

## Outline of Reusable sounding rocket

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<http://www.isas.jaxa.jp/j/enterp/tech/vehicle/06.shtml>

“Reusable sounding rocket” which has been studied in JAXA/ISAS is outlined.

We, “reusable sounding rocket working group,” have proposed the development of fully-reusable type sounding rocket, which will be added to the sounding rocket series (S-310, S-520, etc.) in JAXA/ISAS. Access to space will be much easier, a number of flights will increase, and the revitalization of use is expected: the paradigm shift will occur.

The performance of the reusable sounding rocket is planned to have (i) the maximum height of 150km, (ii) the payload mass of 100kg, (iii) the capability to return to the launch site, even if one failure occurs, and (iv) the capability to provide the 3 minutes zero-gravity environment. The running cost for 1 flight is estimated 15 million yen. The turn-around time (the time between a flight to a subsequent flight) is less than 24 hours. We adopt the subsystems with high technology readiness level, and the system will be ready in 5 years from technological point of view. The ground support equipment is as simple as possible, and the launch system is mobile.

The reusable sounding rocket brings us a paradigm shift. It enables us the innovation in techniques of scientific observations or scientific experiments by its efficient reusability, low-costs, repetitive flight capability in short period, and wide flight envelope. For example, (a) Hovering - observation without space-time coupling, (b) subsonic flight without shock or Doppler shift, (c) observation at different position or time with the same instrument, (d) observation from the different launch site, e.g. , on equator, (e) reuse of instrument - use of expensive instrument / improvement of instrument, and (g) recovery of instrument - big amount of data storage (no use of low bit rate telemetry), sample collection and recovery.

Reusable sounding rocket will contribute to atmospheric science, fluid science, material science, life science, and so on.

