

船舶レーダによる桜島火山の噴煙柱モニタリング - 2018年の観測結果 -

Monitoring of Sakurajima Volcanic Eruption Columns with Marine Radar - Results of Observations in 2018 -

真木雅之⁽¹⁾・小堀壮彦⁽¹⁾・西隆昭⁽¹⁾・藤吉康志⁽²⁾・徳島秀彦⁽³⁾・佐藤英一⁽⁴⁾・井口正人・爲栗健
Masayuki MAKI⁽¹⁾, Takehiko KOBORI⁽¹⁾, Takaaki NISHI⁽¹⁾, Yasushi FUJIYOSHI⁽²⁾,
Hidehiko TOKUSHIMA⁽³⁾, Eiichi SATO⁽⁴⁾, Masato IGUCHI, Takeshi TAMEKURI

- (1) 鹿児島大学
- (2) 北海道大学
- (3) FRSコーポレーション
- (4) 気象研究所

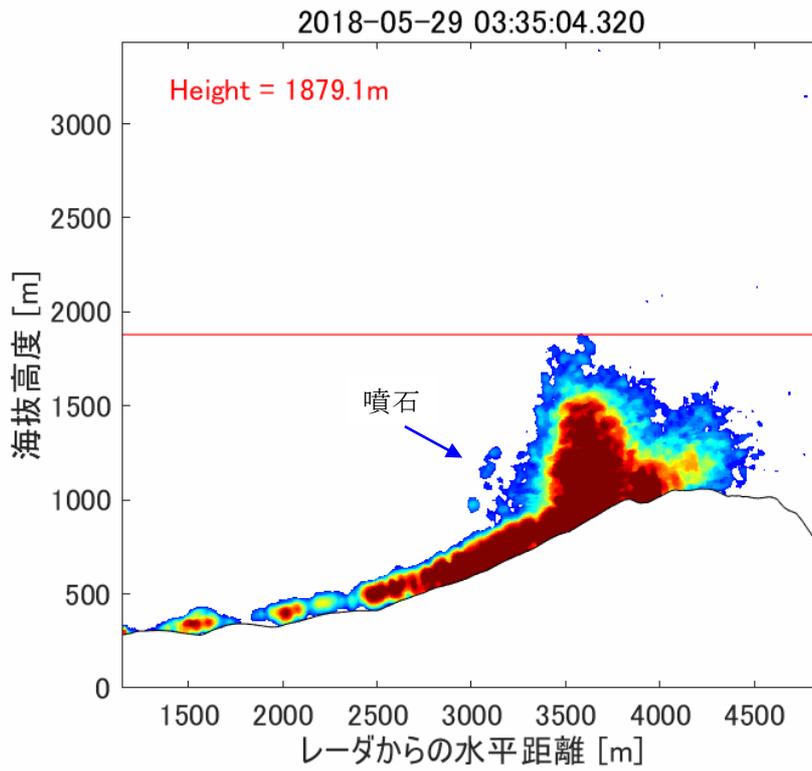
- (1) Kogoshima University, Japan
- (2) Hokkaido University, Japan
- (3) FRS Corporation, Japan
- (4) Meteorological Research Institute, Japan

The present paper describes the results of observational studies of Sakurajima volcanic eruption columns and eruption clouds using an X-band marine radar. The subject radar has a slot antenna with a PPI scanning speed of 48 rpm, a vertical beam width of 22°, a horizontal beam width of 1.2°, and a range resolution of 8 m. In order to study eruption columns with fine temporal resolution, the X-band marine radar was set up at the Kyoto University Kurokami Observatory, which is located approximately 4km from the Sakurajima Minamidake vent. We carried out observations by physically changing the rotational axis of the slot antenna, from vertical (PPI) to horizontal (RHI), to achieve an elevation angle resolution of 1.2°. The observation period was from April 11 to May 31 (a total of 51 days), and the collected data was for a total of 57 eruptions, of which 49 were explosive.

To our knowledge, our observations represent the first time that marine radar has been used to successfully detect eruptions and falling pyroclastic particles (Fig.1, Fig. 2). The radar revealed the fine structure of an ascending eruption column at 1.25-second intervals. The present study demonstrates that eruption source parameters such as eruption column height, eruption rate, and eruption duration can be estimated by marine radar observations. Because marine radar is easy to transport and setup, and inexpensive compared to other research weather radars, it is a convenient instrument for monitoring volcanic eruptions: after a comprehensive assessment of marine radar is completed, the information it provides will be easily utilized in volcanic disaster-prevention systems.

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Keywords: marine radar, Sakurajima, volcanic eruption columns, ash smoke, tephra



GFig.1 Explosive eruption with volcanic rocks.

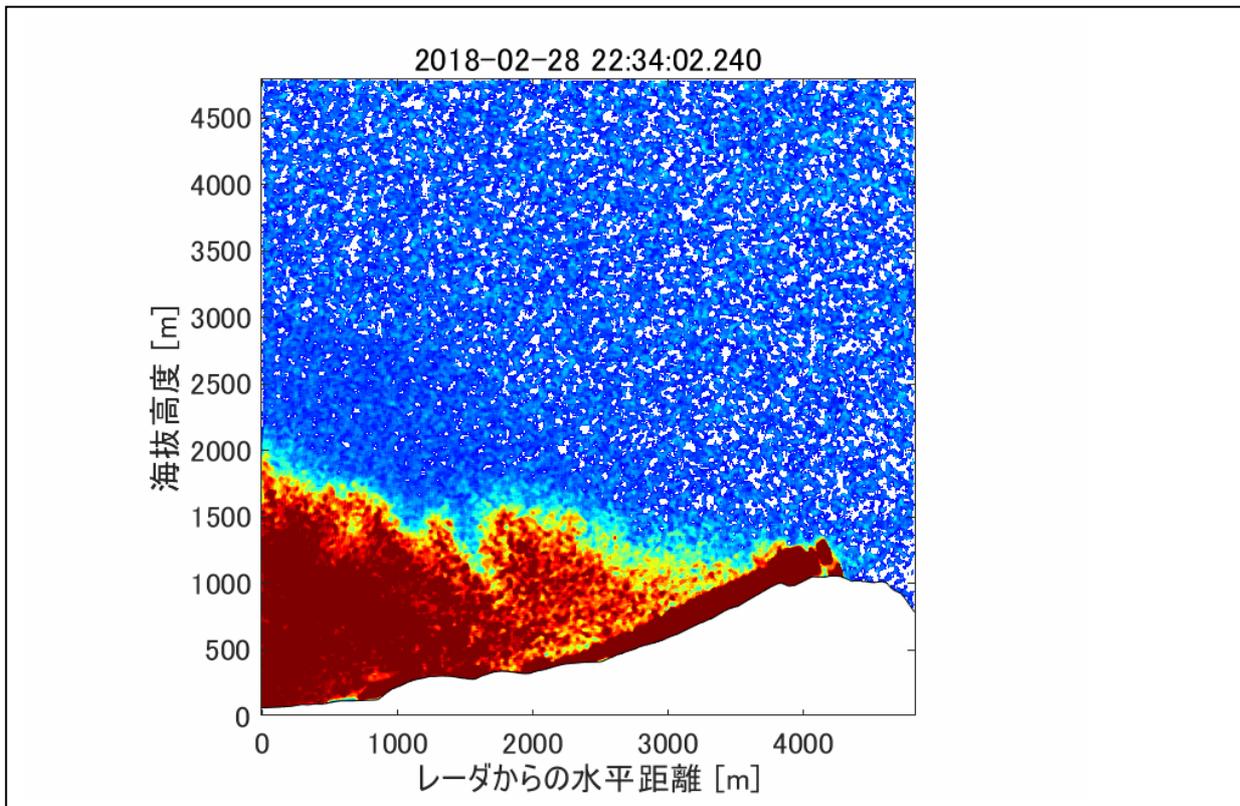


Fig. 2 Continuous eruption under weak rain condition.