Geophysical Research Abstracts, Vol. 5, 11237, 2003

CHARACTERIZATION OF THE RAYLEIGH WAVE POLARIZATION ATTRIBUTES WITH CONTINUOUS WAVELET TRANSFORM.

M. S. Diallo(1), **M. Holschneider** (1), M. Kulesh (1), F. Scherbaum (2), F. Adler (1)

(1) Institute for Mathematics, University Potsdam, Germany.(hols@math.uni-potsdam.de, Tel: 0049 331-977-1663, Fax: 0049 331-977-1578)) (2) Faculty of Geoscience, University of Potsdam, Germany.

Rayleigh wave also termed sometime as “Ground Roll” is an elliptically polarized surface wave that propagate with relatively low velocity, low frequency and high amplitude compared with other seimic event related to the body waves.

Characterization of the Rayleigh waves is very important in earthquake seismology as they are responsible for destructive effect of quakes. In that field, their charaterization has proven to be the tool of choice for subsurface charcterization. For example, information gained from this wave type can be used for the design of quake resistant infrastructural building, for nuclear explosion monitoring and even most recently in forensic seismology. In exploration seismic however, this wave type constitutes the main type of coherent noise, that interfere with the desirable refelection events in later times. They must be filtered or completly eliminated in order to clearly recover the refelction signal. Because of the strong dispersive properties of the Rayleigh wave in an hetergeneous media which usually characterize the near subsurface (Where surface wave energy is the most important), it’s not possible to design an optimal emitter and receiver layout to filter these wave during acquistion. It’s therefore necessary to ressort to other filtering methods during porcessing.

This contribution is concerned with the characterization of the Rayleigh wave regardless of the way they are perceived by the earthquake seimologist or exploration geophysicst by using continuous wavelet transform (CWT). We particularly show how to use CWT with multicomponent seismic data to extract frequency dependent polarization attributes. We also investigate the inverse problem that aims at finding the

diffemorphism that govern the deformation of the wavelet phase of a given seismic events such as a porminent Rayleigh arrival. Defining this operator allows the determination of the velocity dispersion of the Rayleigh wave and to some extent the associated attenuation charactersicitcs of the subsufarce.