
[JJ] Evening Poster | H (Human Geosciences) | H-RE Resource and Engineering Geology

[H-RE13]Availability of earth science data in renewable energy field

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Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Renewable energy penetration is increasing dramatically in the world. Renewable energy power generations have become a strong presence in an electric power system. However, it is a challenge for renewable energy to be stable power sources due in part to natural variability of renewable energy and its uneven distribution. For effective use of renewable energy, a combination of power resources (e.g., thermal power plants, hydropower systems) and energy storage technologies (e.g., pumped-storage power generation and storage battery system) should be desired. Therefore, we need to understand the amount of renewable resources, causes of variation, and the predictability of power output. Then, observation and forecast information from earth science field should be analyzed and applied to power energy field to achieve easy use of earth science databases.

Recently, observation databases from remote sensing technology and/or forecasts from numerical models have become essential for both renewable energy and electric power system fields. This proposed session needs your presentation from the whole of renewable energy fields (solar power, wind power, geothermal power, tidal power, wave power and biomass power generations). Our goal of this session is to exchange views with various researchers between renewable energy field and earth science field (e.g., usage-trends of earth science datasets for renewable energy field, the subjects in hand, earth science datasets availability, and a request from renewable energy field to earth science field, and so on).

[HRE13-P06]Evaluation of AMATERASS surface solar radiation with ground-based observations in Japan

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Keywords:Surface solar radiation, remote sensing, Himawari-8

Observations from the new geostationary satellite Himawari-8 (H-8) are expected to contribute in further developing an efficient photovoltaic system for Japan through an improved energy management system (EMS). However, accurate comparisons with ground truthing observations are essential to assess their uncertainty. In this study, we evaluated Himawari-8 based AMATERASS surface solar radiation (SSR) by ground observations belonging to the SKYNET and JMA network in Japan. The accuracy of the SSR estimates resulted comparable or better than concurrent SSR products from other recent geostationary satellites at hourly time scale, although AMATERASS tends to slightly overestimate the observations. However, the agreement with ground-based observations depended on the time step used in the validation exercise as well as on the spatial domain. Worse agreement was found for the instantaneous time step, with the best root mean square error (RMSE) at the daily level. Comparisons with respect to the JMA stations showed that the magnitude of the RMSE was largely (scarcely) correlated with the amount of cloudiness in the central and southern (northern) regions. By contrast, bright albedo conditions can lead to a reduction or even a reversal of the sign of the mean differences between observations and AMATERASS estimates. Under clear-sky conditions, the influence of aerosols makes the AMATERASS estimates larger than ground observations and the diurnal pattern of the SSR

difference was anti-correlated with AOD in different seasons. Overall, our analysis confirmed the good accuracy of the AMATERASS SSR product, and we expect it to play a key role in contributing to the development of an efficient EMS in Japan.