Ocean floor seismological and environmental monitoring

Determining the shear velocity structure of the oceanic crust from measurements of seafloor compliance

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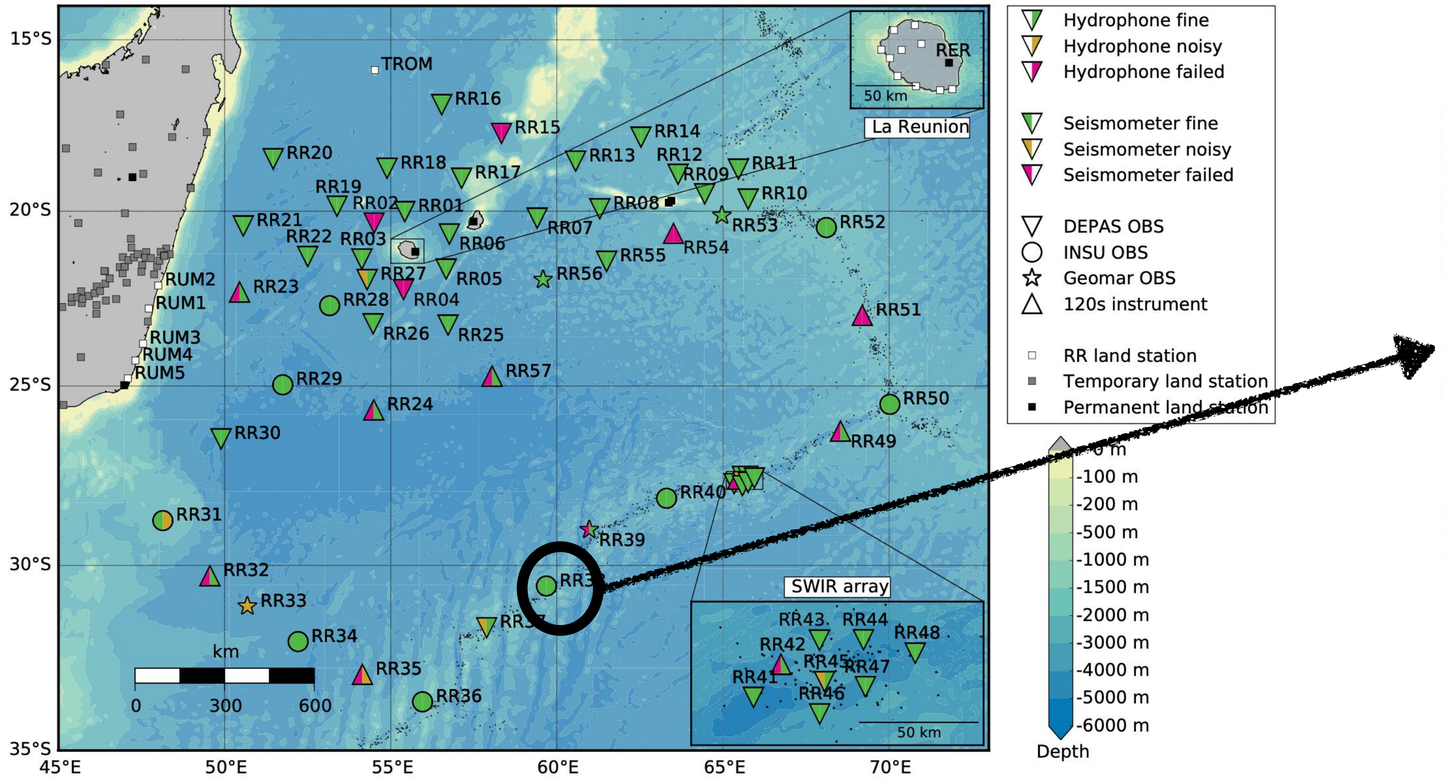
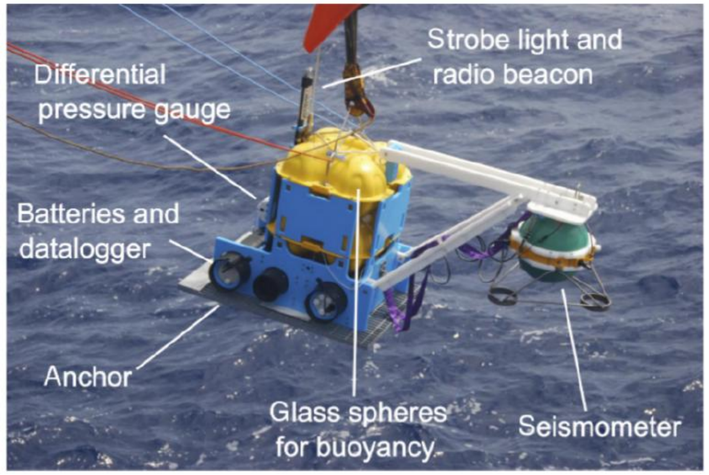
RHUM-RUM Experiment: Ocean Bottom Stations





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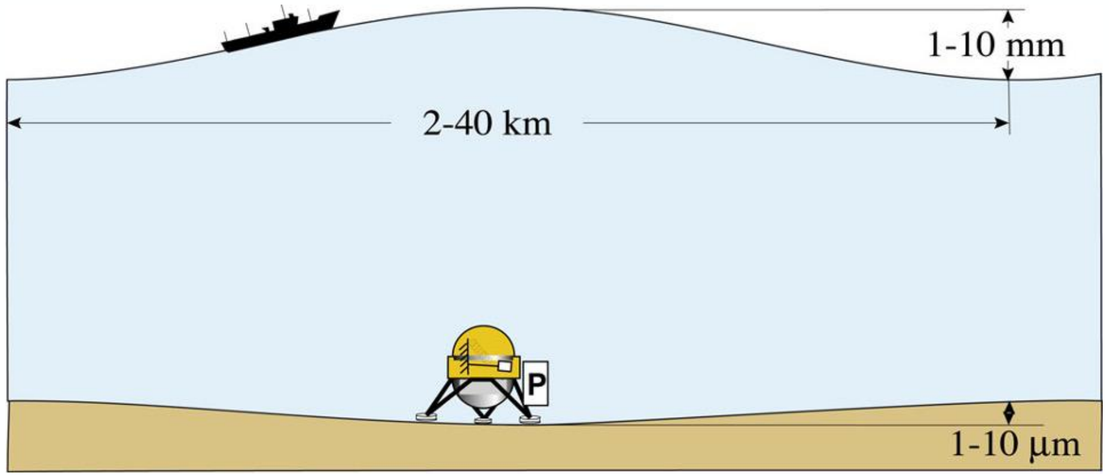
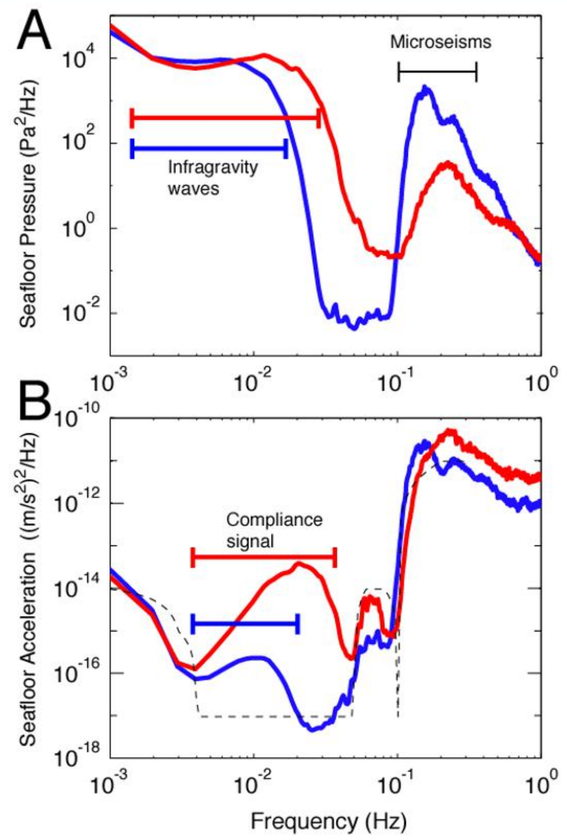
Seafloor Compliance:

Seafloor compliance is a measure of how much the seafloor moves under pressure forcing from ocean waves.

$$\zeta(\omega) \equiv \frac{\mu_z}{\tau_{zz}}\Big|_{z=0}$$

$$\hat{\eta}(\omega) = \frac{\kappa_\omega(\omega)\gamma_{zp}(\omega)}{\omega^2}\sqrt{\frac{|S_a(\omega)|}{|S_p(\omega|}}$$





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Data pre-processing:

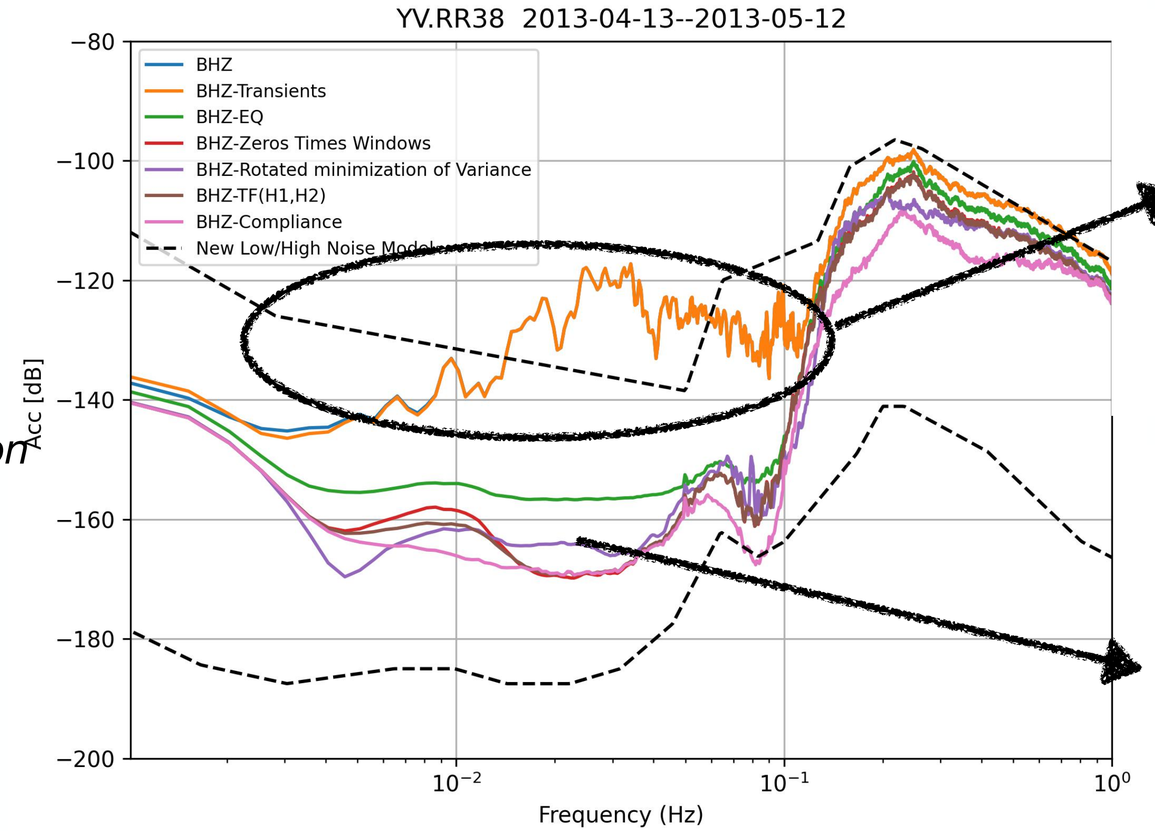
Earthquakes (catalog)

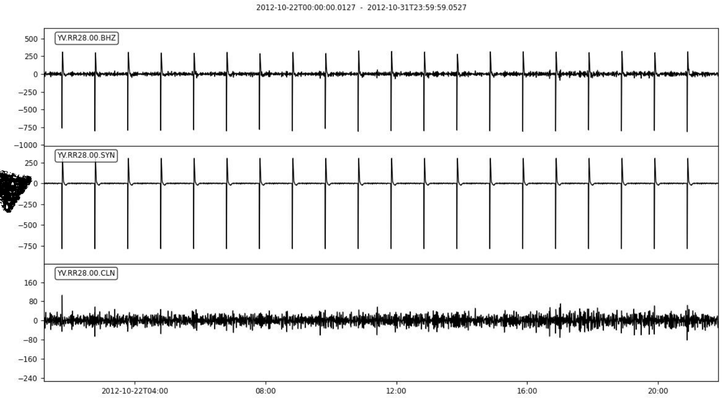
Local earthquakes (recursive STA/LTA)

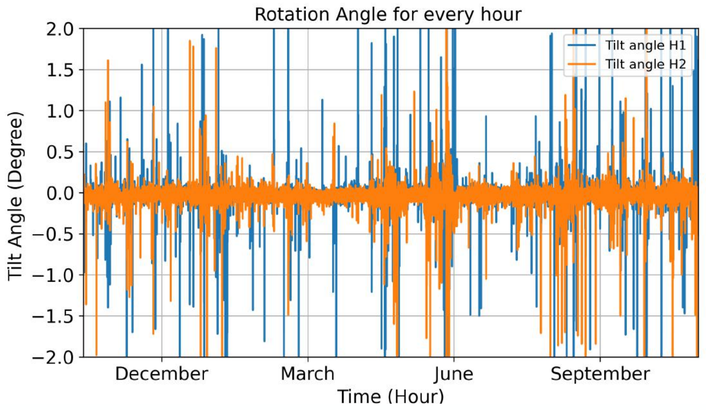
Glitches (comb function)

Tilt correction (minimization of the coherence)

Tilt correction (transfer function)







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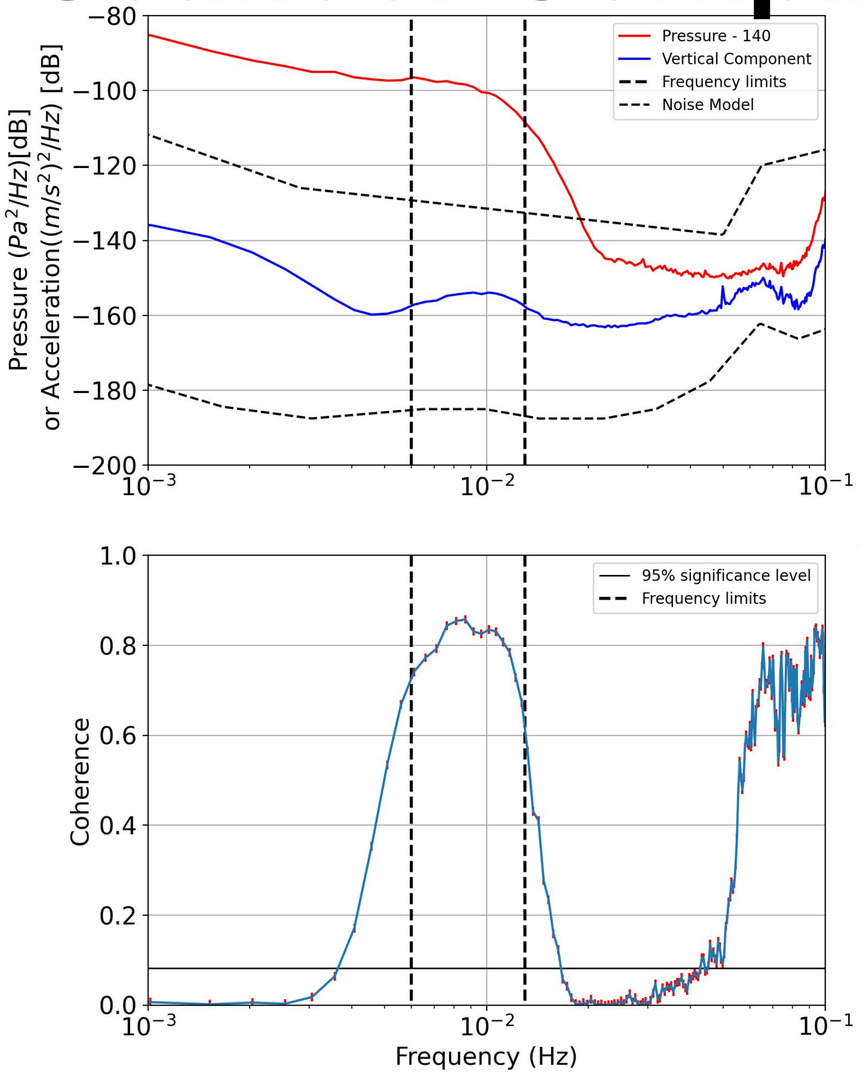
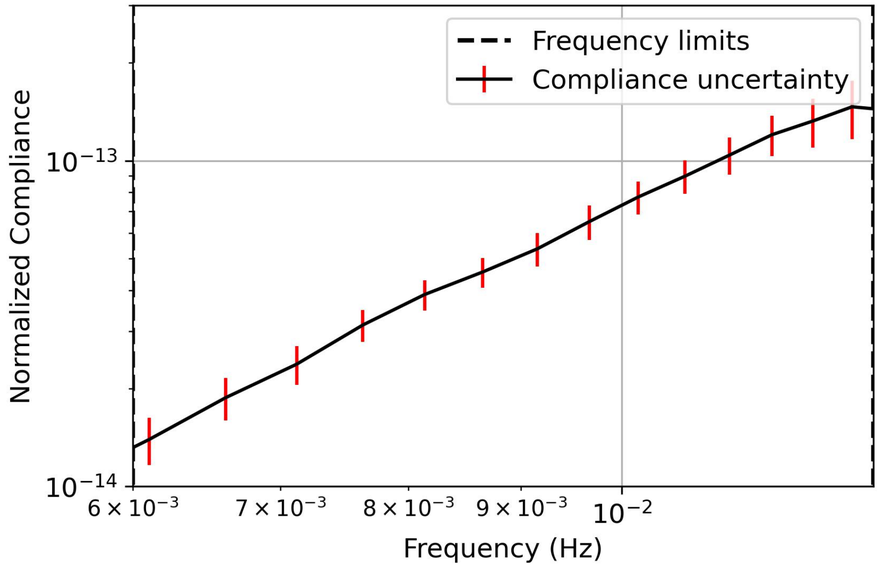
Seafloor Compliance :



$$\hat{\eta}(\omega) = \frac{\kappa_\omega(\omega)\gamma_{zp}(\omega)}{\omega^2}\sqrt{\frac{|S_a(\omega)|}{|S_p(\omega|}}$$



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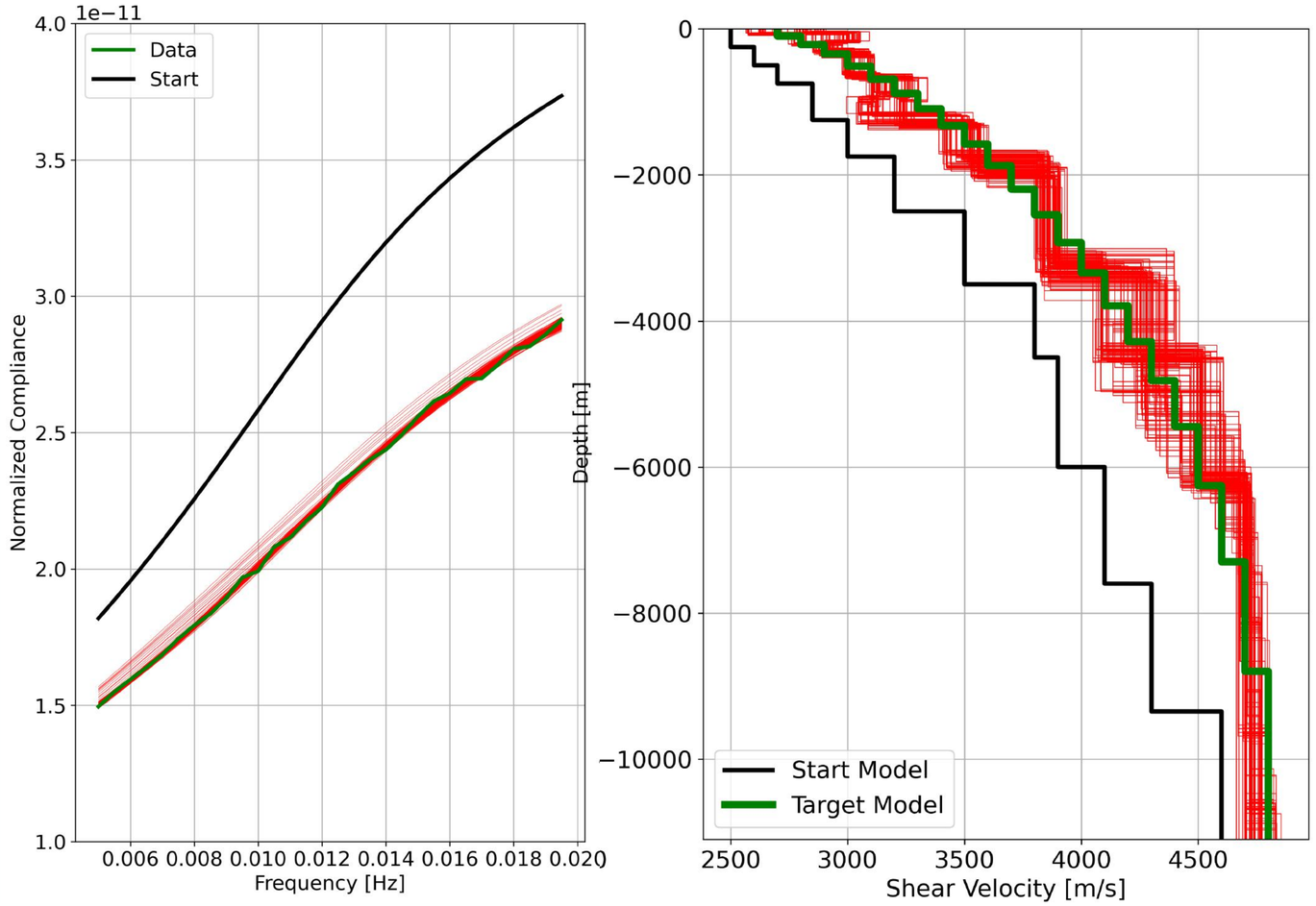
Monte Carlo Inversion
Validation of the method on synthetic data:



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Conclusion:

The compliance function of all broadband ocean bottom seismometers (OBS) in the RHUM-RUM experiment is calculated.

The shear velocity model (0-20 km depth)beneath each OBS can be retrieved by inversion of compliance .

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Thank you for your attention

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