[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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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 combinational 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-P03]Wind Power Potential Variability in the Middle East

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Variability in power generation would affect the reliability and energy efficiency of the power grid. Power generation planning and operation scheduling span various time-scales. These range from day-of-economic-dispatch, where real-time pricing and emergency occur, day-ahead for bidding and scheduling, to months for operational planning and maintenance, and years for systems planning.

To improve reliability, variability in power generation should be understood and better characterized. The conventional approach is to characterize a bulk wind power density variability using a coefficient of variability that is not time interval-specific.

This study aims to characterize the wind power variability at various time-scales of power operations to illustrate its effects across the Middle East via spectral analysis and clustering. Using a high-resolution dataset obtained from a local area model simulation, this study showcases how aggregate variability may impact operation, and informs the planning of large-scale wind power integration in the Middle East in light of the scarcity of observational data.