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

- 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

- 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

- 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
Results: PASSCAL

Mean Monthly Mode Comparisons

Power (dB) vs. Period (s)

- Mountain1
- Mountain2
- Mountain3
- Mountain4
- Coast1
- TA

Period (s)

Power (dB)

HNM

LNM
Results: Flexible Array

Mean Monthly Mode Comparisons

- Period (s)
- Power (dB)

Comparisons include:
- Coast2
- Rural1
- Coast3
- Rural2
- Rural3
- Mountain5
- Coast4
- Rural4
- TA
Results: Direct Burial

Mean Monthly Mode Comparisons

- Power (dB)
- Period (s)
- Mountain5
- Rural3
- Rural4
- TA

HNM
LNM
Results: Vault Comparison

Mean Monthly Mode Comparisons

- Power (dB) vs. Period (s)
- TA
- Direct–Burial
- FA–Vault
- PASSCAL–Vault

HNM
LNM
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

Emplacement Comparison at Poker Flats, AK

- TA Vault
- Posthole
- PASSCAL

Power (dB) vs. Period (s)
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