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Consideration of broadband seismic observation on Mars.

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The surface of Mars has been extensively investigated and huge amount of data have been acquired such as high Res images. On the other hand interior of the Mars has been only weakly constrained by the mean density, the moment of inertia and gravity data. The size of core is poorly constrained and negatively correlated with the core density. High dissipation state is reported for the mantle by tidal interaction (Bills et al 2006), which is against a conventional view of small, cool planet. To clarify these points seismic observation on Mars is deadly needed.

Japan Mars exploration project(MELOS) is now under discussion and it includes seismic measurements for determination the interior structure of Mars such as the core size, its state and attenuation in the mantle. Our plan is to install broadband high sensitivity seismometers, which are intended to detect continuous excitation of free oscillation by atmospheric turbulence. In this presentation we would like to show a basic design of broadband high sensitivity seismometer as well as environment protection designs. The basic parts are composed of a long period pendulum, laser interferometry and its control feedback electricity. As for the environment protection design, the following factors are important. Surface wind seems to be the most important and specific problem. We tested efficient design of wind shelter over the seismometer by wind tunnel experiment (low air pressure & high wind speed). We compared the experiments with computational fluid dynamics.

Keywords: Marsquake, free oscillations, inner structure, core size