

Exploration of Mars (08)  
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AN IMAGER DESIGN FOR METHANE EXPLORATION ON THE MARS

**Abstract**

For long times, people on the earth were looking for “Brothers and Sisters” out of the earth. With near a hundred years effort, it seems that there was some sign of life living on the Mars. With the help of the high resolution detectors and land rovers, scientists have found water and methane on the Mars. On the earth environment, about 90% of methane produced by life activity, and also it may be suitable for the Mars. So the exploration for methane on the Mars becomes a better way to find the Mars’ life. Under this background, and with the promotion of Chinese Mars exploration program, we suggested a method, by detecting the special emission of methane, to obtain the methane distribution on the Mars atmosphere and surface. In order to point out the source of methane on the Mars surface, we plan to design the three-dimensional imaging detector for methane emission of the Mars atmosphere. We choose the 3.3 $\mu$ m infrared emission of the methane as the special detection line and with the method of cross scan to achieve the exploration aim. And the spatial resolution ratio can reach to 10km10km, from the Mars surface to about 200km high. By using the high resolution infrared sensor, the imager can gain the tomography of the methane distribute of the Mars atmosphere, and get the distribution data. After data processing, we can get the diffusion of the methane from the surface source to the Mars higher atmosphere. The most important is that we can note the source region of methane on the Mars surface, which can lead to the further research for the formation mechanism of methane on the Mars. With this exploration target, we have some key techniques to be solved. These keys include narrow-band filter, which can reduce the other band emission disturbance; high resolution infrared sensor, which can receive the infrared signals sensitivity; and also data processing algorithm, which can obtain the tomography results. We do hope that with the development of Chinese space exploration, this instrument can be realized and get more significant data from the Mars orbit.