

Estimation method of tephra deposition using photovoltaic power generation data for model validation of tephra fall simulation.

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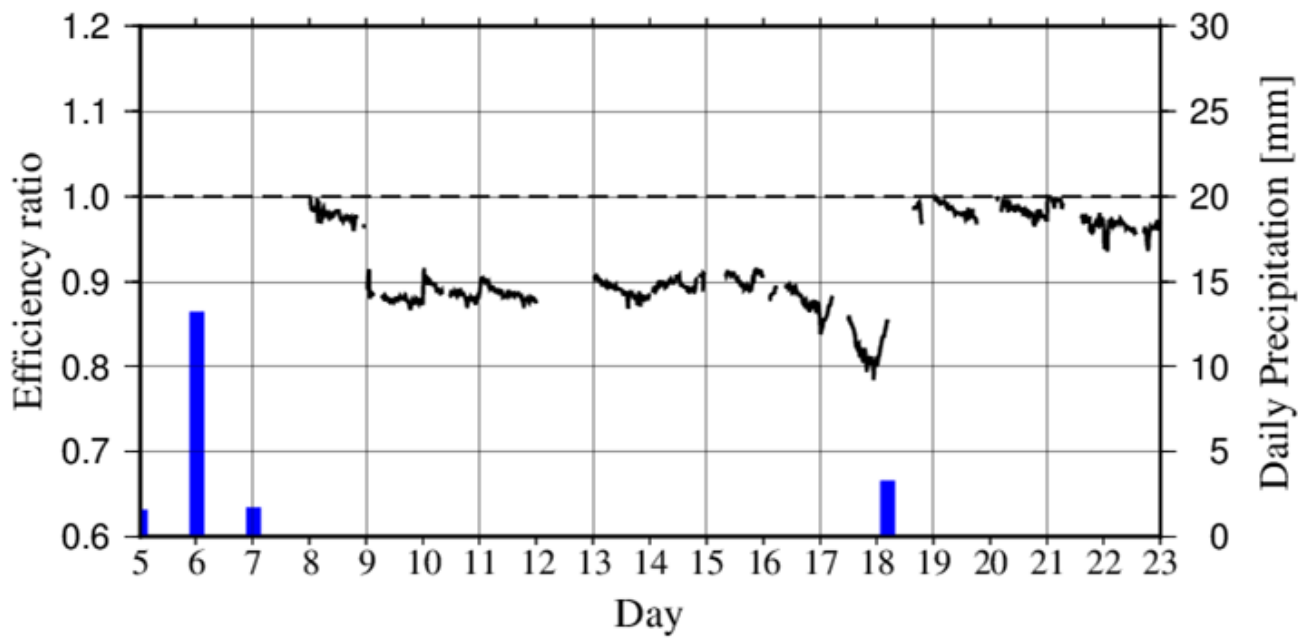
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Operational and research-based tephra fall forecast and hindcast were performed for recent major eruption events in Japan using tephra transport and dispersion models. For a model validation, several data sets are already available such as the space-borne and ground-based remote sensing data as well as in-situ measurement data, however the temporal and spatial resolutions of those data are insufficient for precise quantitative evaluation of tephra fall. It is desired to develop new data representing tephra fall in higher resolution.

The authors propose an application of photovoltaic (PV) power data to estimation of tephra fall. Kaldellis and Kapsali (2011) indicated linear relationship between tephra deposition amount and PV power efficiency. In generally, numerous PV systems have been installed in the Japan and its PV output data has been also monitored at several minute intervals. This approach makes it possible to obtain the tephra fall data in high resolution without new instruments.

We investigated a relationship between tephra deposition and PV module efficiency at Kirishima exposure site in Kyusyu region (on the western part of the Japan islands) in July 2013. In case of a volcanic eruption event of Mt. Sakura-jima (on the southern part of Kyusyu region), it was confirmed that PV power output was on the decrease. PV power output restituted after rainfall event in 18 July, (see Figure). The number of events that PV power output was decreased more than 20 % compared with an initial condition is 72 days in 2013.

Keywords: Estimation of tephra fall, Photovoltaic power generation



Figure, Comparison of time series of PV module efficiency and daily-accumulated precipitation in July 2013. The solid black line indicate PV module efficiency (see left axis), and blue bar indicate daily precipitation (see right axis, mm), respectively.