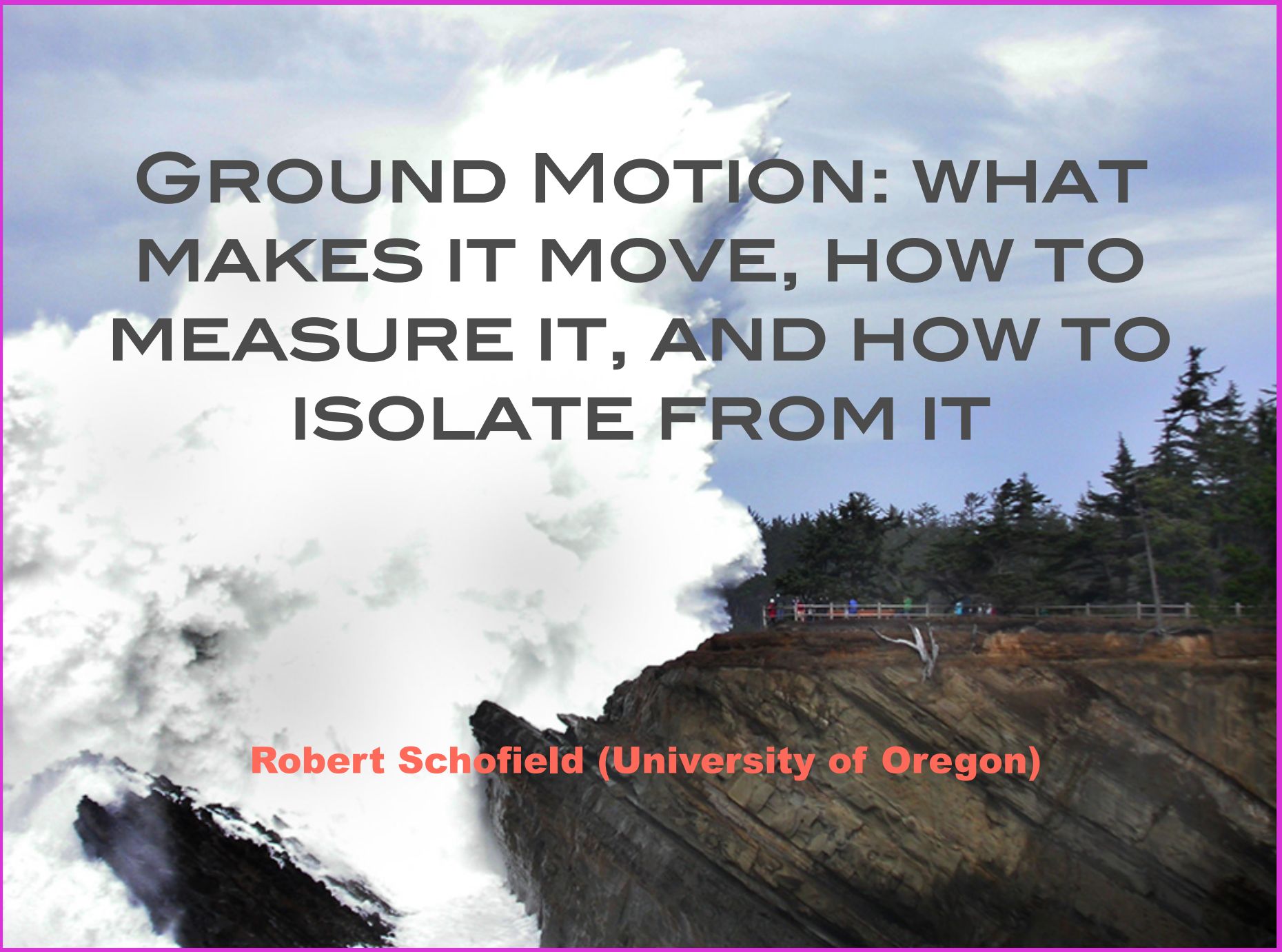
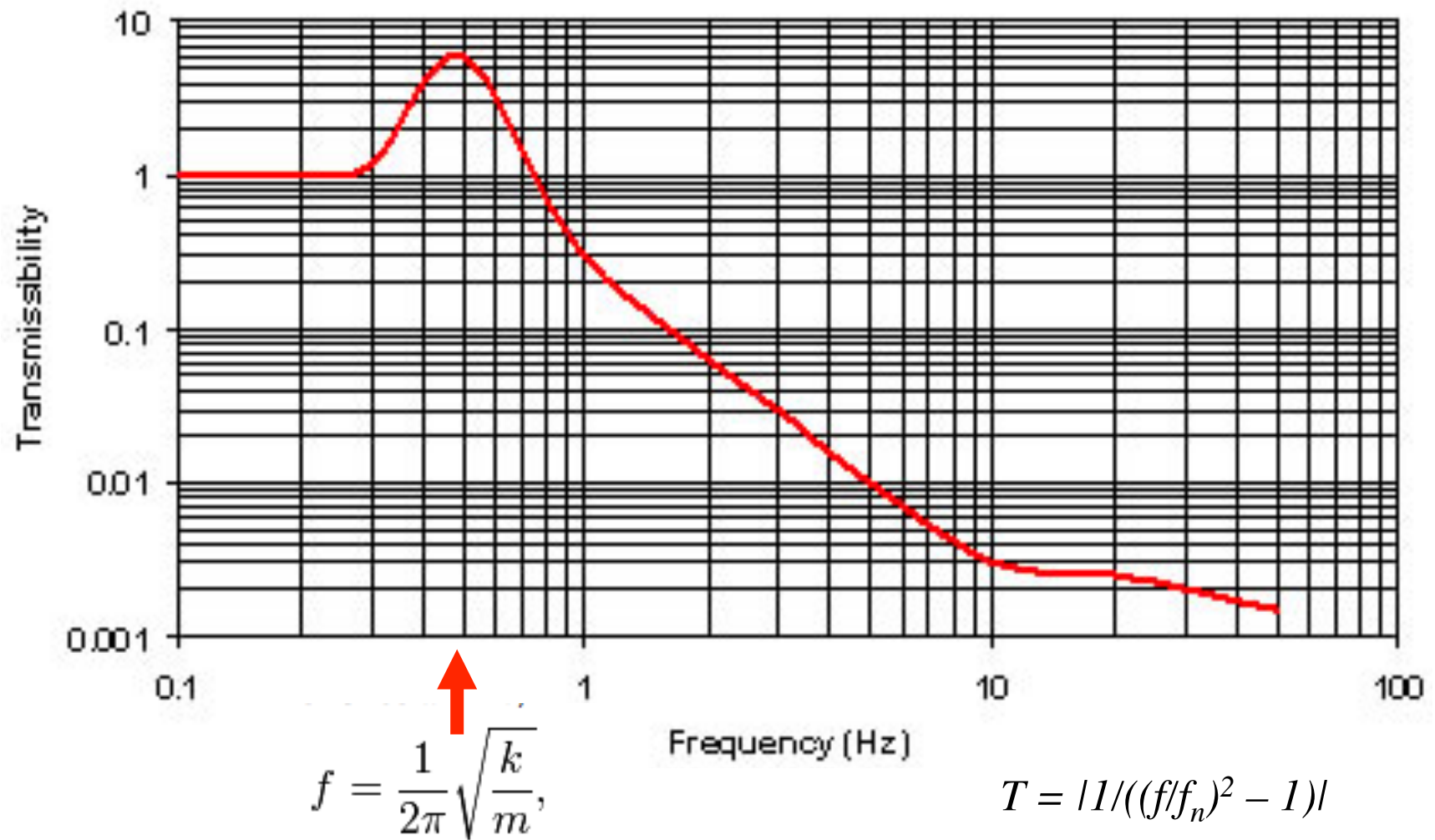


The background image is a composite of three distinct natural scenes. The top half features a bright, overcast sky with large, white, billowing clouds. The bottom left shows a dark, jagged rock formation where white, turbulent waves are crashing. The bottom right depicts a steep, layered rock cliff face, with a line of dark evergreen trees and a wooden walkway visible on the ridge above it.

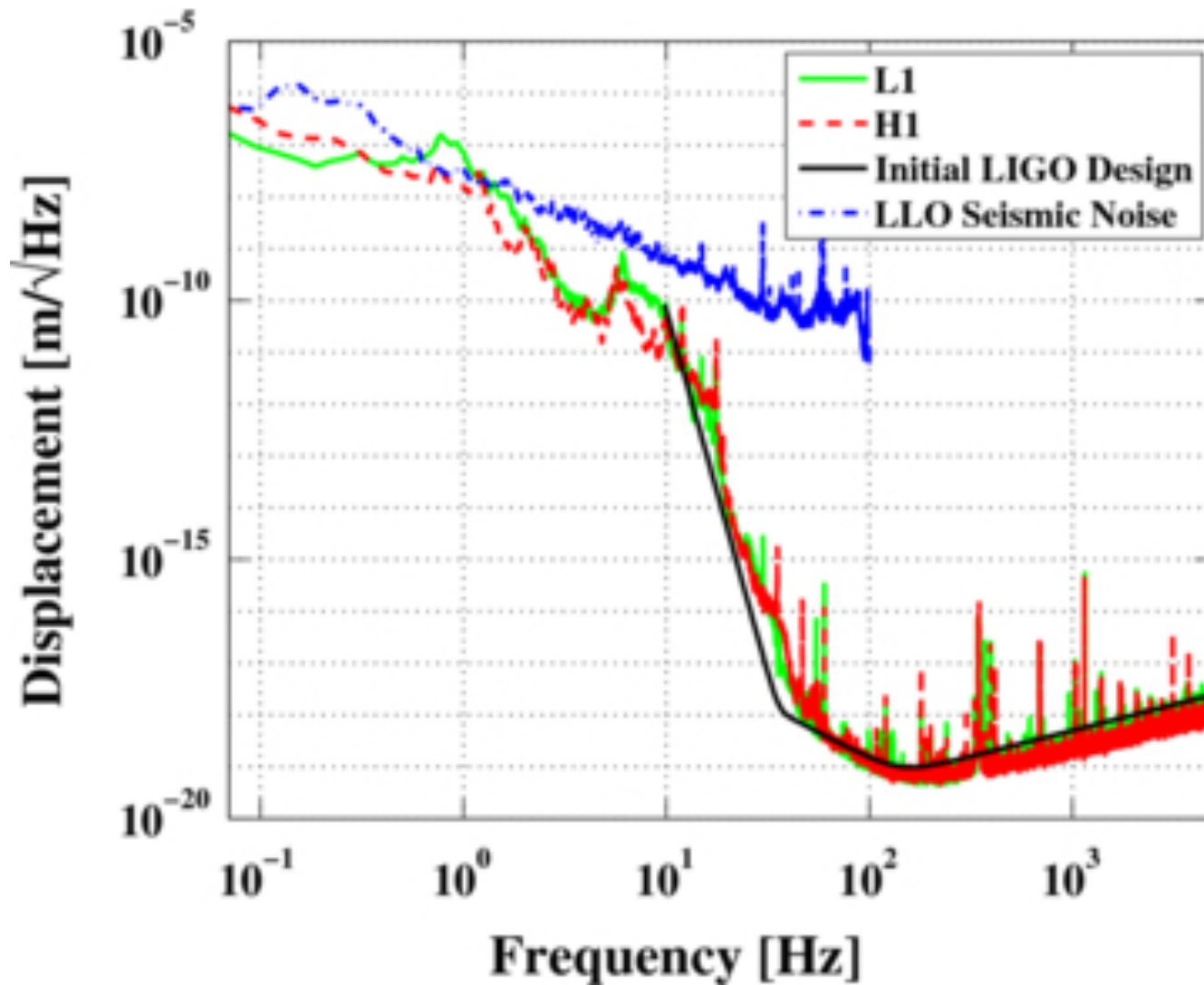
GROUND MOTION: WHAT MAKES IT MOVE, HOW TO MEASURE IT, AND HOW TO ISOLATE FROM IT

Robert Schofield (University of Oregon)

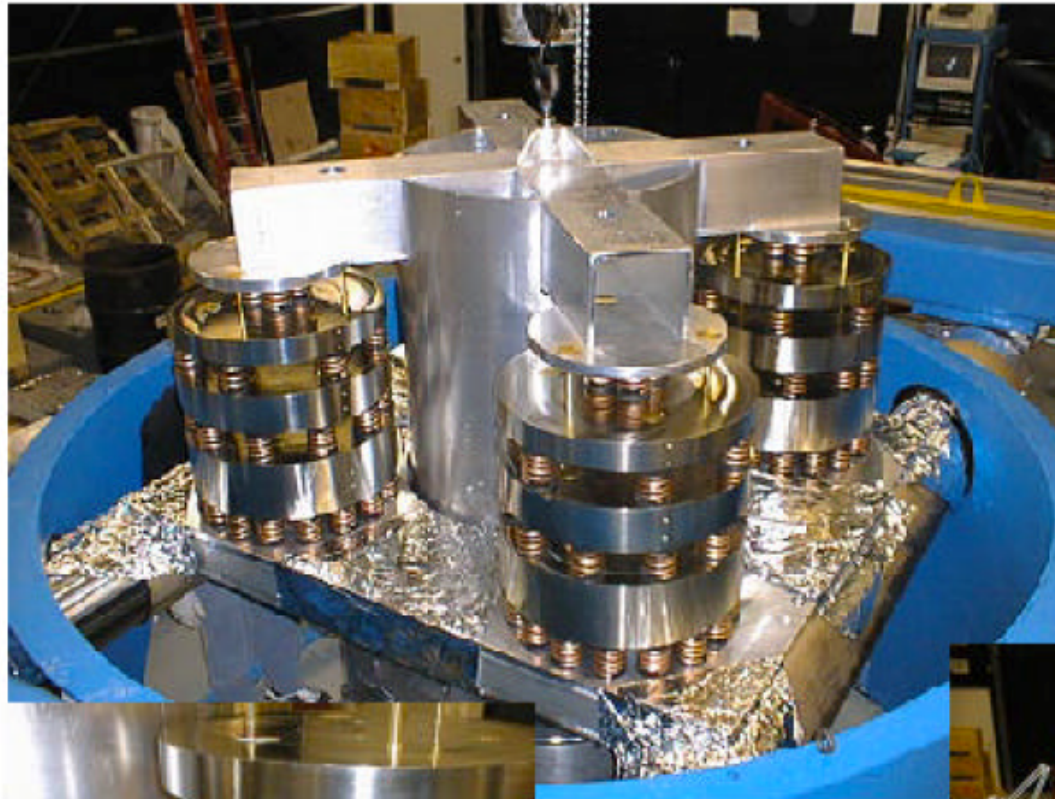
MASS ON SPRING



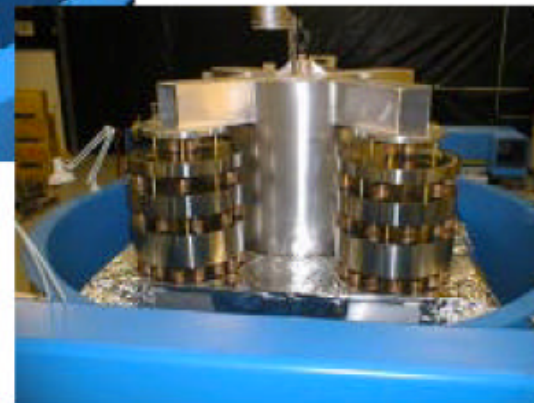
LIGO REDUCED MOTION BY A BILLION AT 100 Hz

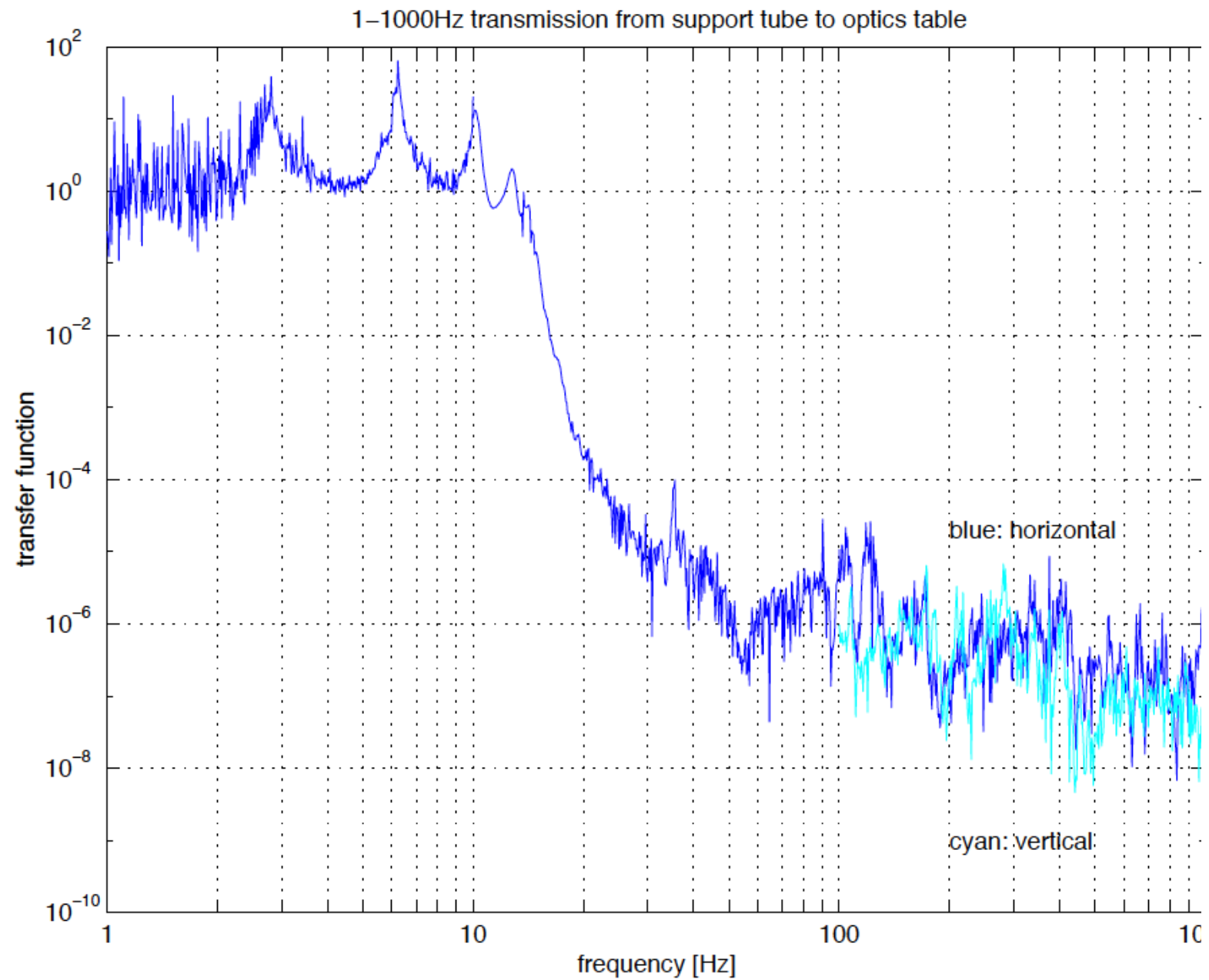


STACKS OF MASSES AND SPRINGS

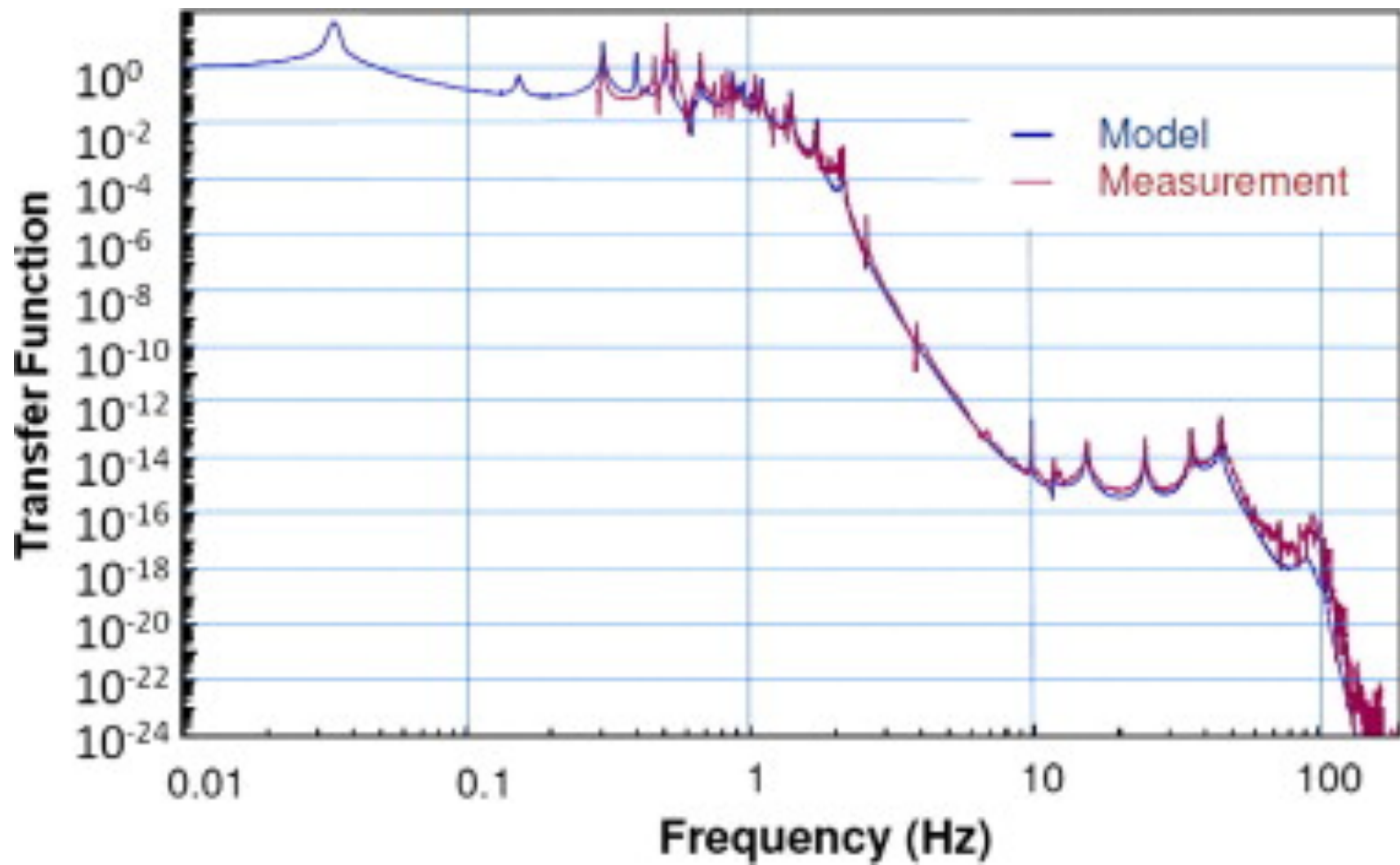


- BSC seismic isolation system assembly inside mockup BSC shell for performance tests [HYTEC, Los Alamos, NM]

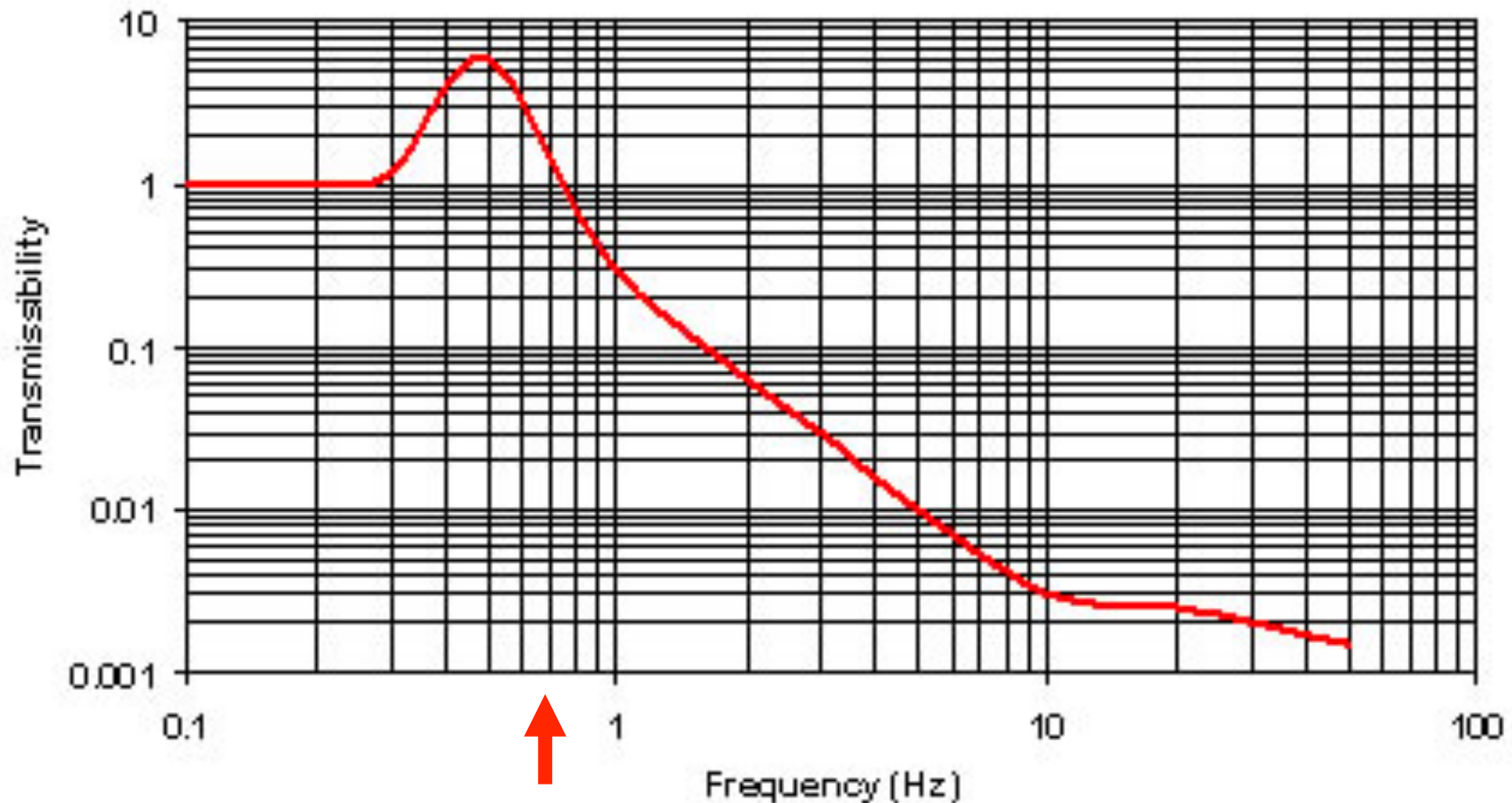




VIRGO



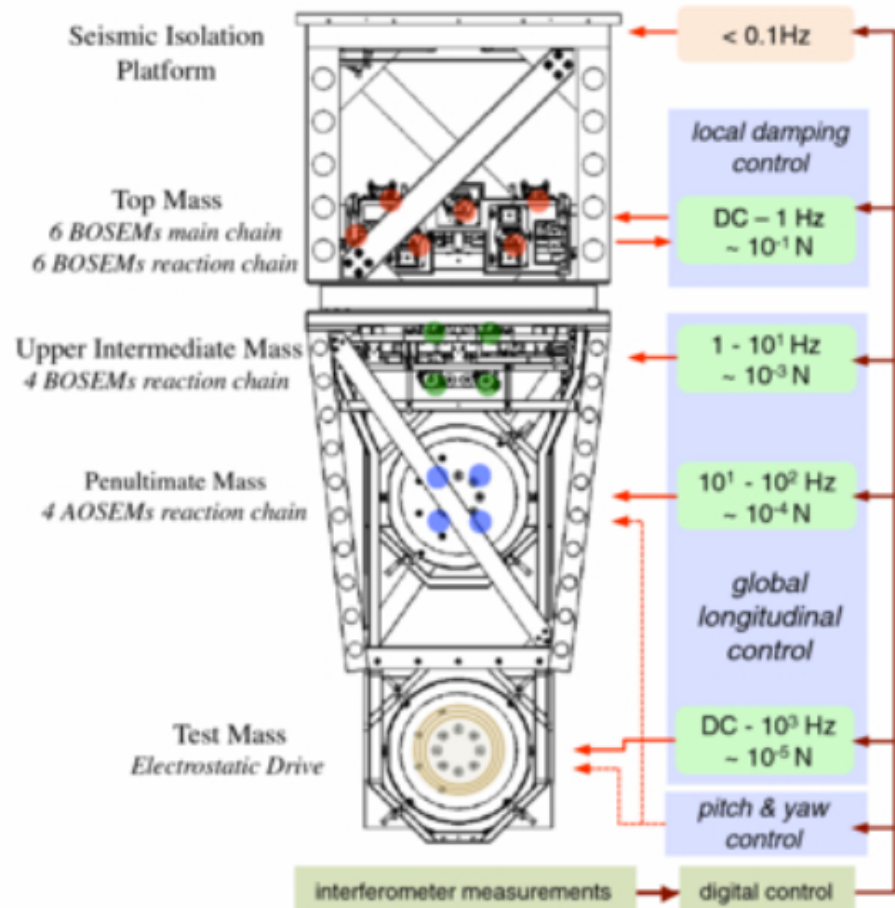
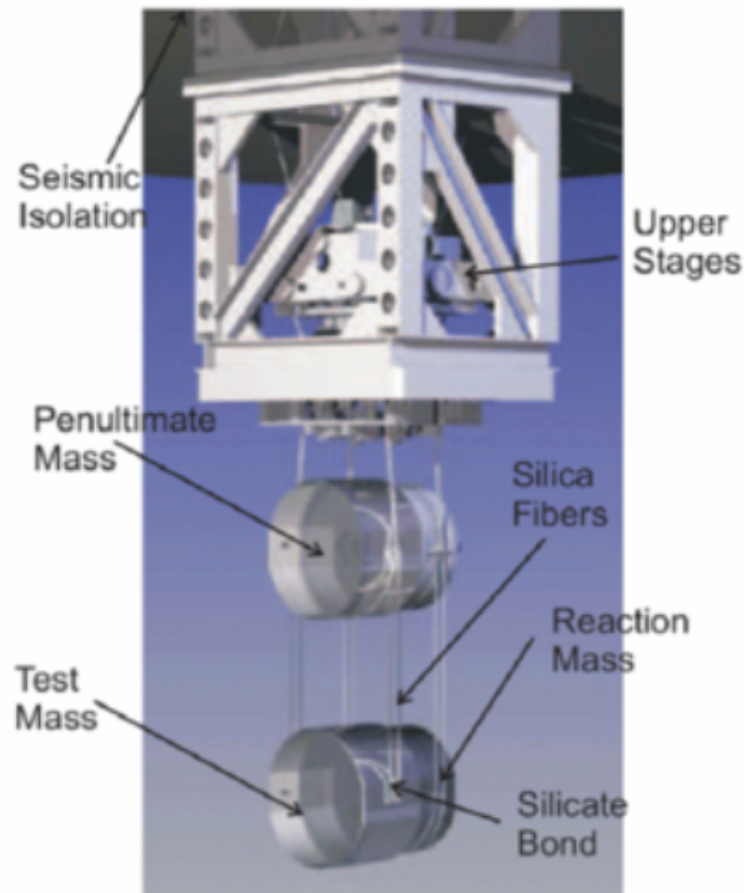
A PENDULUM IS LIKE A MASS AND SPRING



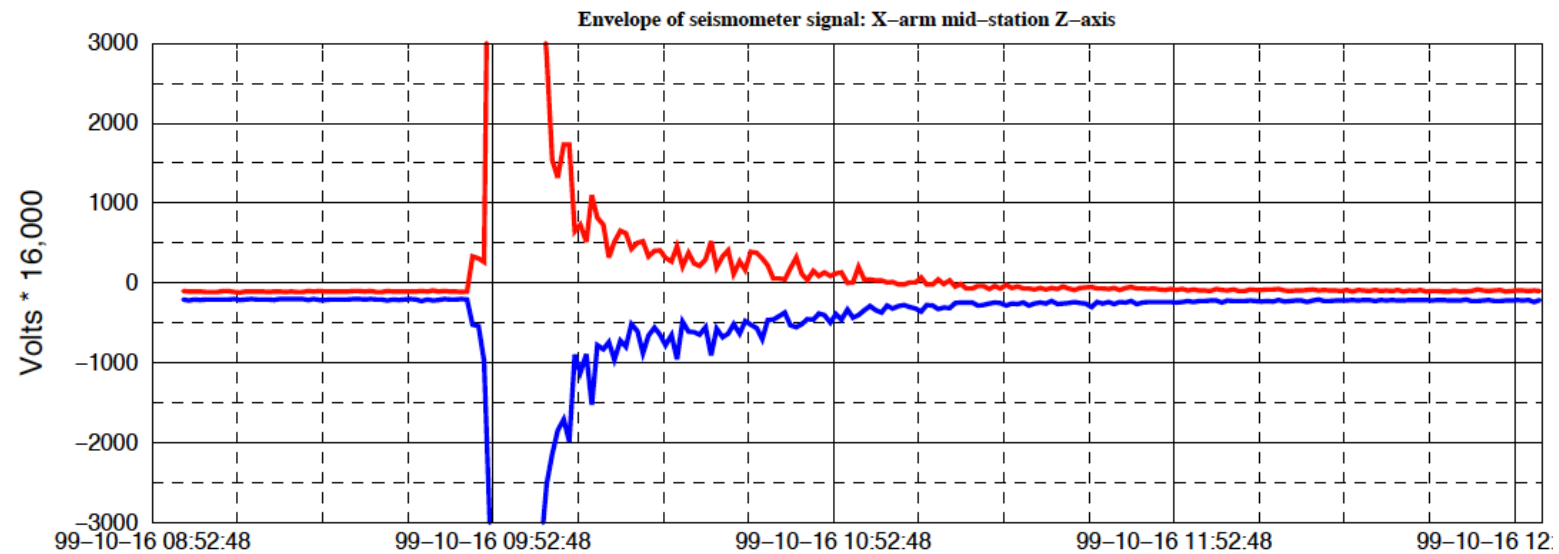
$$f = \frac{1}{2\pi} \sqrt{\frac{g}{L}}$$

$$f = \frac{1}{2\pi} \sqrt{\frac{k}{m}},$$

4 STACKED PENDULA FOR ADVANCED LIGO



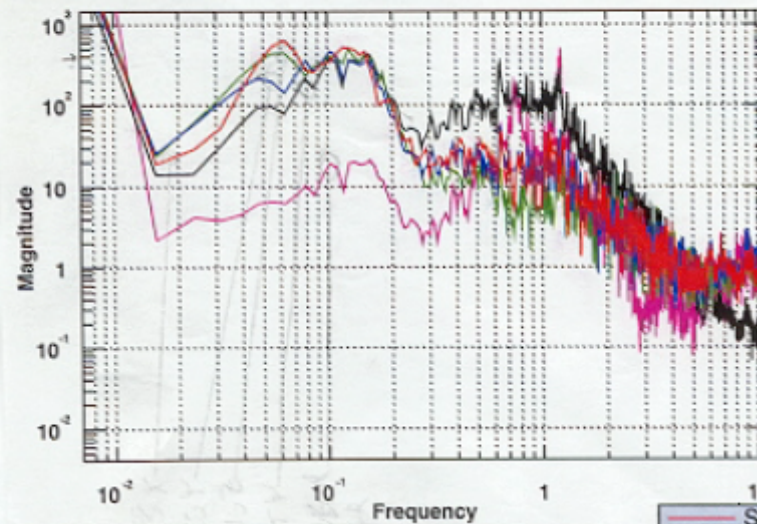
SEISMOMETERS



SEISMIC SPECTRA WITH EARTHQUAKE

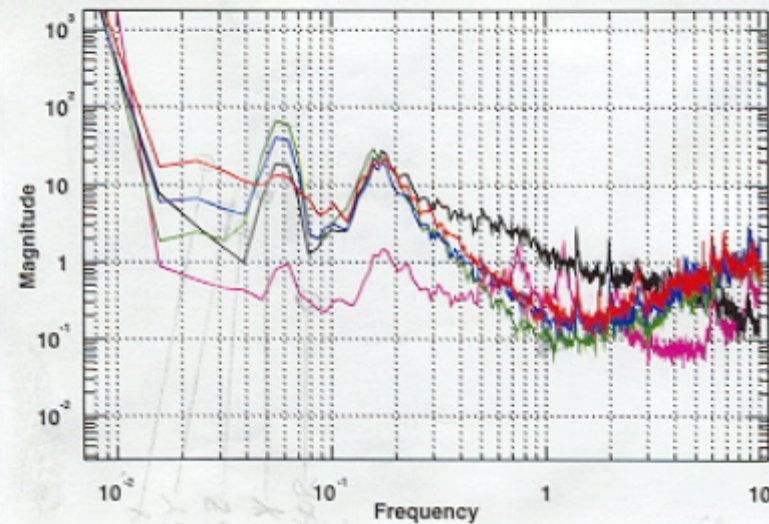
M 5.1, 155 miles off Oregon coast, Jan. 20, 2000

Power spectrum



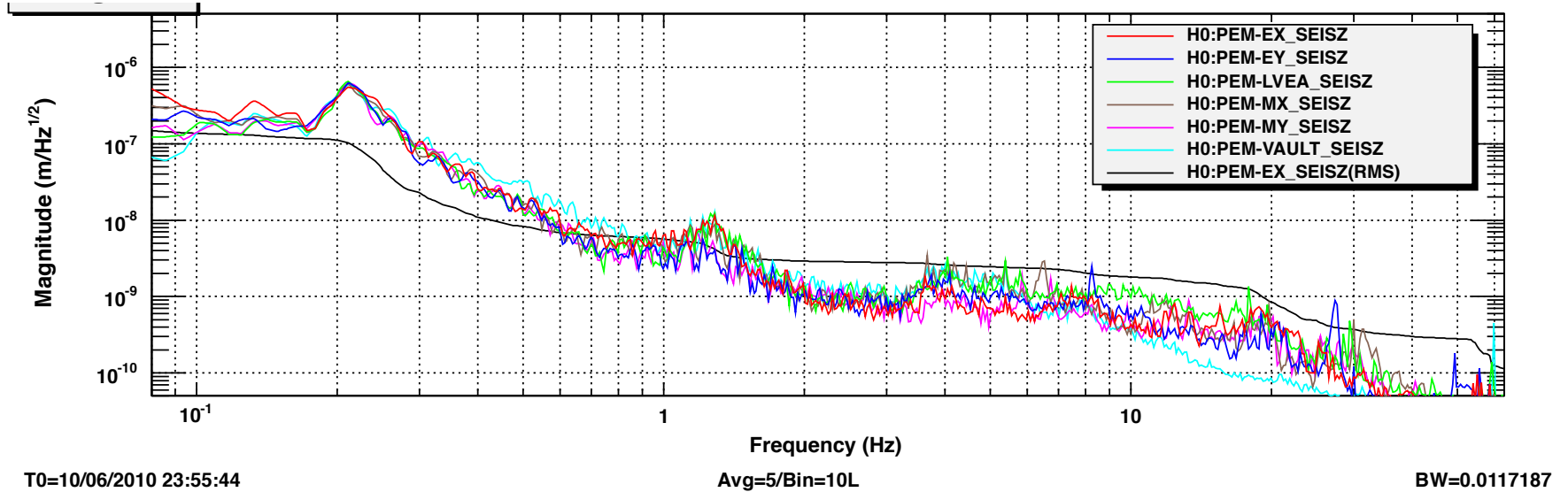
M 5.5, near Kermadec islands, Jan. 20, 2000

Power spectrum

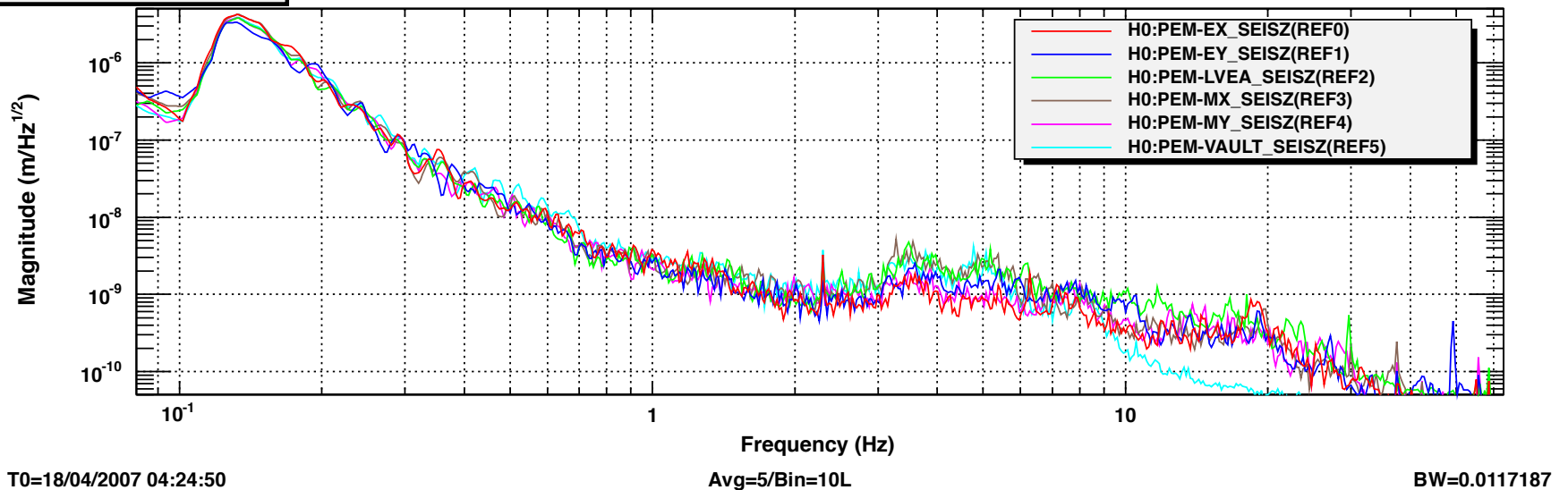


— Seismometer X-axis
— Seismometer Y-axis
— Seismometer Z-axis
— Tilt meter X-axis
— Shadow Sensor (L. R.)

SEISMIC SPECTRA

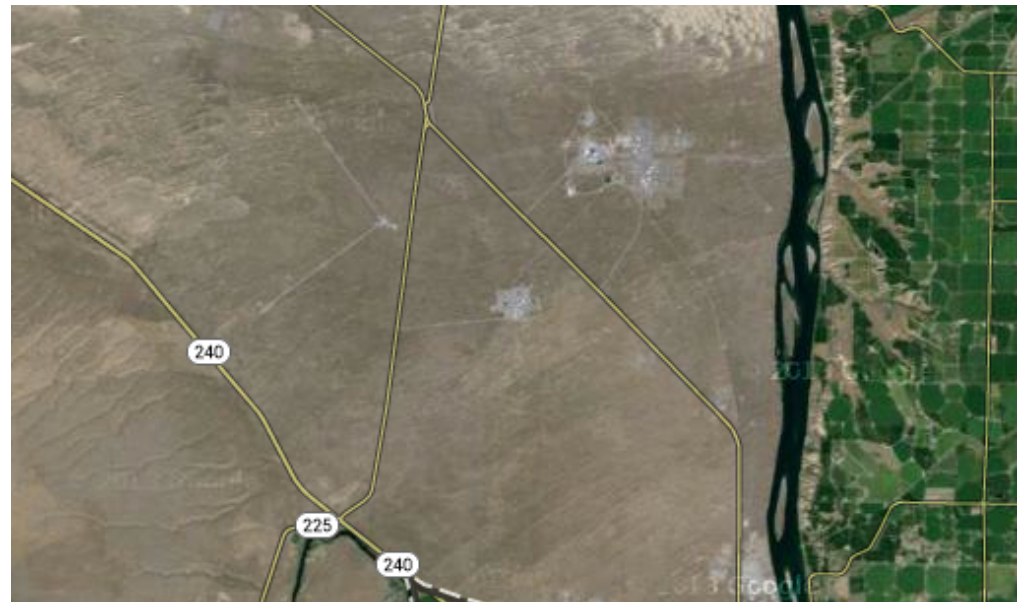


REFERENCE

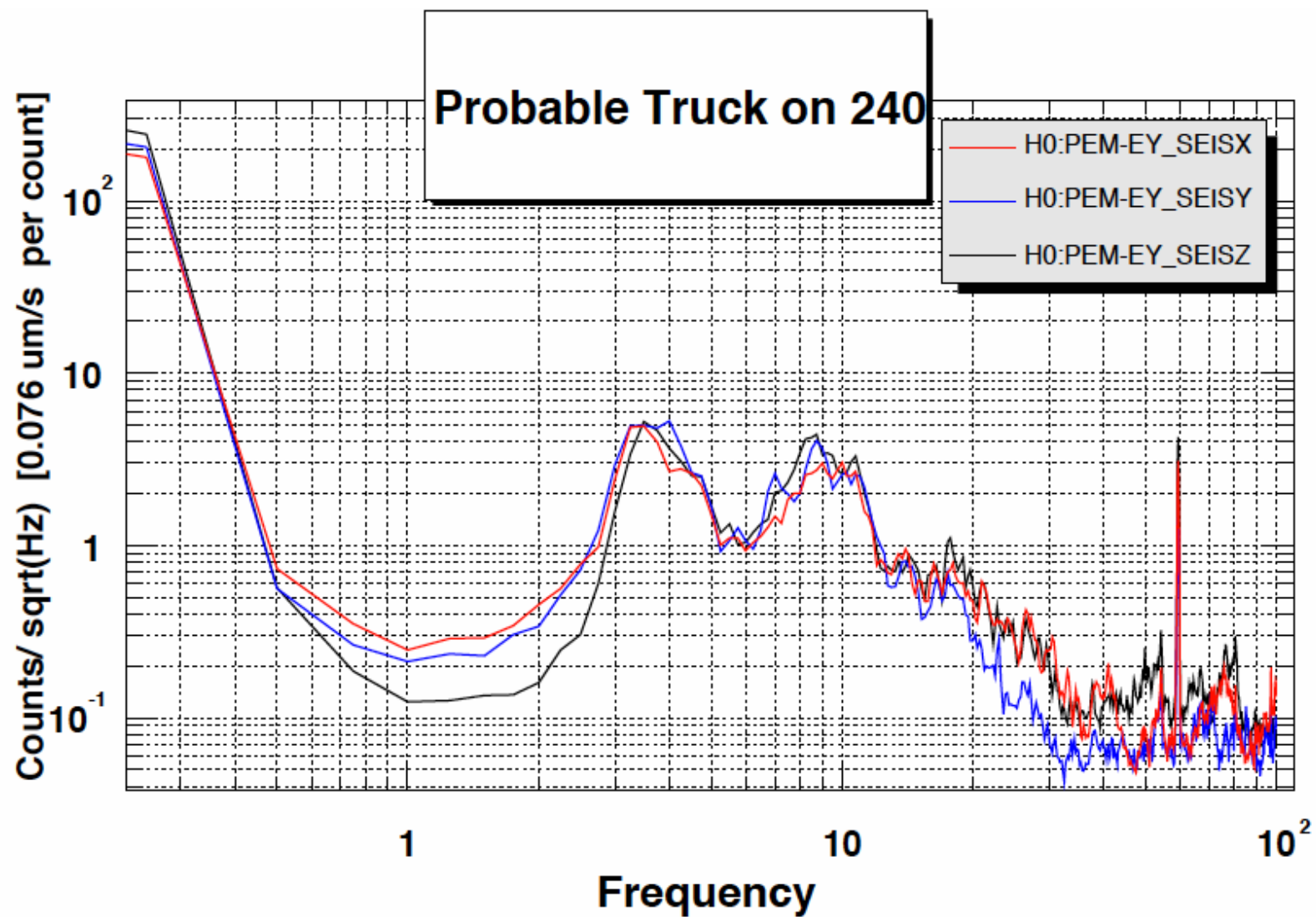




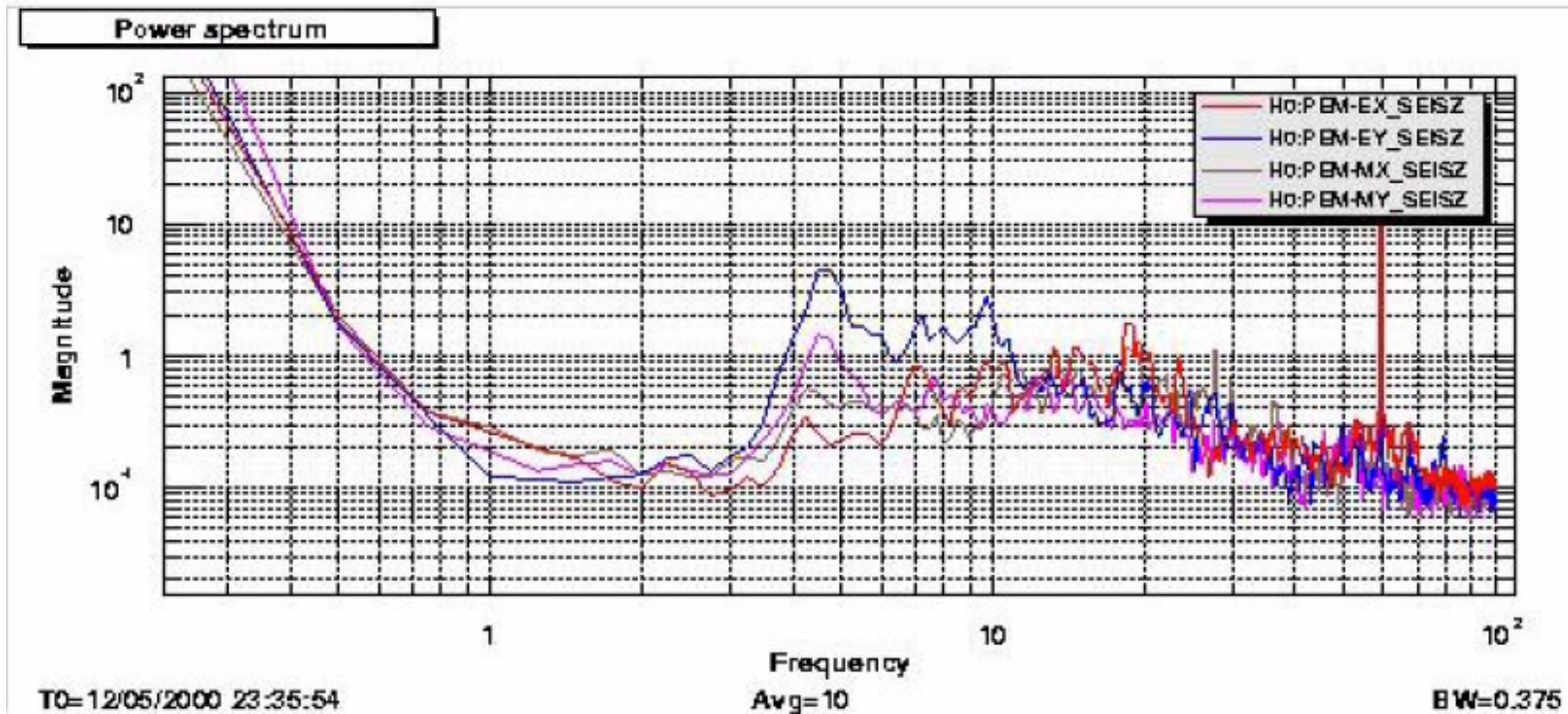
POINTING WITH ARRIVAL TIME DELAYS



TRUCKS

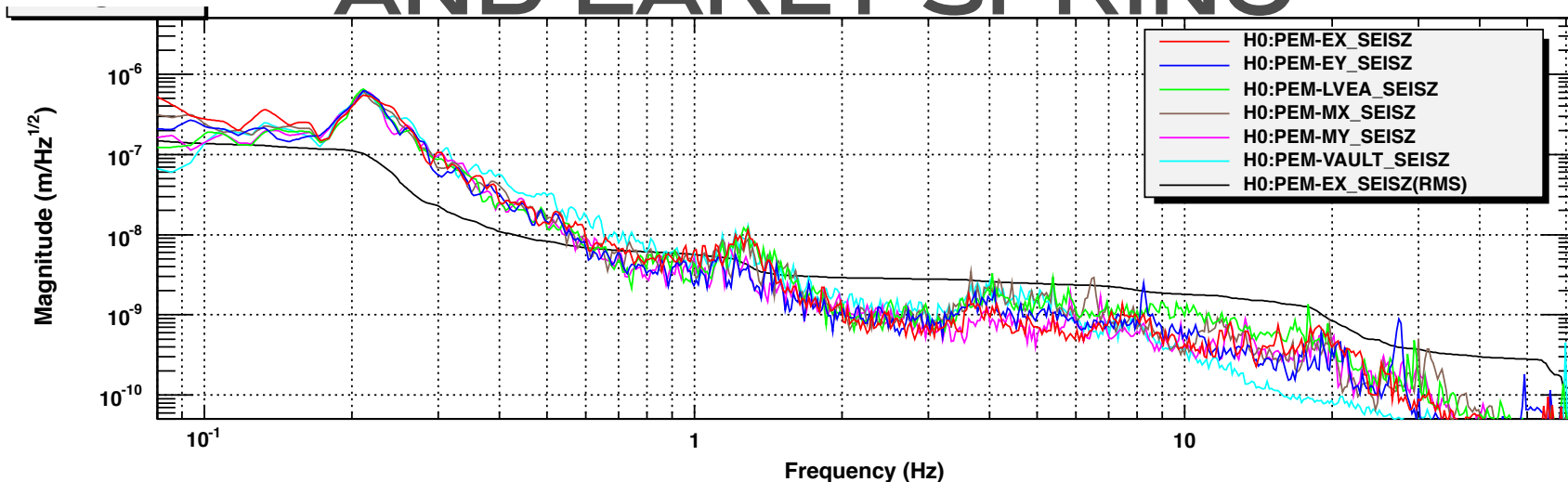


ATTENUATION WITH DISTANCE



$$\frac{A_{mid}}{A_{end}} = \sqrt{\frac{R_{end}}{R_{mid}}} e^{-\pi(R_{mid} - R_{end})/Q\lambda}$$

SEISMIC SPECTRA, LATE SPRING AND EARLY SPRING

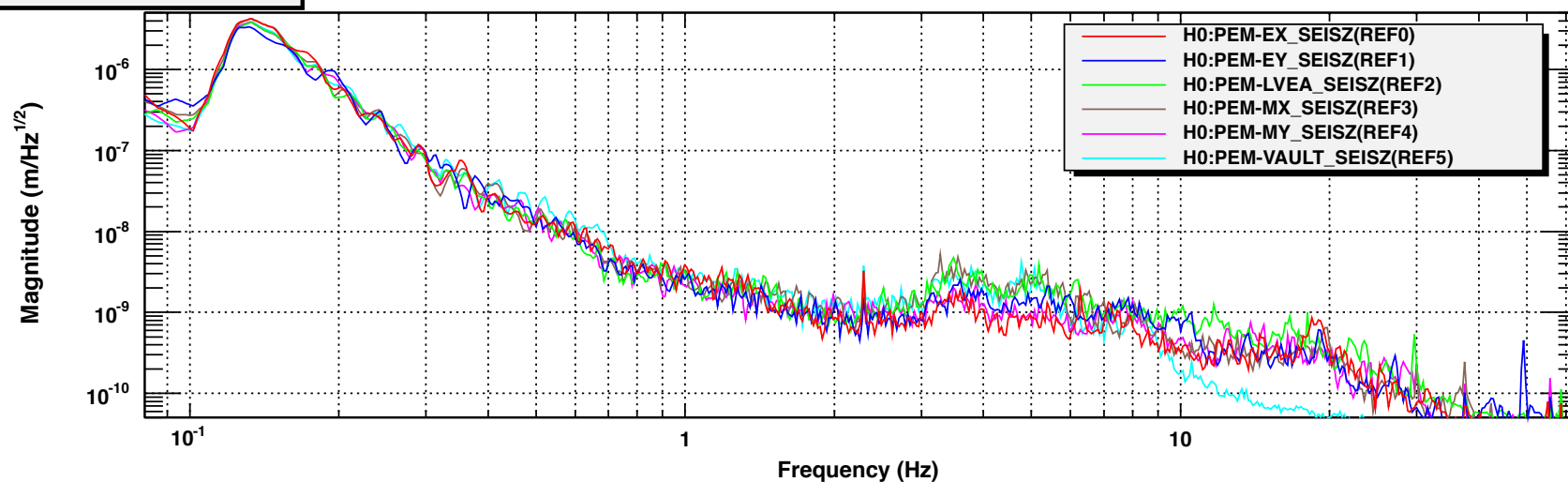


T0=10/06/2010 23:55:44

Avg=5/Bin=10L

BW=0.0117187

REFERENCE



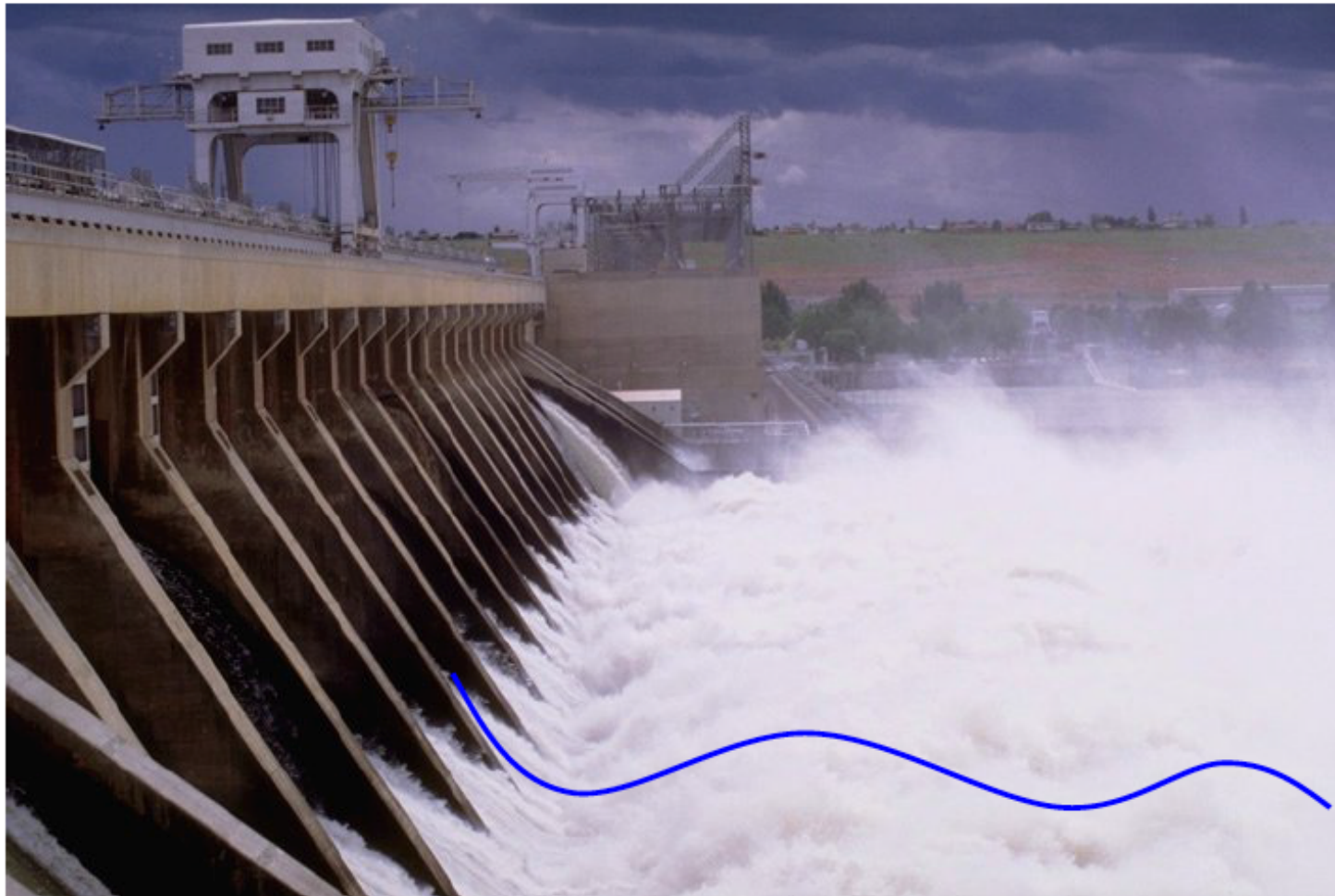
T0=18/04/2007 04:24:50

Avg=5/Bin=10L

BW=0.0117187

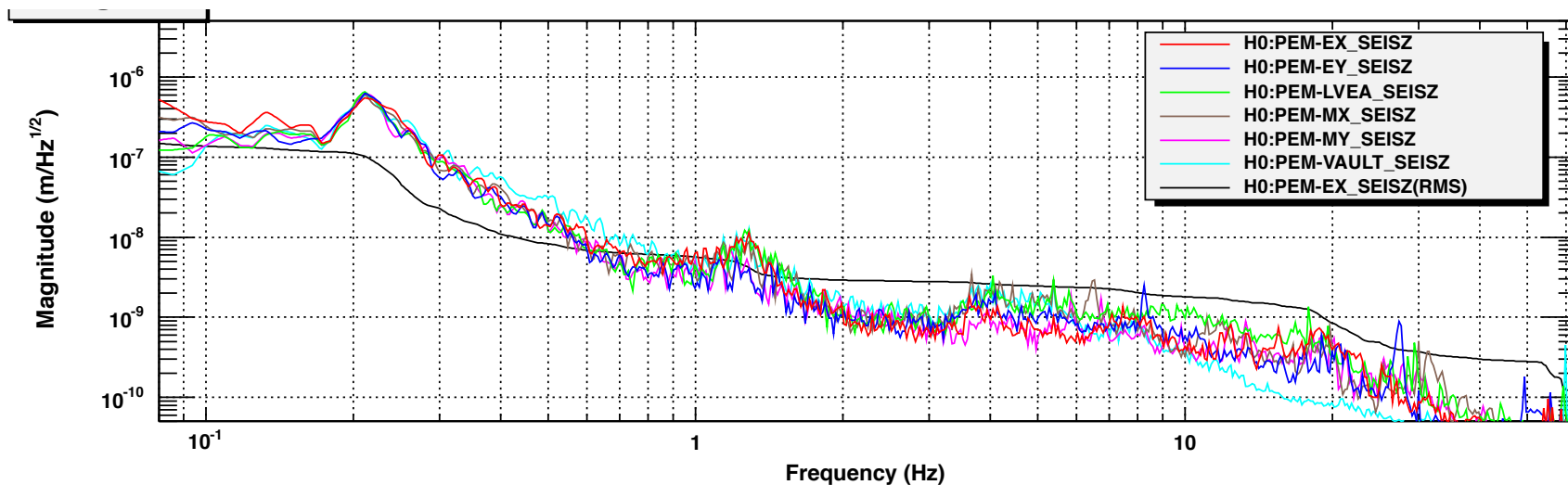
Dam affects inspiral range through upconversion of seismic signal at 1.2 Hz.

“Bounce” of water timed at 1 to 0.3 second.



Large mass bouncing on the ground at our most sensitive frequency

SEISMIC SPECTRUM

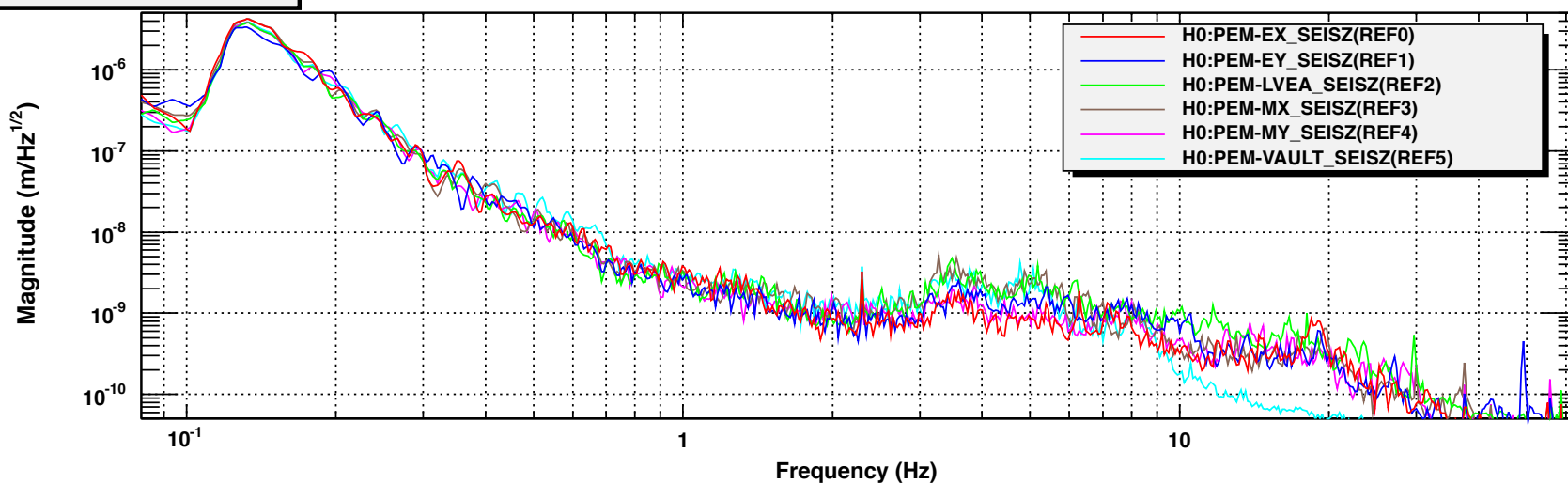


T0=10/06/2010 23:55:44

Avg=5/Bin=10L

BW=0.0117187

REFERENCE

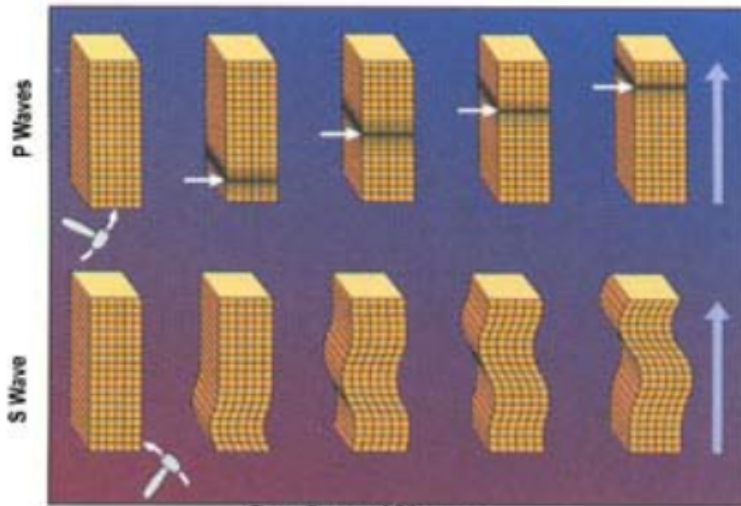


T0=18/04/2007 04:24:50

Avg=5/Bin=10L

BW=0.0117187

Body Waves



Surface Waves

