

Form B-5

Date (日付)

29/ January/ 2015 (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): Miyazaki kita high school, Miyazaki prefecture

- Date (実施日時): 27/ January/ 2015 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): (in English) Gravity monitoring for sustainable development in Geothermal field

(in Japanese) 地熱エリアにおける持続可能な開発のための重力モニタリング

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

Abstract/summary of lecture:

The lecture consists of three explanations:

1. The research purpose is to achieve a sustainable development.

The population of people on the earth is going to increase about 200,000 peoples/day, energy demand also increases in spite of limited energy resource. Nowadays, total world energy consumption about 80% come from fossil fuel while the energy resource of fossil fuel (oil, gas, coal) is will be over in the near future. In the other hand, the nuclear energy still has a big question about the safety of radiation. I ask young generation to think about the sustainability of future energy in order to support human living.

2. The research object is geothermal energy

The 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. 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 in Indonesia is mostly used for electricity generation and a small portion is directly used. I explained the basic of geothermal system.

3. The research method is gravity monitoring

Monitoring study over the geothermal field for a sustainable production reason is my interest

research. 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 μGal 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 Gal = 1 $\text{cm/s}^2 = 10^{-2} \text{ m/s}^2$. This method calculates gravity changes in the surface of the geothermal field. We also calculate gravity force from many factors as correction factor. The monitoring of 4-D gravity enables detection the hydrothermal flow in active reservoirs of the subsurface. The Gravity variation can be assumed as mass-transport processes at depth. We use relative and absolute gravimeter for repeated measurement. I introduce the equipment and working system of relative gravimeters (Scintrex and LaCoste Romberg) and absolute gravimeter (A10 Micro-g). I explained some gravity monitoring case study in Indonesia and Japan.

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

- Lecture format (講演形式):

◆Lecture time (講演時間) 70 min (分), Q&A time (質疑応答時間) 20 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))

Use projector, conducted some simple experiments of gravity using balls, canes, water, spring, and forks

◆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. Yusaku Yonekura

◆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 gravity and geothermal energy (during lecture and after lecture). They look so interesting during lecture and some simple experiments.

- 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。):

今回、初めて本事業に参加させていただきましたが、高校生にとって非常にいい機会であったと感じました。講演内容が一般の方にもあまり馴染みのない「重力モニタリング」であったにも関わらず、ほとんどの生徒が内容を理解しようと真剣に話に聞き入っていました。質問も英語を使って、なかなか鋭い内容をぶつけてくれました。今後もこのように多くの高校生たちが刺激を得られる機会を、継続して設けていただきたいと思います。