

Remote sensing of Martian surface events by Electro-magnetic and Sonic Wave observation aboard a Martian rover

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In order to detect many kinds of surface events on Mars, a small instrument with electro-magnetic and sonic wave receivers has been considered as one of the remote sensing equipments onboard a future Japanese Mars rover.

By combining the observation of 3-axes electro-magnetic waves and sonic waves, precise identification of the events source coordinates with respect to the rover position can be realized because of the phase difference of each detecting waves and large difference of the speed of light (c) and sound (C_s). The observation plan has been discussed as a remote sensing instrument for distribution measurement of Martian discharge events (like lightning and thunder on the Earth), however, it can also be applied for the Martian surface studies as a very unique equipment, moreover, the size, weight, and power resources for the instrument is small and suited for installing on the small rover system planned to land the Mars.

On the Mars, as a result of the most recent research activities mainly by the NASA MSL (Opportunity) rover and several orbiters, many possible surface events like fluid motion on the edge of craters, so called RSL (Recurring Slope Lineae) seen as a narrow dark-tones streak activities depending on the Martian season change. Moreover, some scientists reported the possible regions of gas eruption from the surface of the Mars.

Here, we will introduce the recent progress of the instrumentation design and environment test results of the electro-magnetic and sonic wave observation instruments for the future exploration by landing explorer on the Mars.

Keywords: Mars, Electro-magnetic wave, Sonic wave, Surface events, Rover, Remote sensing