

Form B-5

Date (日付)

19/November/2013 (Date/Month/Year: 日/月/年)

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): Yayan Sofyan (ID No. P13068)

- Participating school (学校名): Chienkan senior high school, Saga prefecture

- Date (実施日時): 16/ November/ 2013 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): (in English) Let's discover our earth...!! Gravity monitoring in volcano and geothermal area

(in Japanese) 地熱と火山エリアにおける重力モニタリング

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

Abstract/summary of lecture:

The population of people on the earth is going to increase, energy demand also increases in spite of limited energy resource. The energy resource of fossil fuel (oil, gas, coal) is will be over in the near future while nuclear energy still has a big question about the safety of radiation. Green, renewable and sustainable energy is the future energy resources. These energies can be developed without any significant negative impact to the environment, derived from natural processes that are replenished constantly and high efficiency in the long term use. One of these energies is geothermal energy as an alternative potential energy to replace the fossil fuel. The long-term sustainability of geothermal energy has been demonstrated in the Lardarello geothermal field in Italy since 1913. Monitoring study over the geothermal field is important for sustainable production.

Indonesia and Japan have similarity huge geothermal energy resources that lies between the ring of fire that have a large number of volcanoes. Indonesia is one of the largest geothermal resource potential countries in the world, with a total energy potential of about 27.5 GWe of 256 geothermal areas (Japan has about 19.14 GWe). Geothermal energy is mostly used for electricity generation and a small portion is direct used.

Repeat gravity measurement (RGM) is an effective and good monitoring method. Gravity is a basic physical property of Newton that explains the interaction force between two masses. The RGM is generally used to distinguish data in the range of 1 – 500 μ Gal from those in geophysical prospecting. A common unit of gravity used in geophysics is the Gal, and derived

from the old cgs system of units: $1 \text{ Gal} = 1 \text{ cm/s}^2 = 10^{-2} \text{ m/s}^2$. This method calculates gravity changes in the surface of the geothermal and volcanic field. We also calculate gravity force from many factors as correction factor. The monitoring of 4-D gravity enables detection intrusion or hydrothermal flow in active reservoirs (geothermal or volcanic) of the subsurface. The Gravity variation can be assumed as mass-transport processes at depth. We use relative and absolute gravimeter for repeated measurement. The relative gravimeter (Scintrex and LaCoste Romberg) has high accuracy and low residual drift but estimate relative value. Gravimeters need to calibrate to the gravity absolute points. The absolute gravimeter (A10) has absolute value with high accuracy but heavy and difficult to carry. The combination of relative and absolute gravimeter generate more accurate data in the monitoring. We applied this hybrid method in some geothermal field and volcanic field.

- Language used (使用言語): English and Japanese

- Lecture format (講演形式):

◆Lecture time (講演時間) 80 min (分), Q&A time (質疑応答時間) 10 min (分)

◆Lecture style (ex.: used projector, conducted experiments)

(講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))

Projector (touch screen television)

◆Interpretation (ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

Assistance by accompanied person

◆Name and title of accompanied person (同行者 職・氏名)

Mr. Taiki Arima (I explained a little in Japanese)

◆Other note worthy information (その他特筆すべき事項):

I was happy, because student listened my lecture very well and there are some interesting questions about geothermal energy (during lecture and after lecture), for the example: why Japan develop only small geothermal energy (2.7% of potential)?, When we ready to develop geothermal energy? Is it possible to develop geothermal energy from volcanic field? Also there are questions about gravity measurement method and gravimeters.

- Impressions and opinions from accompanied person (同行者の方から、本事業に対する意見・感想等が あ り ま し た ら 、 お 願 い い た し ま す 。):