

The Construction of new dense GPS observation network: AGNeSS

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The Aceh GPS Network for Sumatran fault System (AGNeSS) was constructed after the 2004 Sumatra-Andaman earthquake. The AGNeSS is transversely located at the northern part of Sumatra fault system in Aceh Province. This network is designed to monitor and detect the strain accumulation at the northern part of inland Sumatran fault system. Previous studies stated that strain accumulation in inland might be detected after big earthquakes occurred in subduction zone. Hence, the AGNeSS was constructed to research this possibility. In fact, there has been no big earthquake occurring in the area for over the last 200 years. The AGNeSS is constituted of continuous and campaign GPS sites. To date, there have been eight GPS continuous sites, which started to operate on November 2007. Another two continuous GPS sites will be added next year, thus there will be ten continuous GPS sites in total. The average distance between continuous GPS sites is less than 20 km. In addition, some campaign GPS sites are located between continuous GPS sites. The distance between GPS sites near the Sumatra fault system is less than 10 km. These campaign GPS sites are based on the existing and new benchmarks which are constructed for this research. The existing PIDI benchmark belongs to Bakosurtanal (National Coordinating Agency for Surveys and Mapping) while SBGN and SBGS benchmarks belong to BPPT (Agency for the Assessment and Application of Technology) and the rest belong to BPN (National Agency for Land Administration). On the other hand, UMLH is one of the continuous GPS sites from SuGAR (Sumatran GPS Array) network. The number of campaign GPS sites is 17. The design of the AGNeSS is similar to regional GPS observation network at Atotsugawa fault system in Japan, which constitutes of over 20 continuous GPS sites.

At continuous GPS site, we constructed new antenna pillar while GPS instruments and solar panel controller are set inside the pillar. We use Trimble 4000SSI at almost every continuous GPS sites of AGNeSS. This GPS observation system is based on the GPS data logger (5X86 CPU 233 MHz, 128MB memory and 4GB compact flash memory card) and Trimble 4000SSI. The main power resource depends on power generator at nearby town. If main power shutdowns, solar cell and battery were used instead as auxiliary power.

The sampling rate of continuous GPS sites is 1 sec by offline observation. However, 1 sec sampling data could be resampled to 30 sec sampling data everyday. 1 sec sampling data is saved to Compact Flash card at least for about 1 month. If earthquake occurred at Sumatran fault system, we can obtain 1 sec sampling GPS data within 1 month. Especially for MNYK site, we use Trimble 5700 because power resource at this site only comes from the solar power and data sampling is set to 30 sec.

The following year, we will change to an online system for ACEH GPS site. GPS data logger of this site will be connected to the internet, and RINEX data files are automatically sent to Research Center for Seismology, Volcanology and Disaster Mitigation (RSVD), Nagoya University in Japan.

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