



Low frequency response

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Presented in his absence by
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1. Measurements

2 types of sensors :

→ **Seismic sensors** : Measurement of the ground velocity

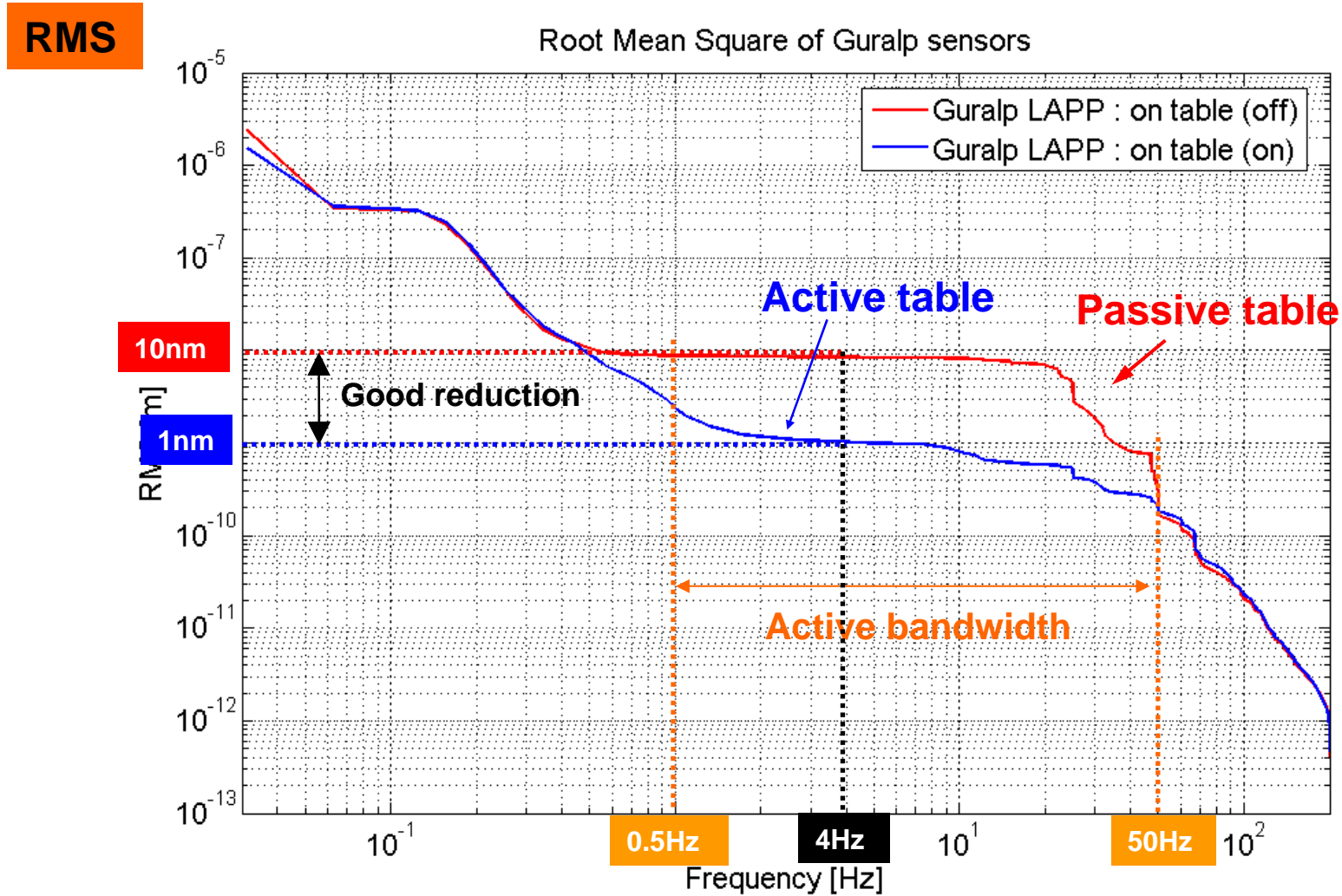
→ **Accelerometers** : Measurement of the ground acceleration

Sensors	VE-13	Guralp CMG-40T	SP400U	GSV-320	ENDEVCO 86
Sensitivity	1V → 1 mm/s	1V → 0.625mm/s	1V → 1 mm/s	1V → 0.5 mm/s	1V → 0.1g
Garanteed frequency range	1 - 315 Hz	0,033 - 50 Hz	0,1-50 Hz	1 - 315 Hz	1-100 Hz
Quantity	2	2	2	2	2



1. Measurements

Introduction
Sensors characteristics
Stabilisation of the ground
Beam vibration study





Experimental set-up



Measurements done simultaneously on the floor and on the table

10 minutes between measurements active table active and passive table

Sensors: Güralp CMG40T , they have a flat response between 0.033Hz and 50Hz

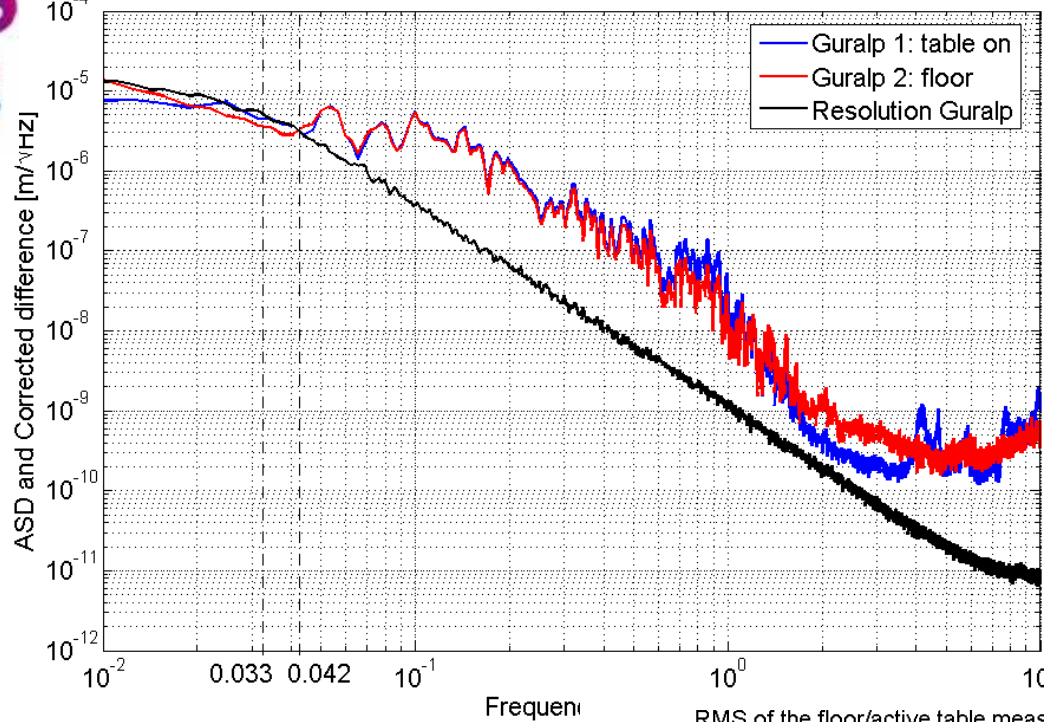
Acquisition system: very low electronic noise

Acquisition parameters:

- Acquisition frequency: 51.2Hz
- Number of points (time scale): 16384
- Frequency resolution: 3.125mHz



ASD of the floor/active table measured by Guralp sensors the day and Guralp resolution



Active table

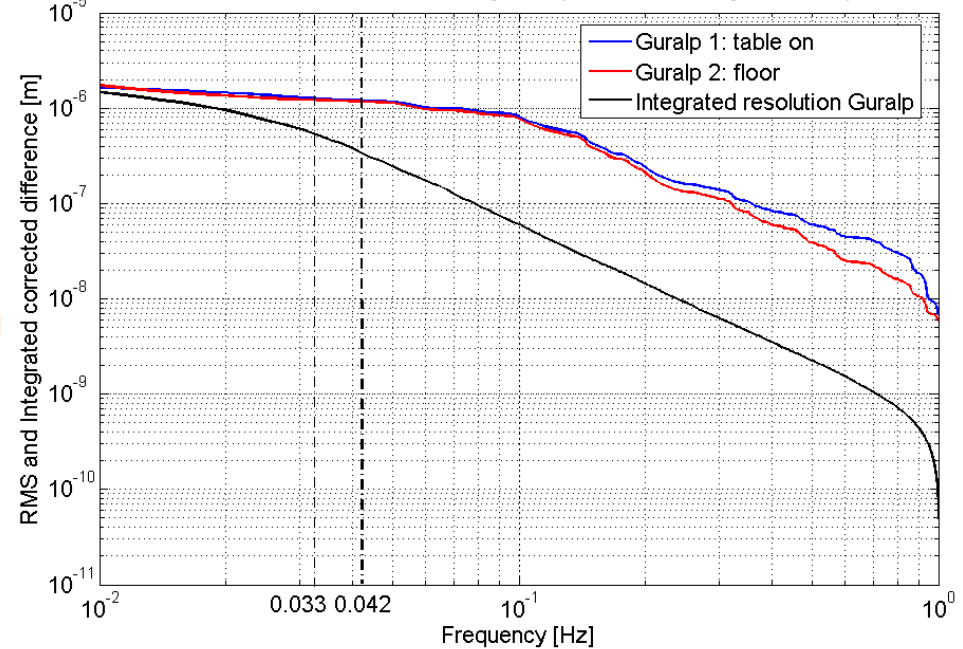
At 0.042Hz and subtracting sensor electronic noise :

Floor RMS: $1.164\mu\text{m} - 0.313\mu\text{m} = 0.851\mu\text{m}$

Active table RMS: $1.187\mu\text{m} - 0.313\mu\text{m} = 0.874\mu\text{m}$

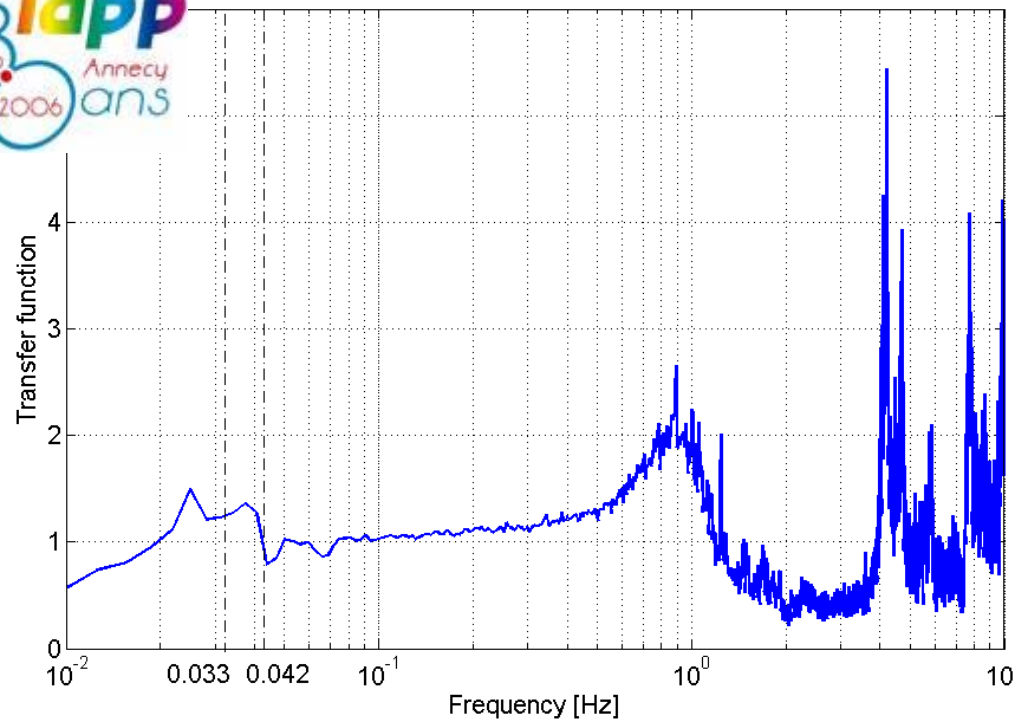
→ Active table amplified vibrations of 23nm between 0.042Hz and 1Hz.

RMS of the floor/active table measured by Guralp sensors the day and Guralp resolution





Transfer function Active table/Floor from measurements performed the day



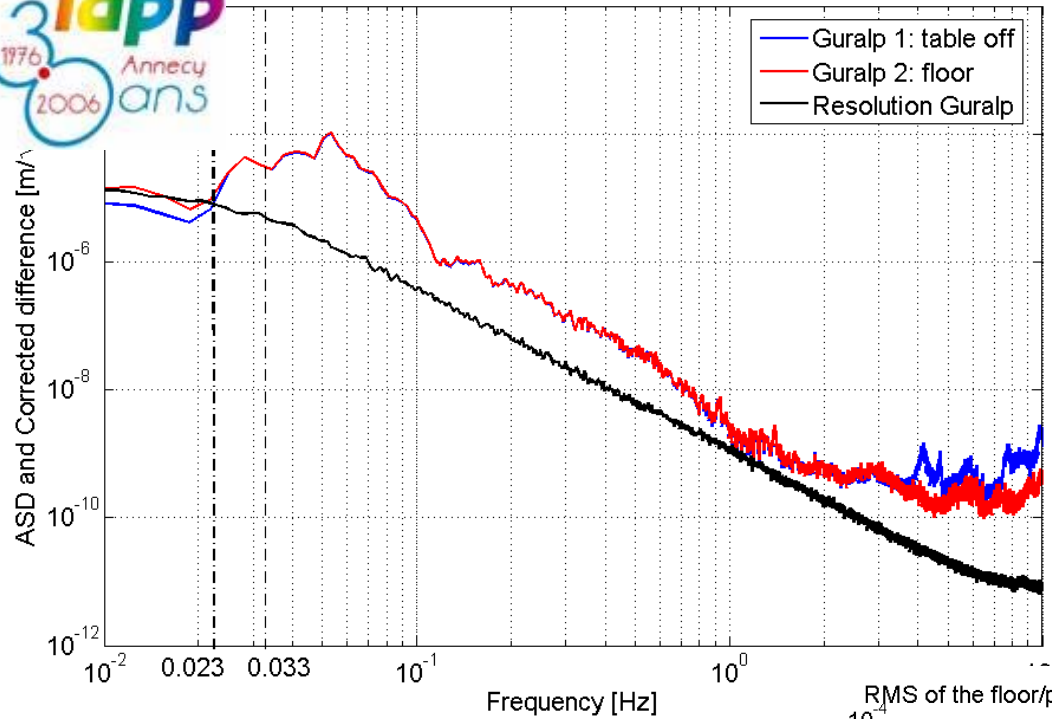
Active table

Vibrations on active table are due to ground motion between 0.042Hz and 1Hz (good coherence, and transfer function close to 1). At 0.042 Hz, table RMS almost equal to floor RMS.

In detail, between 0.042 Hz and 0.1Hz, table slightly dampens vibrations. between 0.1Hz and 0.5Hz, they are slightly amplified above 0.5Hz, other parameters have to be taken into account.



RMS of the floor/passive table measured by Guralp sensors the day and Guralp resolution



Passive table

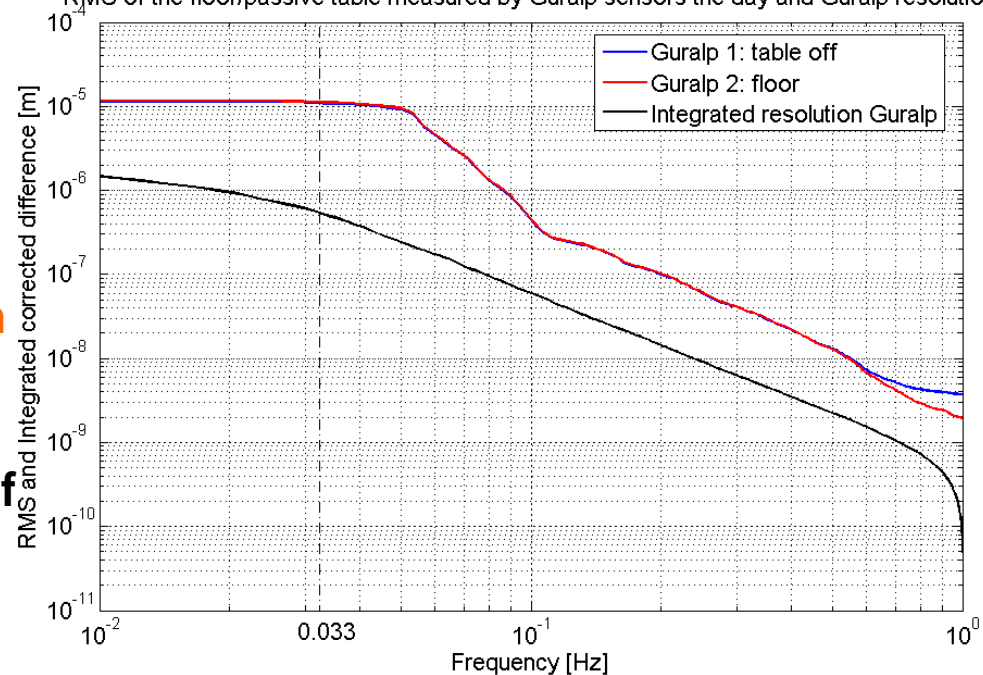
At 0.033Hz and subtracting sensor electronic noise :

Floor RMS: $11.077\mu\text{m} - 0.481\mu\text{m} = 10.596\mu\text{m}$

Passive RMS : $10.782\mu\text{m} - 0.481\mu\text{m} = 10.301\mu\text{m}$

→ Passive table damps vibrations of 295nm between 0.033Hz and 1Hz.

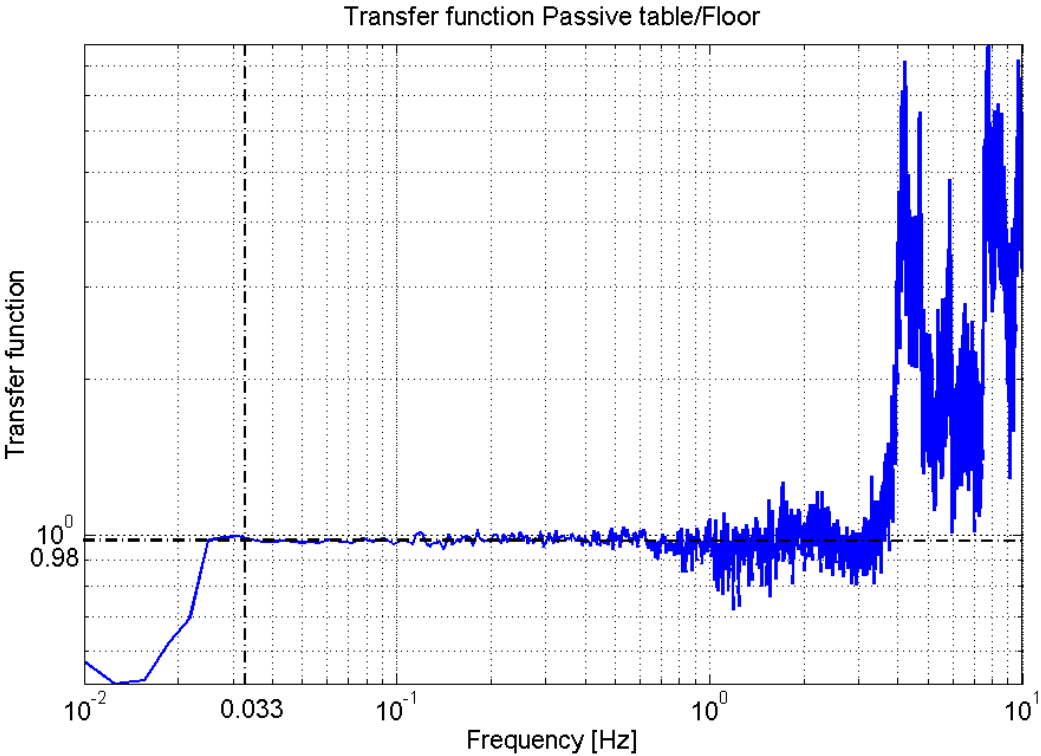
RMS of the floor/passive table measured by Guralp sensors the day and Guralp resolution



Passive table



For comparison, at 0.042Hz,
Floor : 10.242um-0.313um=9.929um
Passive table : 9.964um-0.313um=9.651um
Damping amount: 270nm.



Flat transfer function when table passive

These are the first measurements: ground vibrations were not the same for both measurements.