Geophysical Research Abstracts, Vol. 7, 05553, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05553

Surface wave dispersion inversion when the 1D assumption breaks down

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Dispersion analysis of surface waves methods can provide useful information about the subsurface, but is subject to experimental and theoretical limitations. Numerical simulations are used to study these limitations, but validation of theory and numerical code with an analysis of real data is generally necessary. However, most of the time the complexity of field studies do not allow us to isolate the parameters of interest. Physical modeling of surface waves using laser-Doppler vibrometry can provide useful data, bridging the gap between numerical simulations and field studies. As an illustration of this, we present an example which implicates two major limits of the dispersion analysis of surface waves: the horizontally layered medium (1D) assumption and the limitations of the spread length. We show the effects on the dispersion curves of non-horizontal layering under the array of receivers. Without strong a priori information or alternative geophysical tools, an interface sloping only a few degrees can bias the inverse problem significantly.