We used moderate earthquakes with magnitudes ranging from 4.5 to 5.0. The dataset is shown in Figure 1, and consists of 14 local earthquakes recorded by the instruments of MASE from February 2005 to May 2006.

The smoothed spectra of the vertical velocity-component for P wave is calculated from a 3.5 s time window, beginning 0.5 s before the arrival pick, after 5% cosine taper is applied. A smoothed spectrum of noise is also calculated from a 3.5 s time window immediately preceding each signal window in the same way. Tests show that changing the window length from 2-5 s does not produce significantly different spectra in the frequency band used, so a constant 3.5 s window length was used for all the events. The signal is kept for further analysis if the signal-to-noise ratio is greater than 2, in a frequency band 0.5 to 7-30 Hz.

In Figure 2, two velocity spectra are calculated for two paths with the same distance from an event. The blue one is mainly through the crust, and the red one is mainly through the mantle wedge. From figure 2, we can see that the wave passing through the mantle wedge attenuates more than the wave passing through the crust.

A complete set of path-average Q determined for one event is provided in Figure 3 for example.

We can see that the average Q for the wave path through the mantle wedge is smaller than that for the path through the crust. This indicates that the mantle wedge is characterized by higher attenuation property than the crust.