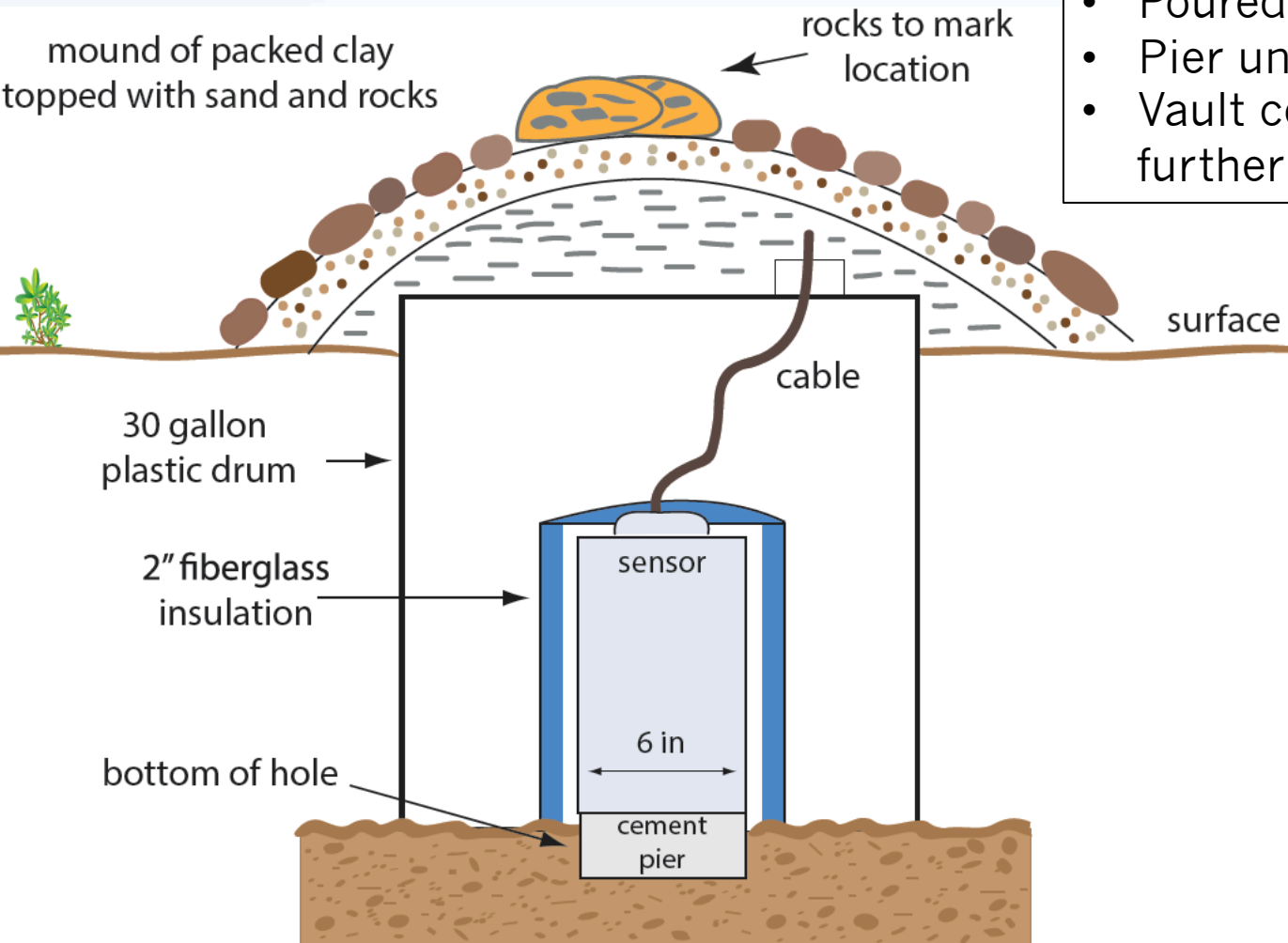


# Comparative Noise Performance of Portable Broadband Sensor Emplacements

Justin Sweet, Eliana A-Dotson, Bruce Beaudoin, and  
Kent Anderson

# Current Practices: PASSCAL



- Target depth: 1m
- Poured concrete pier
- Pier uncoupled from vault
- Vault covered with soil for further insulation

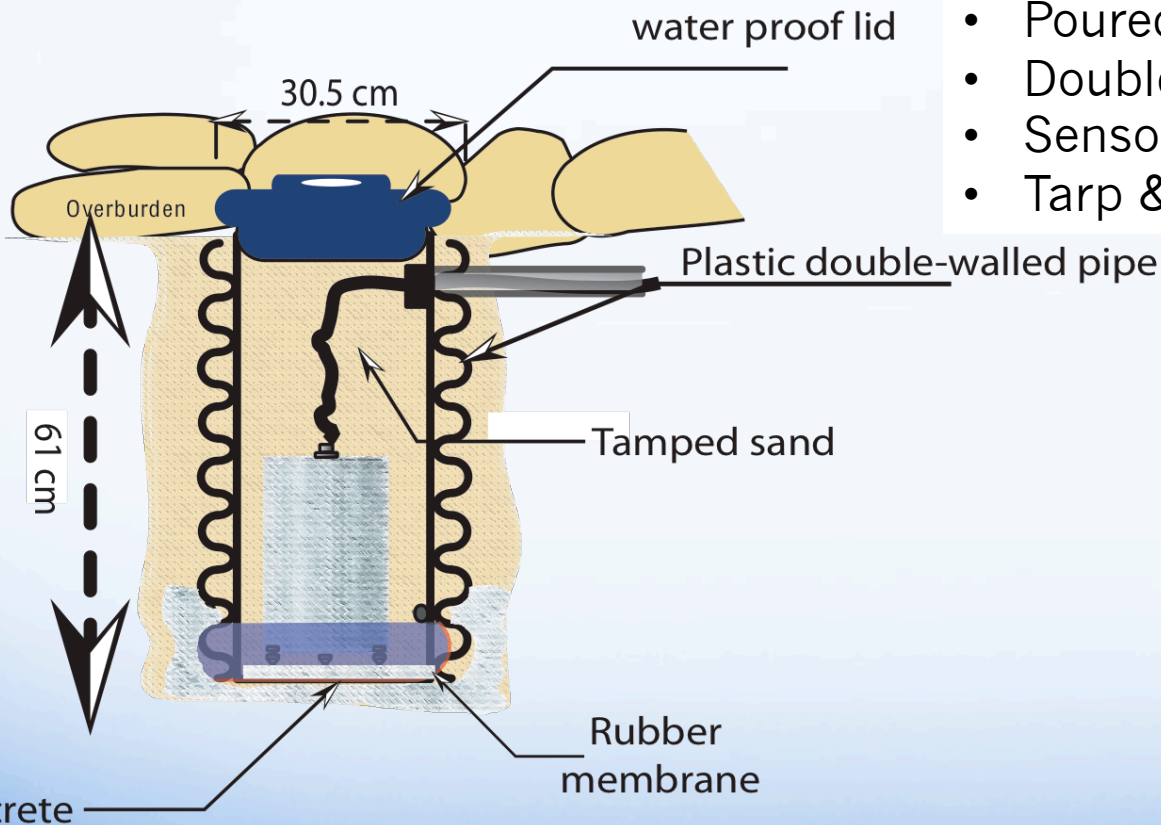
**Cost: ~\$100**

# Current Practices: Flexible Array

## Flexible Array Station

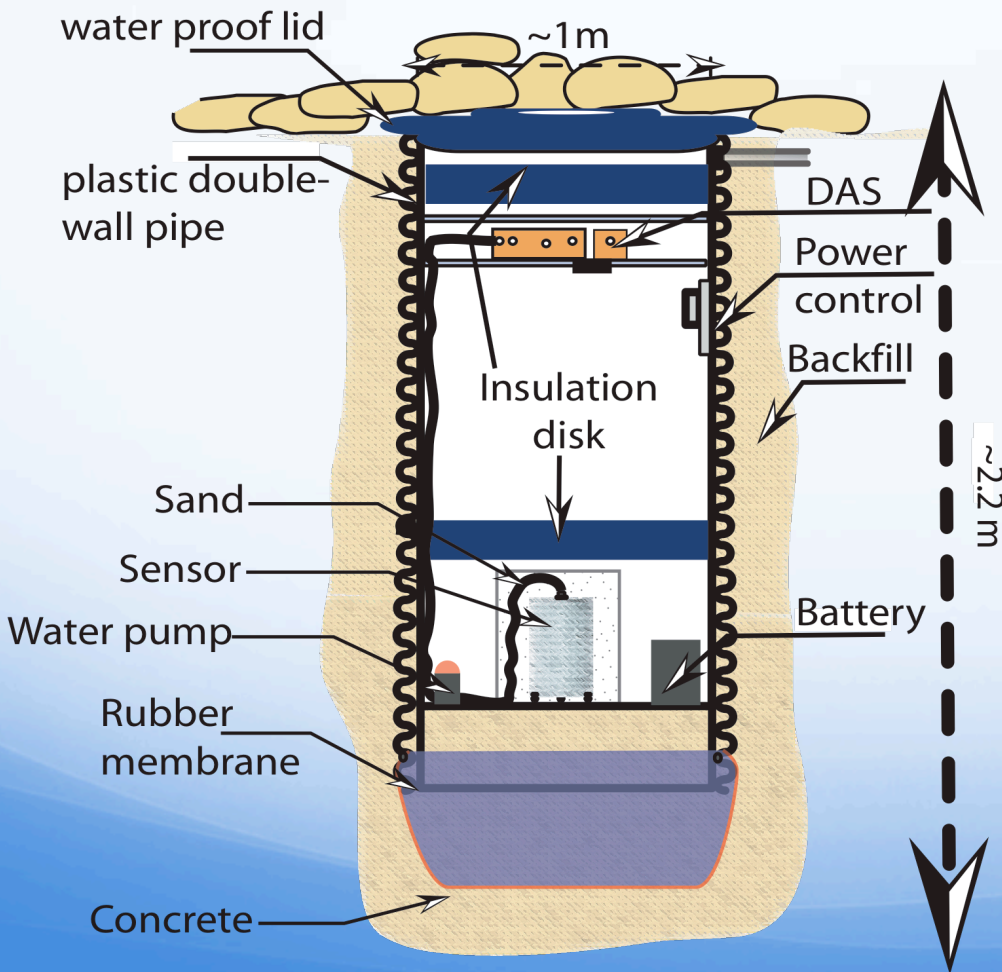
- Target depth: ~60cm
- Poured concrete base
- Double-walled plastic pipe
- Sensor covered with ~13cm sand
- Tarp & 2.5cm dirt covering vault

**Cost: \$200 to \$300**



# Current Practices: Transportable Array

Transportable Array Station

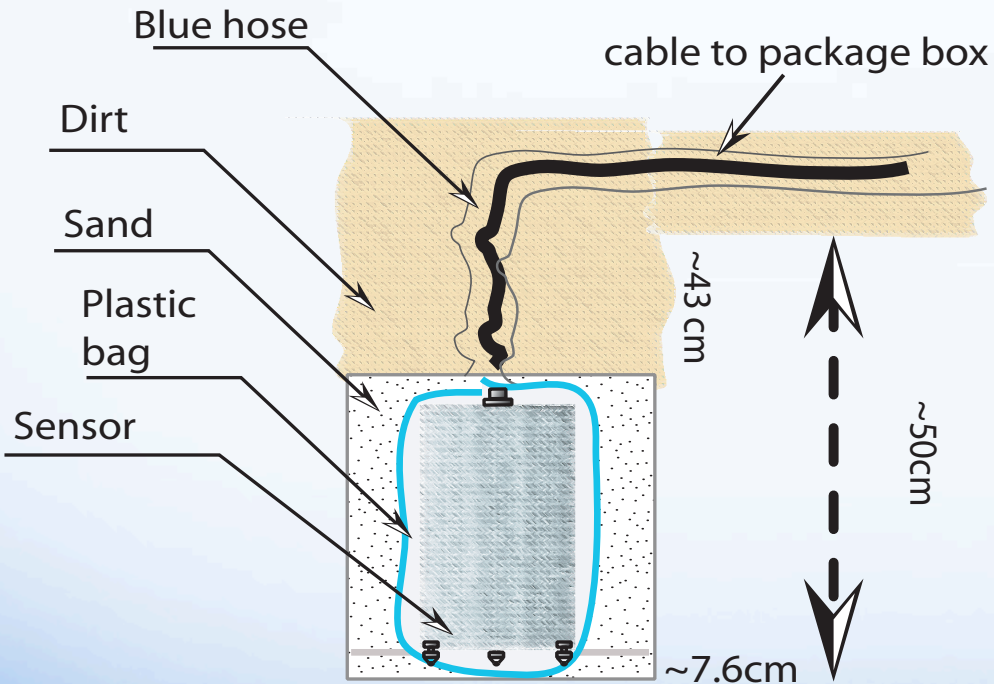


- Target depth: ~2m
- 15 cu-yard poured concrete base
- 1.1m diameter plastic sewer pipe
- Insulation disk above sensor and at top of vault below lid
- DAS, power housed inside vault

**Cost: ~\$8,000**

# Current Practices: Direct Burial

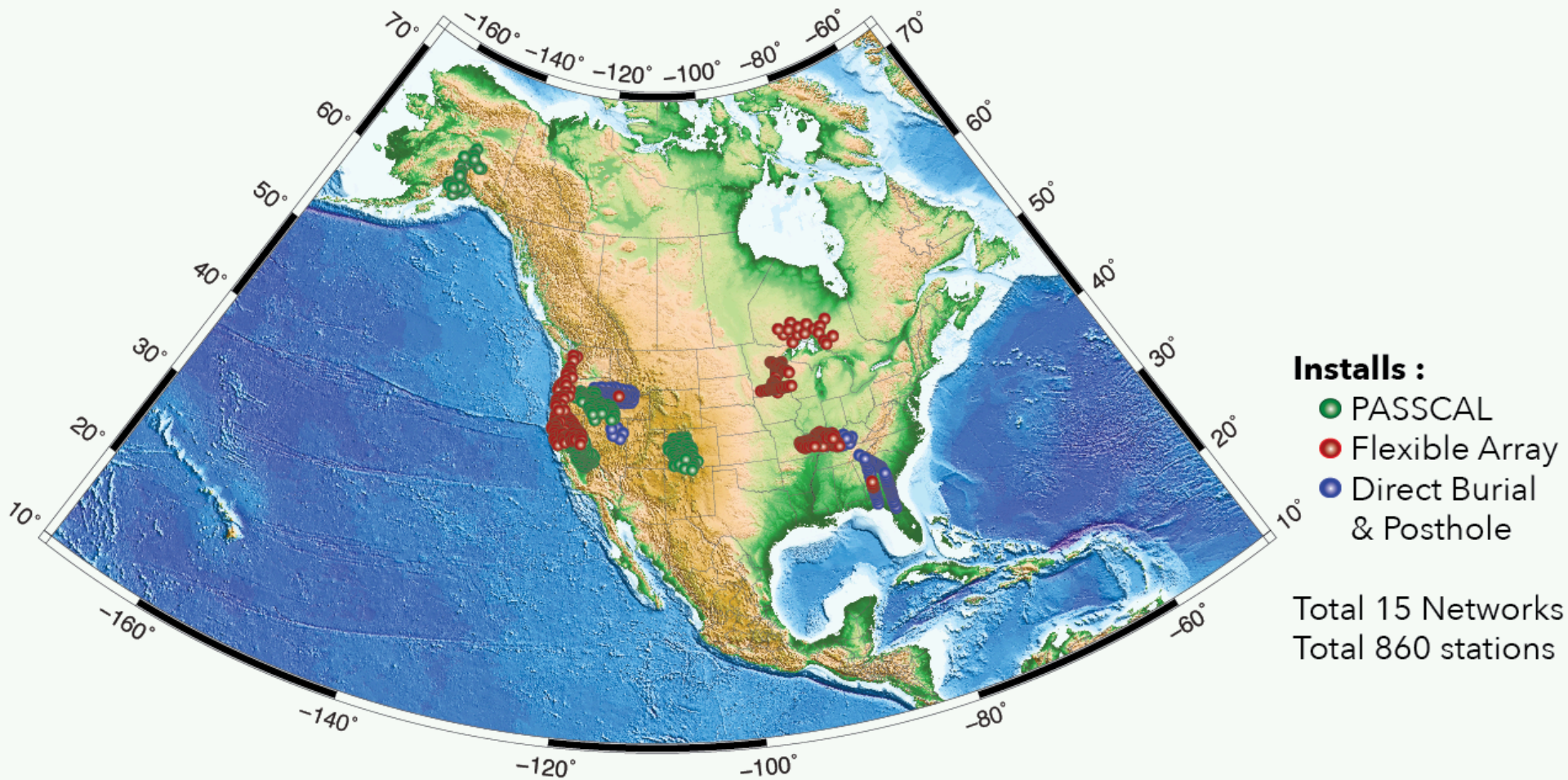
## Direct Burial Station



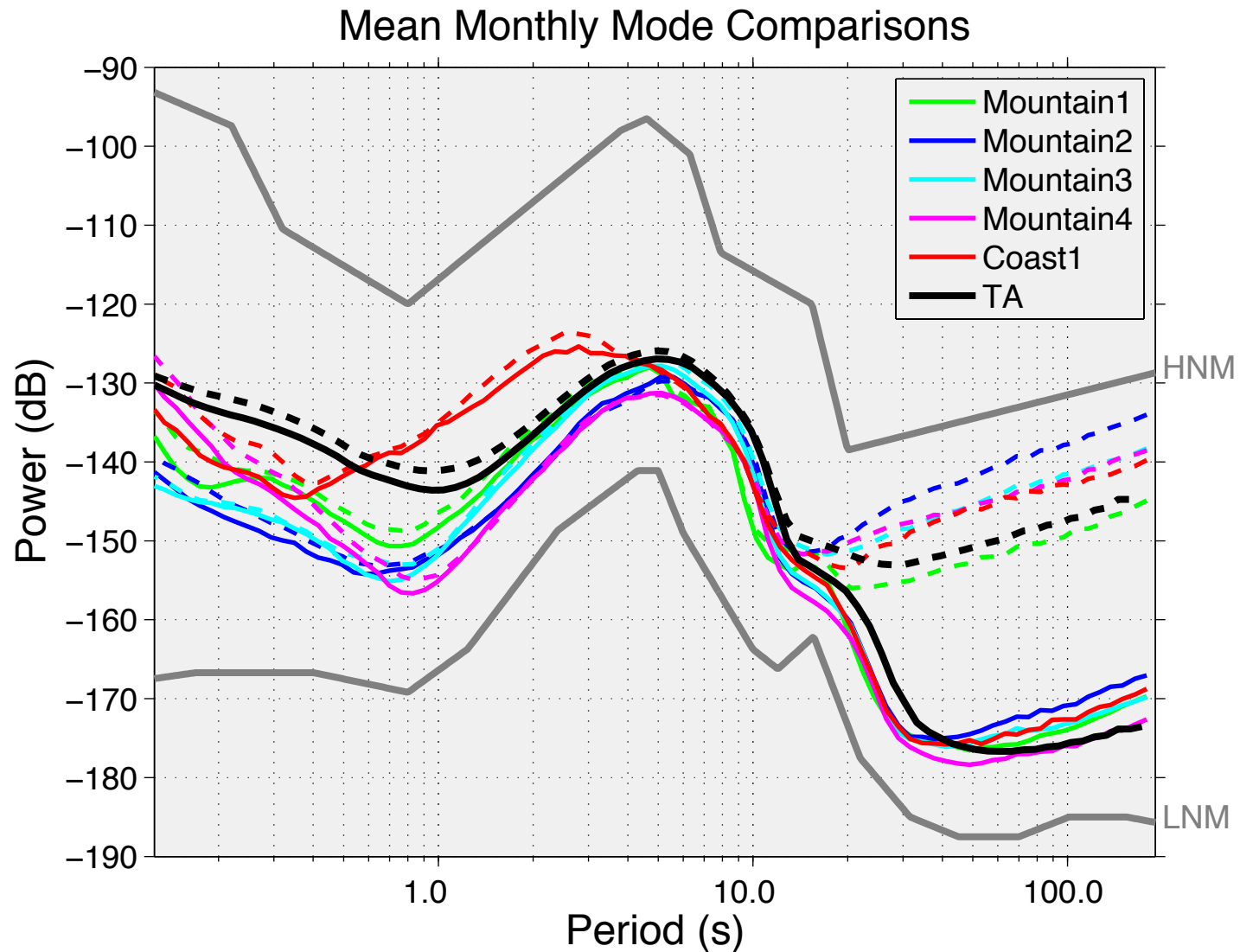
- Target depth: 0.5 to 1m
- Approx. 8cm sand below sensor
- Sensor in 25cm plastic bag filled with sand to top of sensor
- About 0.5m dirt on top of sensor

**Cost: \$30 to \$50**

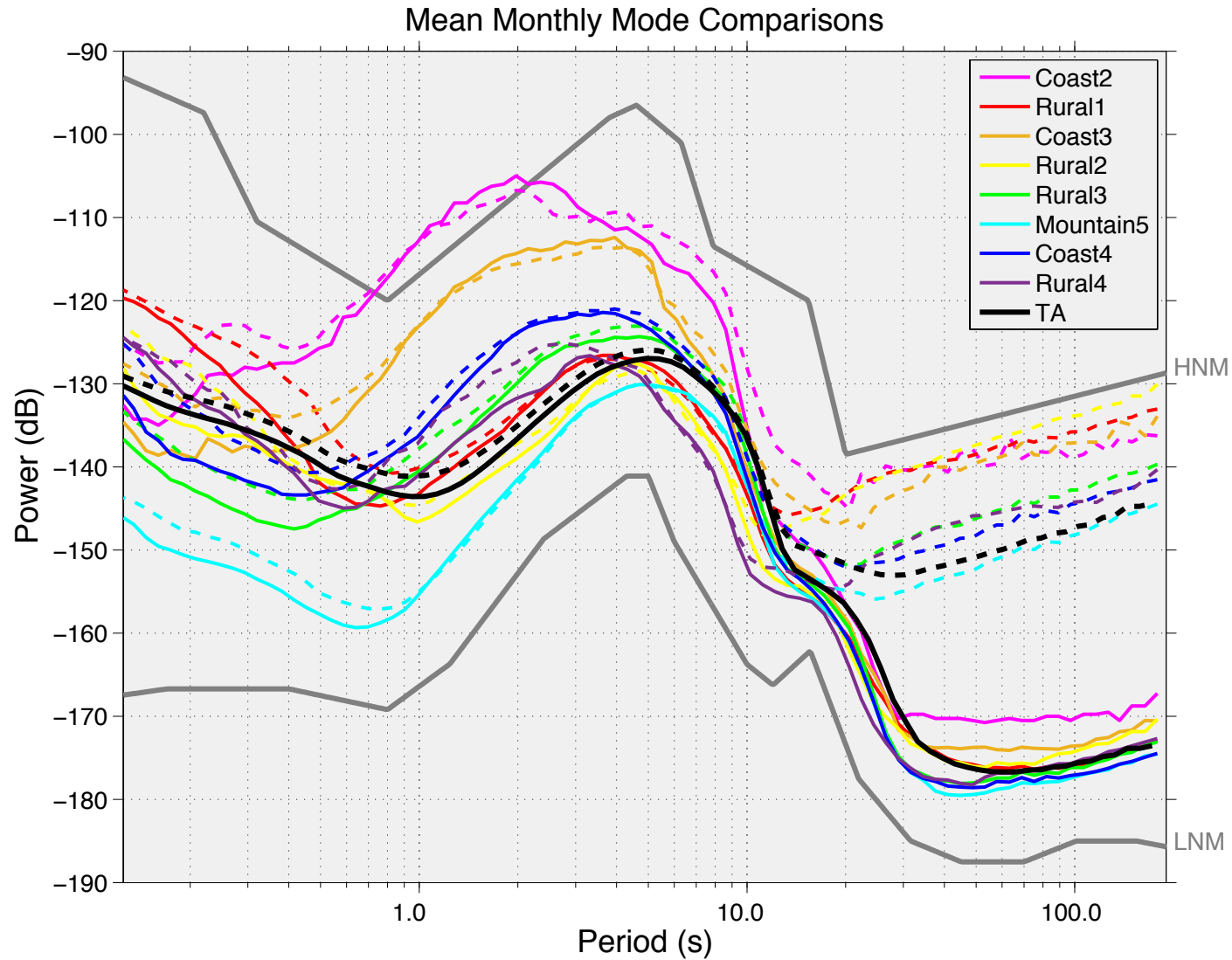
# Analyzed Networks



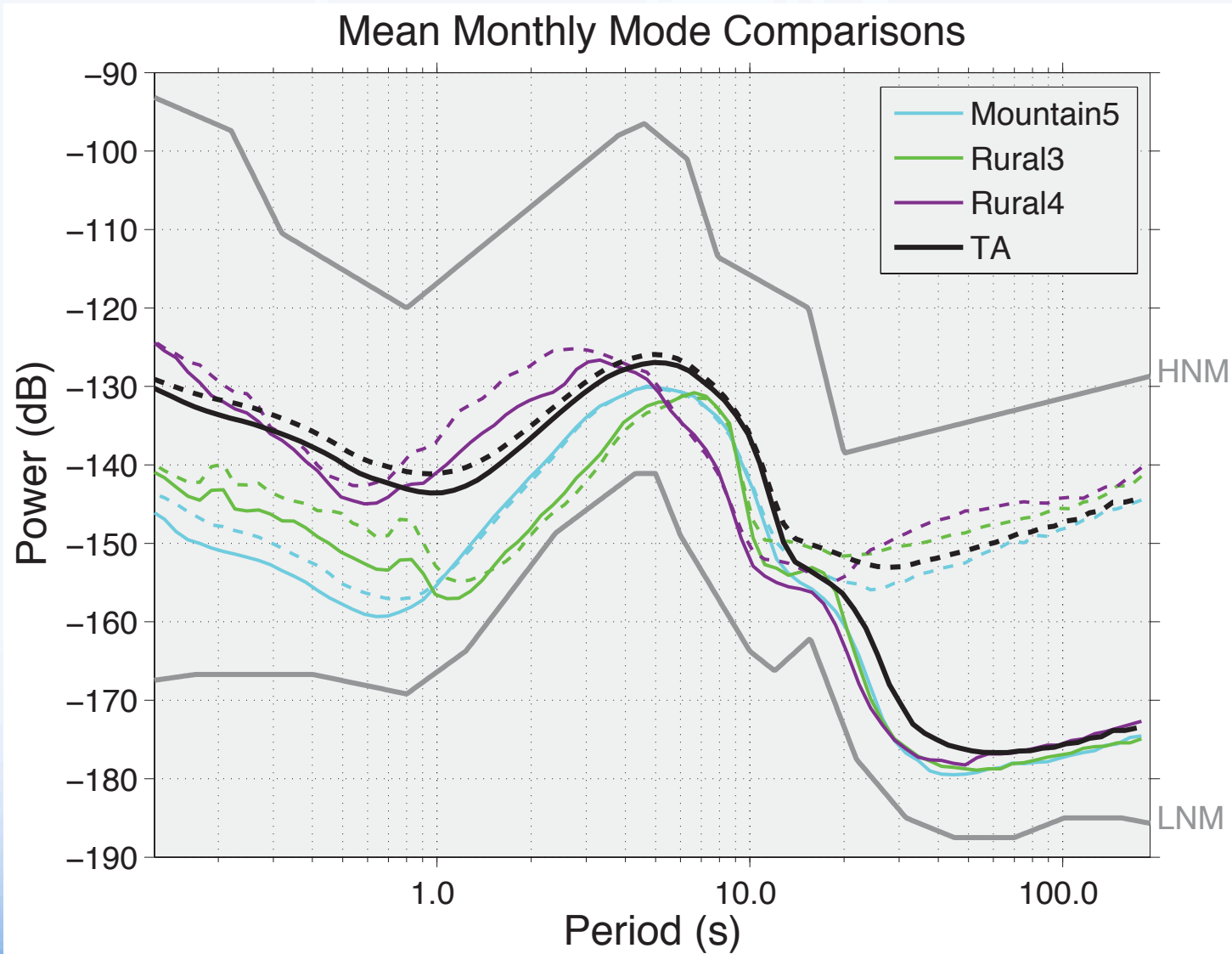
# Results: PASSCAL



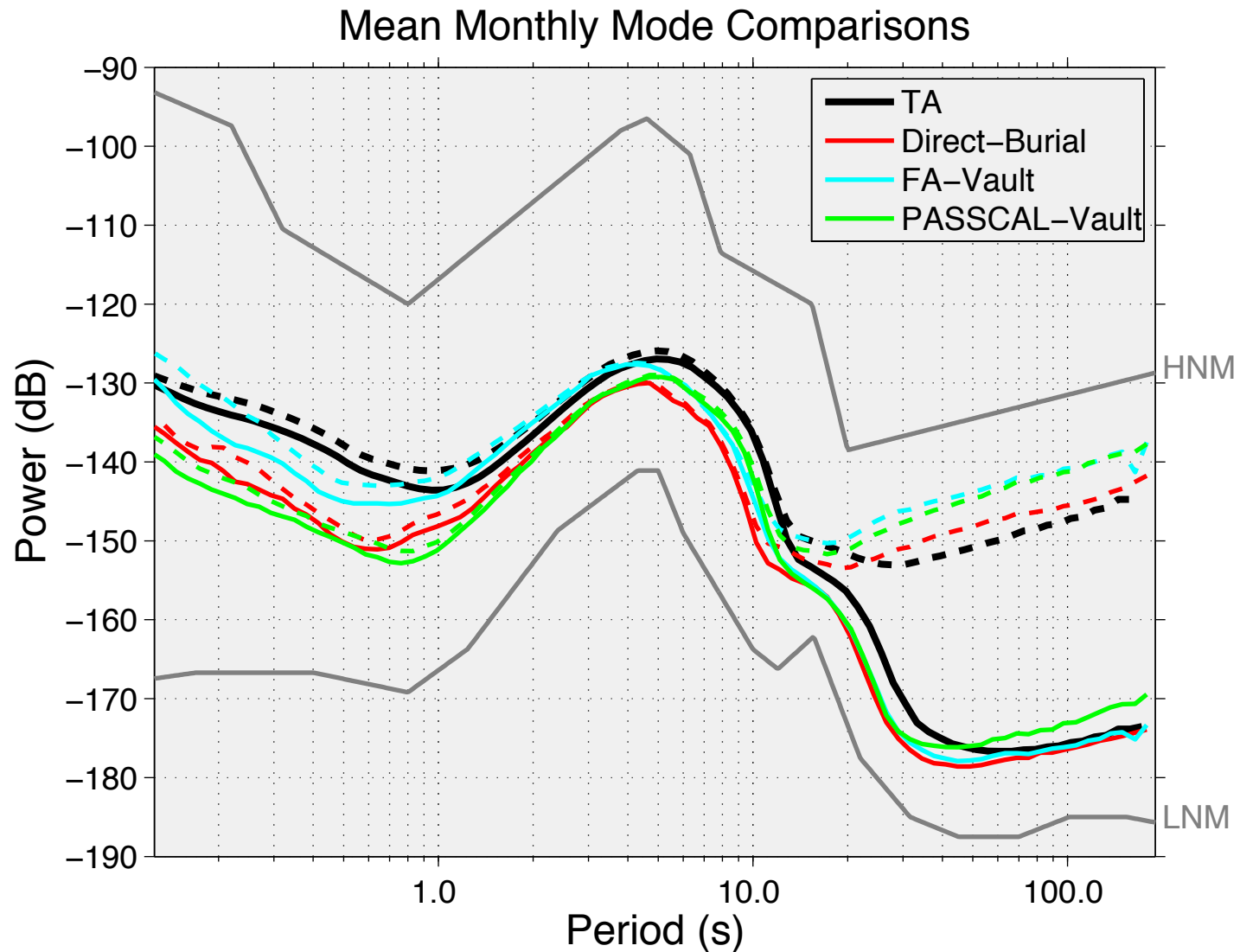
# Results: Flexible Array



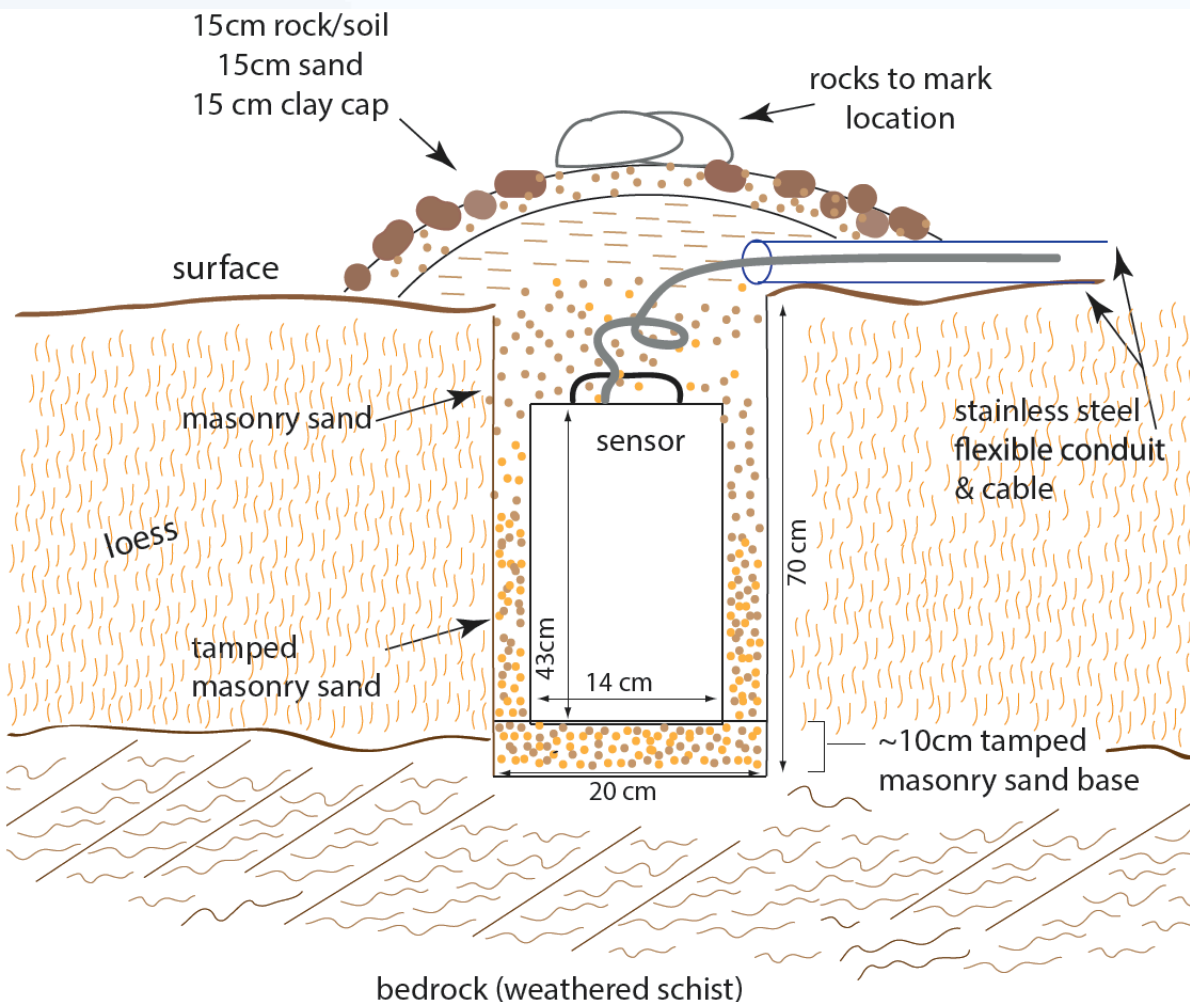
# Results: Direct Burial



# Results: Vault Comparison



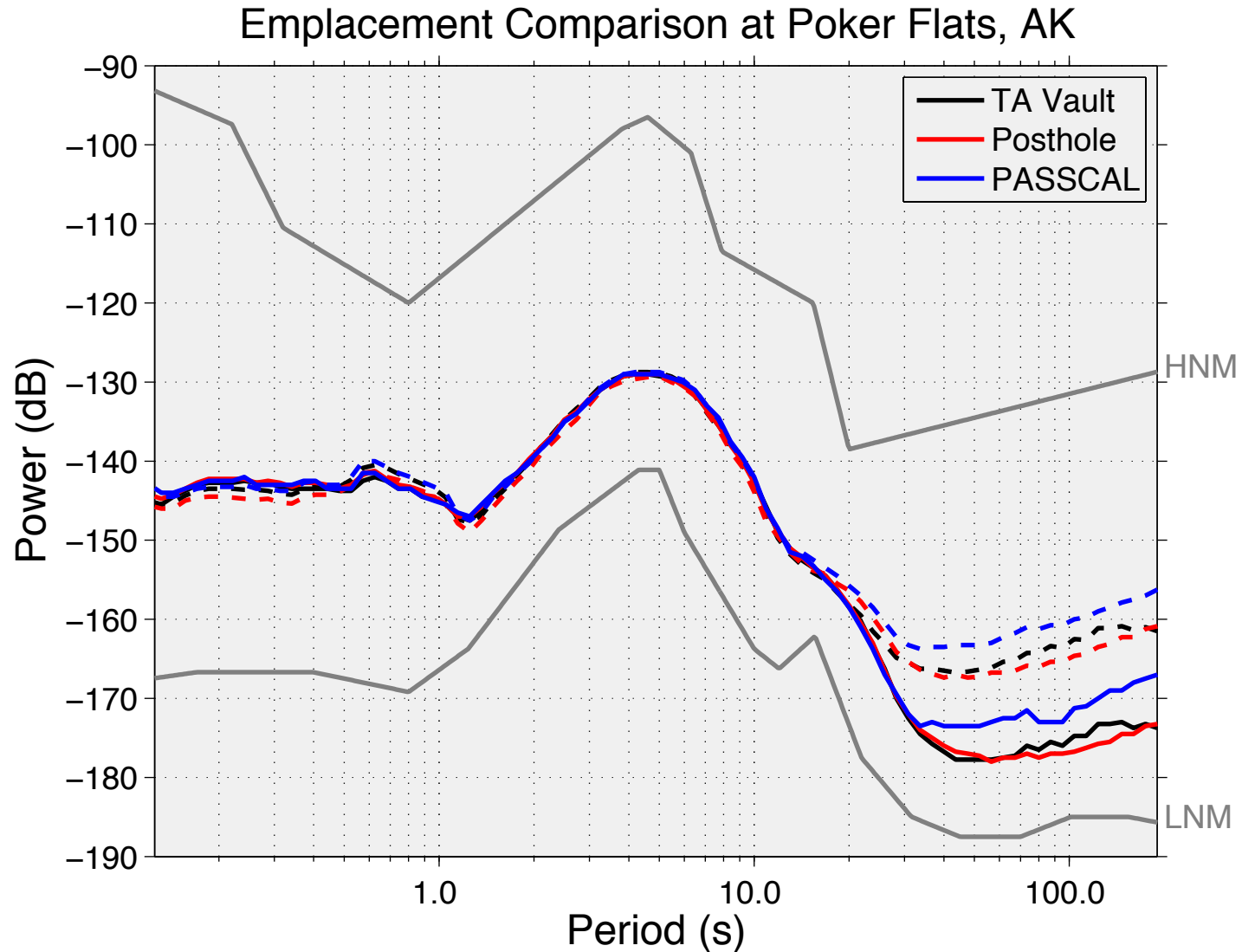
# The Future: Posthole Sensors



- Target depth: ~0.7 to 1m
- Purpose-built direct bury sensors
- Cable loosely looped near top to ensure strain relief
- After orientation & leveling, sand poured in and tamped to ensure maximum coupling

**Cost: \$30 to \$50**

# The Future: Posthole Sensors



# Conclusions

- Comparison of Direct-Burial (\$50), PASSCAL (\$100), FA (\$300), and TA (\$8000) vaults
- Direct burial can have similar long-period noise levels as TA style installations
- PASSCAL and FA vaults appear to be less quiet at longer periods
- New purpose-built posthole sensors are cheap to install (\$50) and achieve noise levels similar to or quieter than TA style vaults