

Development of the low-cost GNSS receiver and its application to the earth science

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Observation of crustal deformation by GNSS is quite important to understand the strain accumulation near the active fault and the volcanic activities. On the other hand, the cost of the GNSS observation system for geodetic purposes is still expensive, which is an impediment to improving the density of the observation sites. In contrast, low-cost GNSS chips have been introduced for purposes other than geodetic applications.

In this study, we adopted Septentrio mosaic-x5 chip as the main GNSS engine. The mosaic-x5 chip is a multi-band, multi-constellation GNSS chip with low power consumption. The positioning engine itself is approximately the same as that of the previous Septentrio receiver and can be expected to be used for crustal deformation monitoring purposes. In addition, the chip itself possesses the functions of mounting and writing SD cards, and the web interface makes it easy to change settings.

We have developed a logger that can be used for both field observations and continuous online operations based on these features. From the perspective of field observation, power consumption must be kept as low as possible. Therefore, we have successfully reduced the power consumption to approximately 1W by incorporating a mechanism to disable the LAN ports when they are not in use. In addition, a backup power supply has been installed to prevent damage to the recording file system even in situations where the power is suddenly turned off. In the presentation, we will evaluate the quality of the obtained data and discuss the possibility of ultra-dense GNSS observation using these low-cost GNSS observation equipment.

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