

Eruption clouds at volcanoes in Kyushu, Japan observed by web-camera, radar and satellite images

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Eruptive volcanoes in Kyushu, Japan to discuss

1. Aso-Nakadake:
Ash eruptions since 25 Nov. 2014
2. Kirishima-Shinmoedake:
Sub-Plinean eruptions 26-27 Jan. '11
3. Sakurajima:
Vulcanian eruptions since 1955 with
increased activity of Showa crater
since 2009
4. Kuchierabujima-shindake:
Strong eruption on 29 May 2015,
resulting evacuation of the residents

1. Aso volcano



Web-camera at Aso Volcano Museum ■, 3km west from Nakadake △
Kumamoto Univ.-AVM collaboration, since May 2009

Magmatic eruptions: 25 Nov. 2014_10:11 - after 20 years of low activity



11.25_11
2014.11.dd_hh

11.25_15

11.26_07



11.26_12

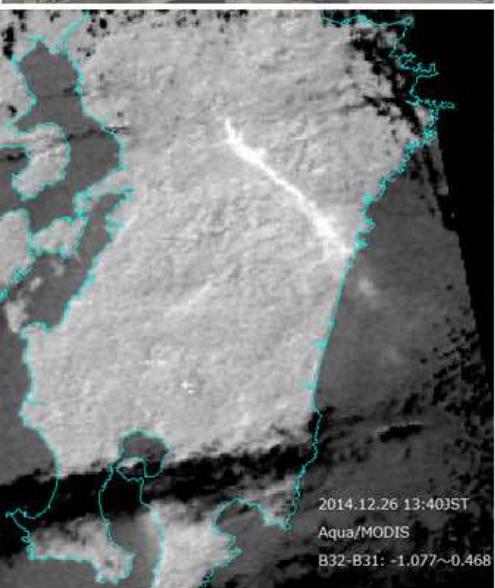
11.27_07

11.27_14

Web-cam scenes of 25–27 Nov. 2014 from Archive every hour
<http://es.educ.kumamoto-u.ac.jp/volc/aso/>

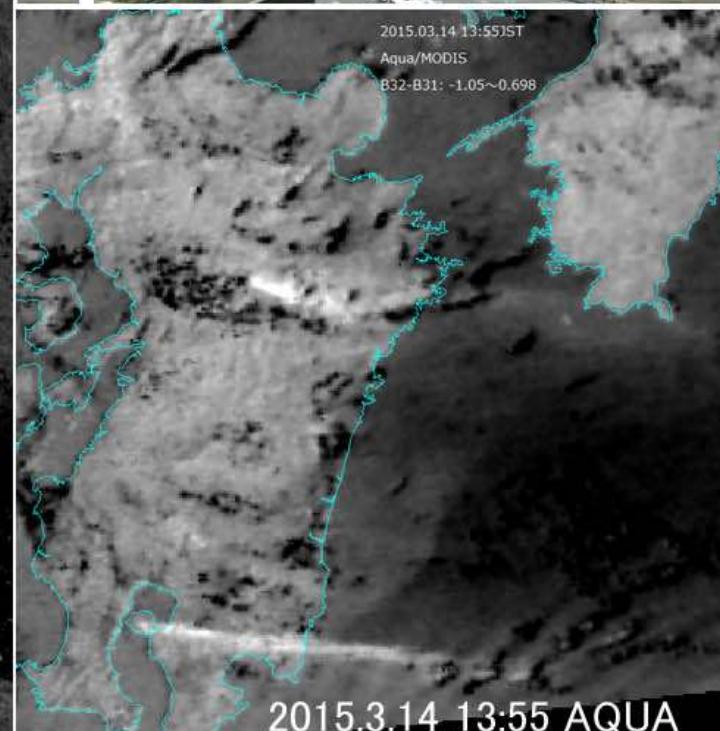
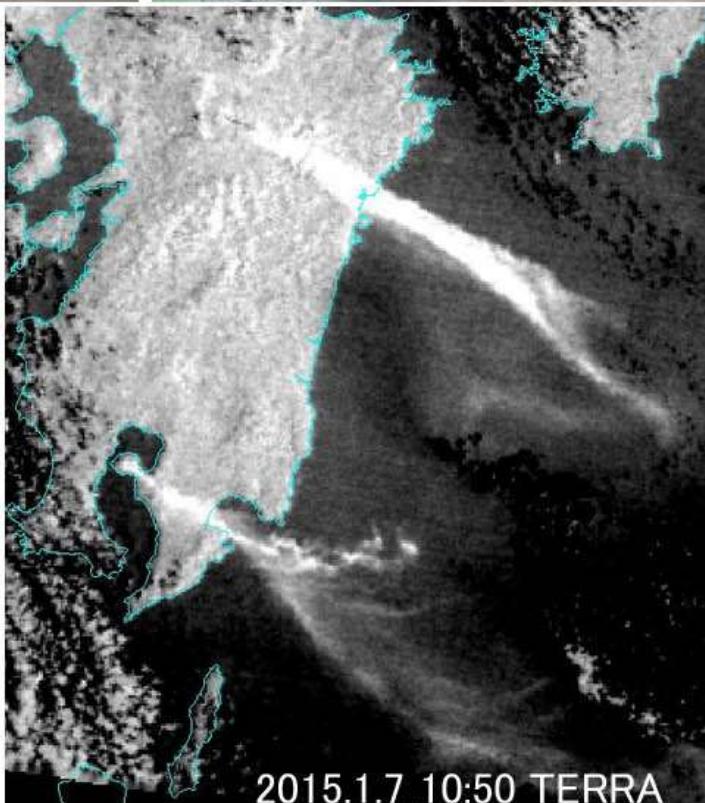
Web-Cam vs. MODIS AVI images

<http://es.educ.kumamoto-u.ac.jp/sat/aso/>



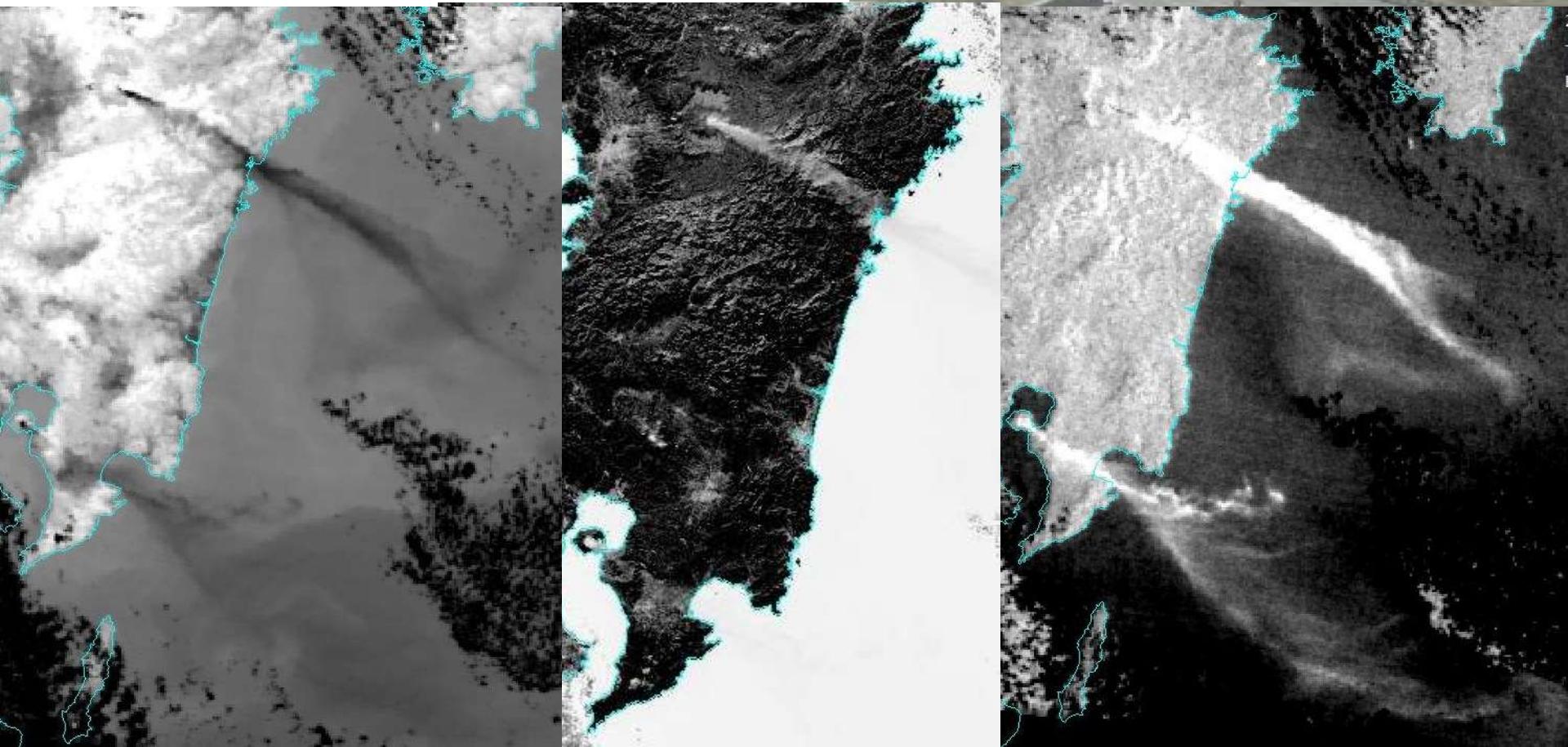
AVI= B32-B31

2014.12.26_13:40 AQUA



Methods of ash detection

2015.1.7_10:50
TERRA/ MODIS
B20, B1-B2, B32-B31=AVI



2. Kirishima volcanoes

Sub-Plinean eruptions 26-27 Jan. 2011

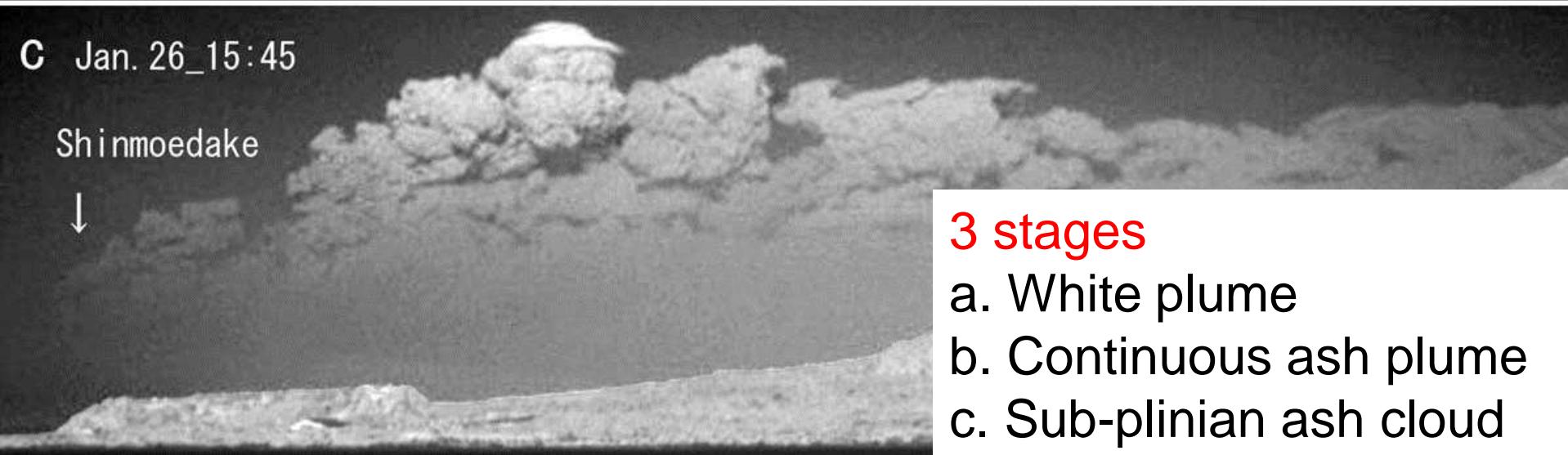
a Jan. 02_10:18



b Jan. 22_10:55



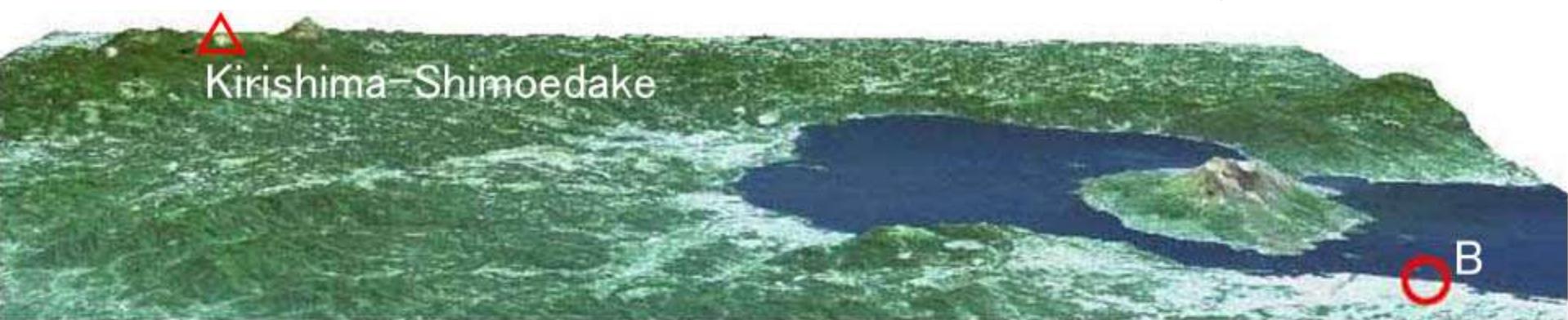
c Jan. 26_15:45



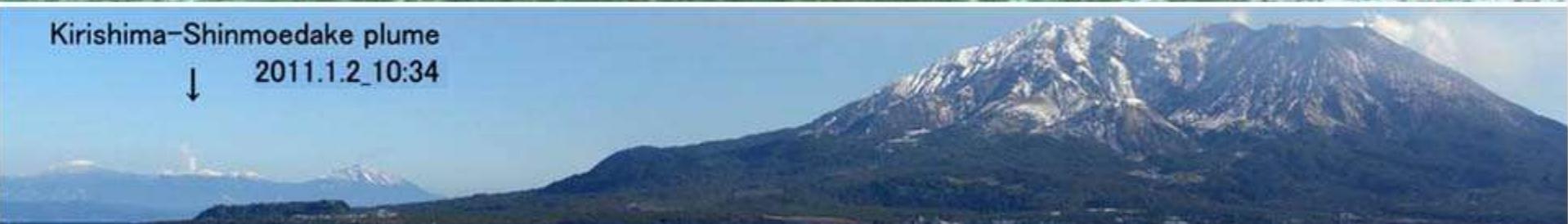
3 stages

- a. White plume
- b. Continuous ash plume
- c. Sub-plinian ash cloud

Plume observation 50 km away from B



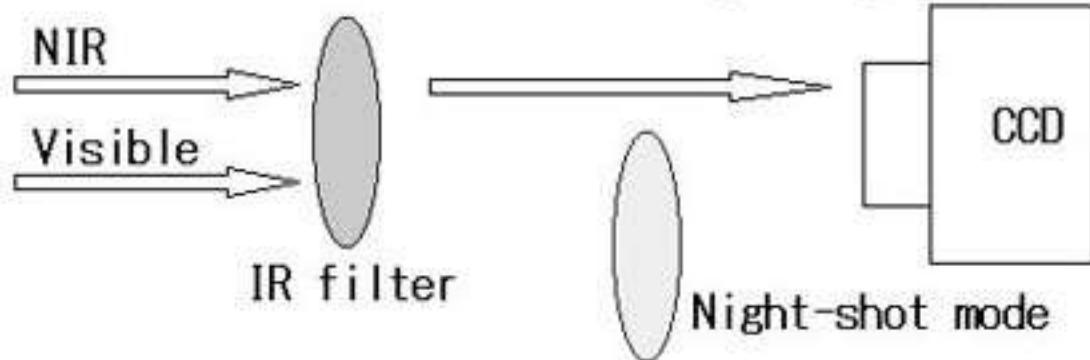
Kirishima-Shinmoedake plume
↓ 2011.1.2_10:34



2011.1.2_10:56



Method of Near-Infrared photography



2011.1.2_10:18_10:18 NIR

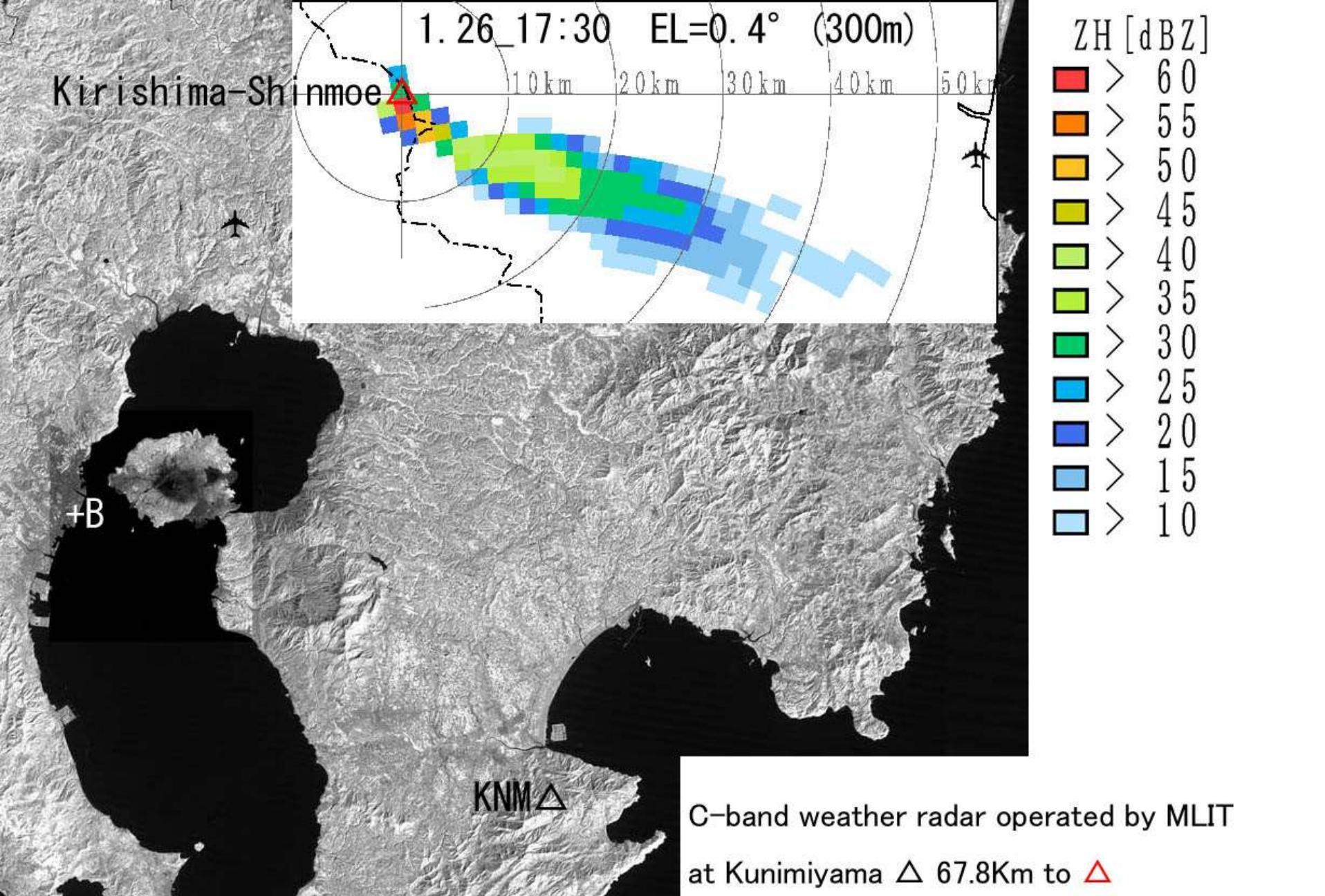
Sub-plinian erupt. 1. 26_15:30-

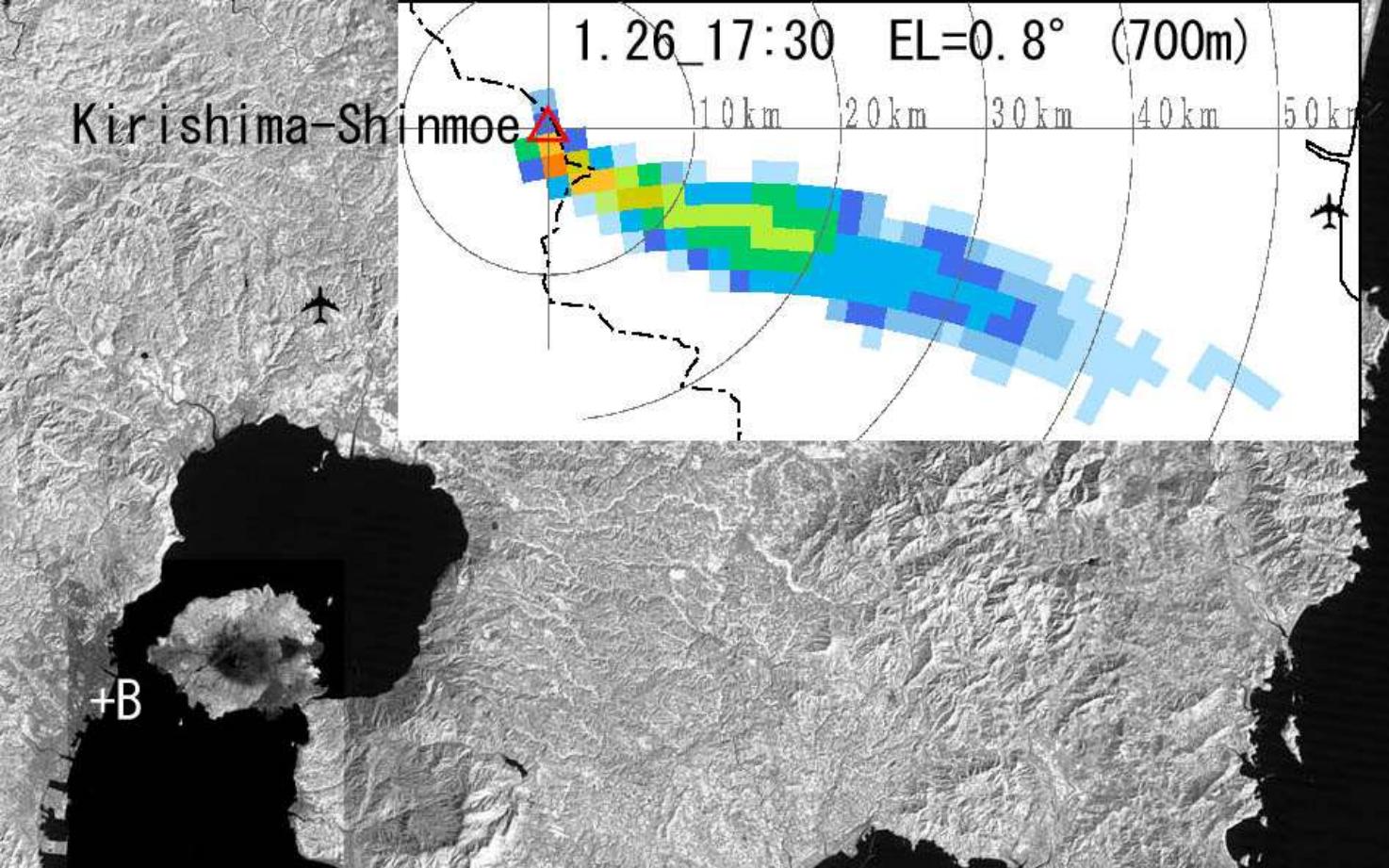


17:45

Gigantic ash
clouds seen
also from
other sites







NIR from B
17:45



Satellite images

NOAA-APT (TIR) : Kumamoto Univ.

MODIS/Terra, Aqua : Stations at Chiba, Abashiri and Miyakojima by Tokyo Univ. Information Sciences : Automatic Vis. Quick Look & **Aerosol Vapor Index = AVI = Band32-Band31 (12μm – 11μm)**

MTSAT-2 ERI/IIS, Tokyo Univ. → AVI

Forward trajectories : NOAA HYSPLIT Model, every 6 hour

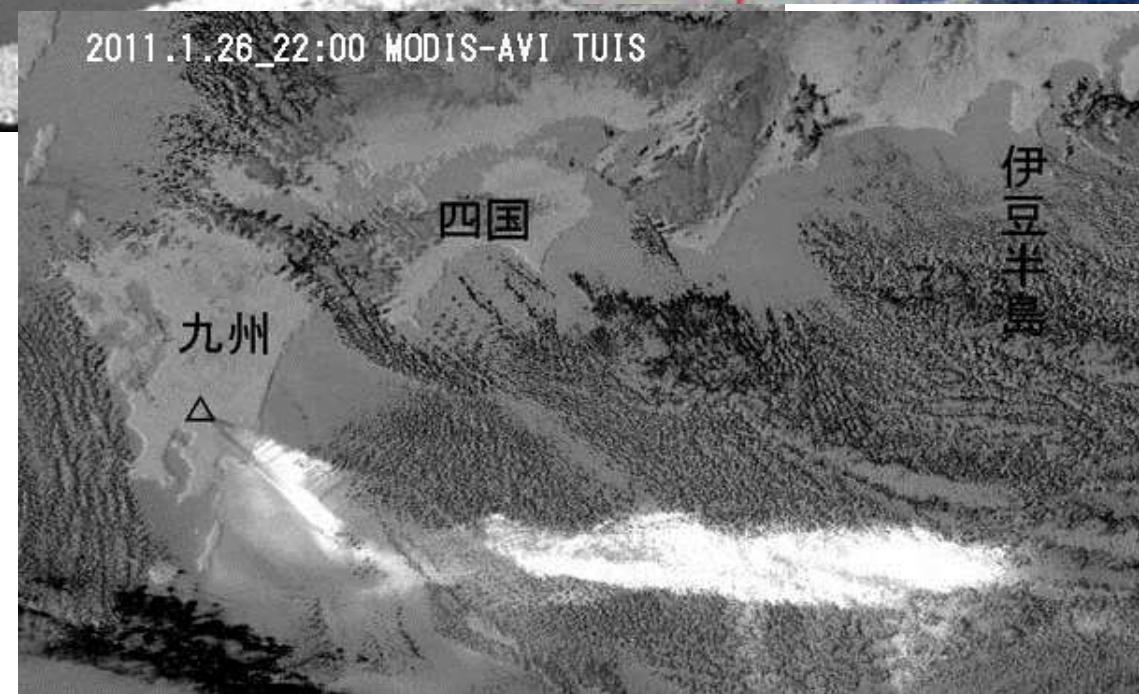
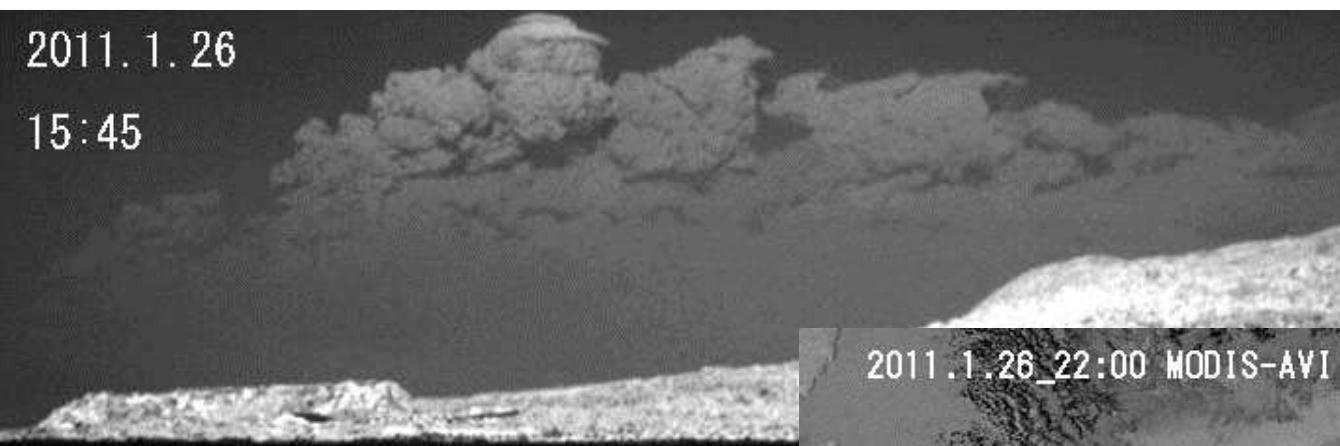
Ground observation

Visible & NIR automatic interval recordings at B and other sites, supplemented with manual zooming and photo-shootings

Satellite images of sub-plinian eruptions 1.26_15:30-1.27

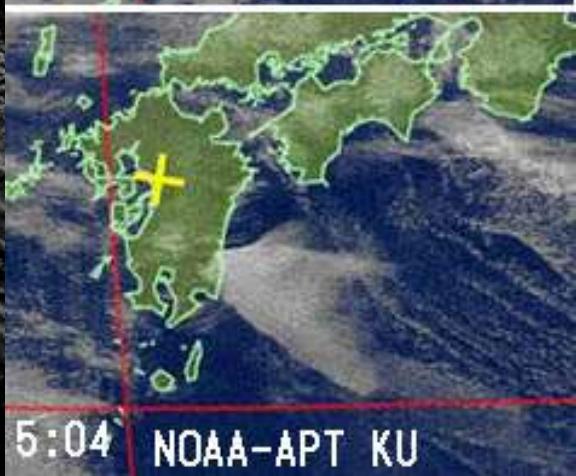
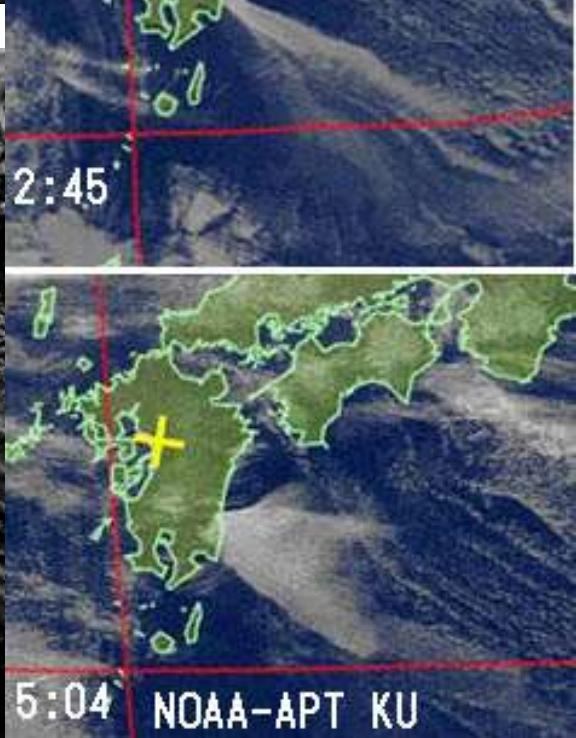
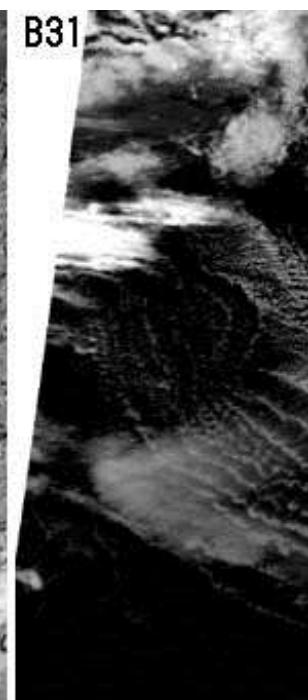
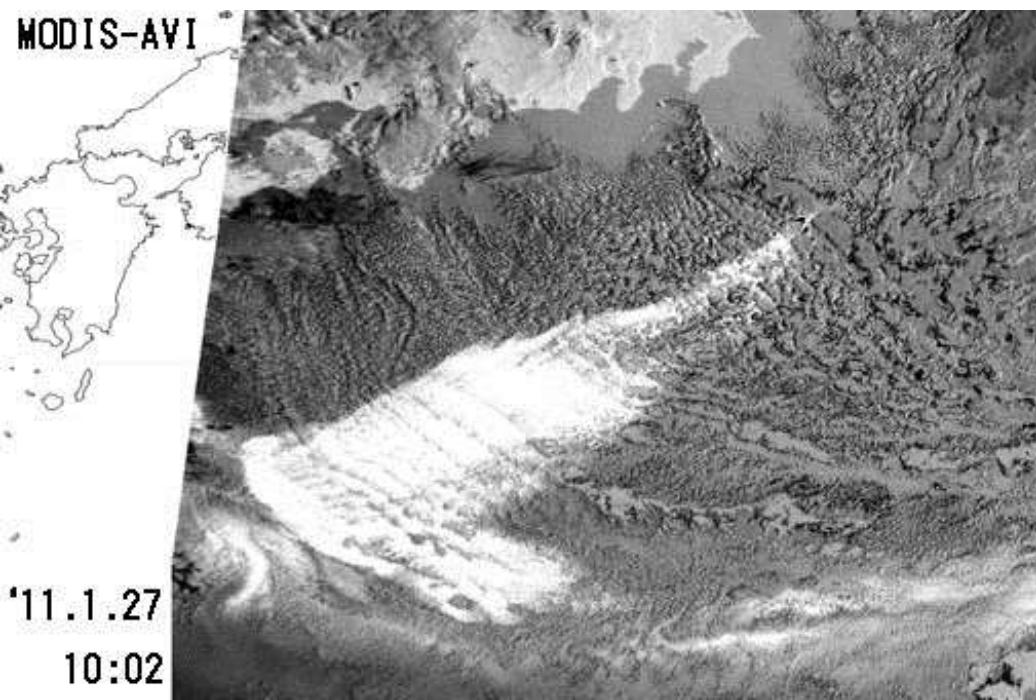
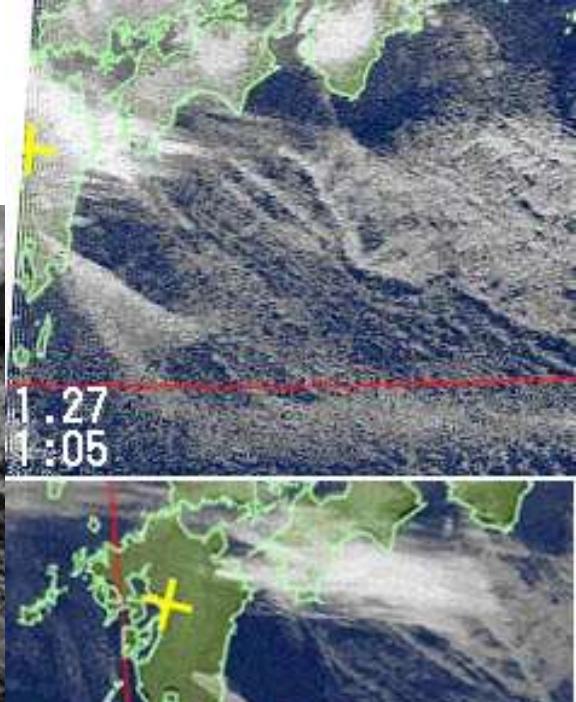
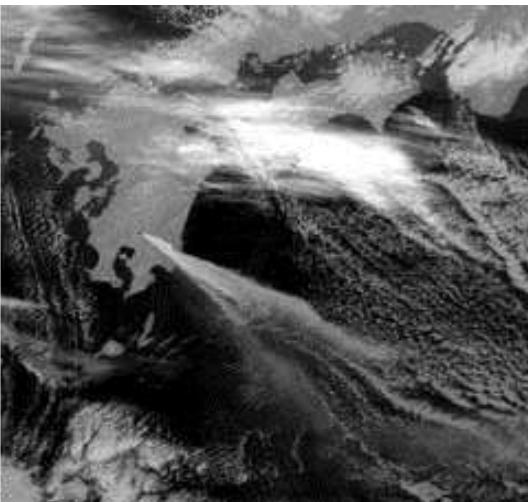
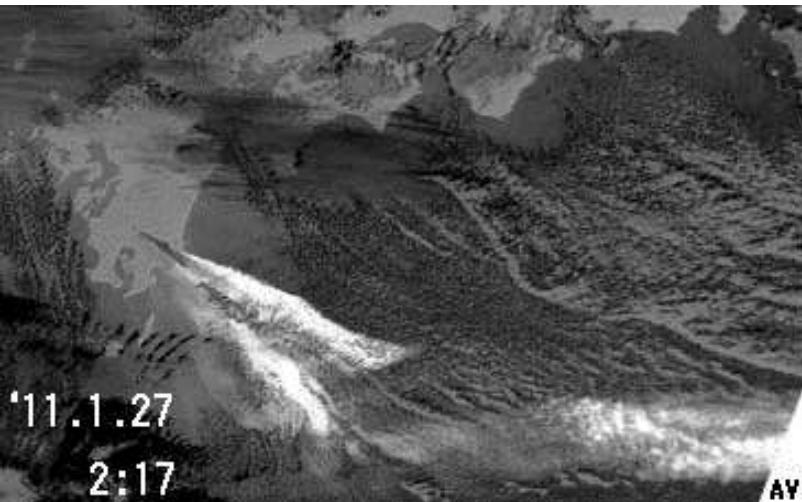
2011. 1. 26

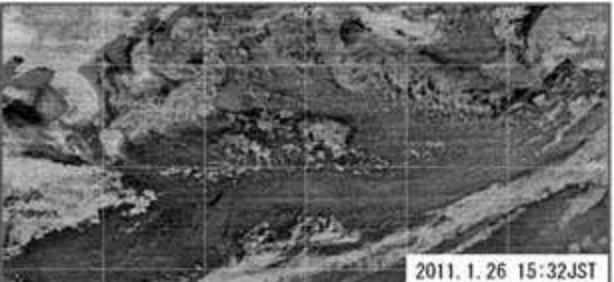
15:45



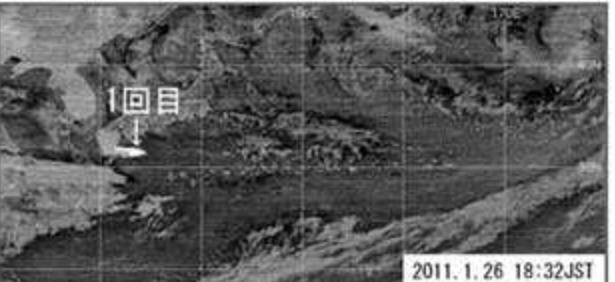
See details on the web
<http://wwwkav.mydns.jp/volc/kiri/kiri11/kiri11top.htm>

1.27 :Magmatic eruption continues

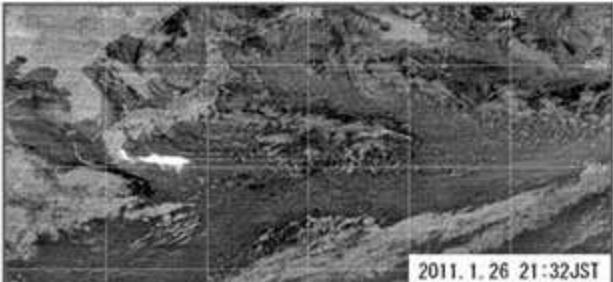




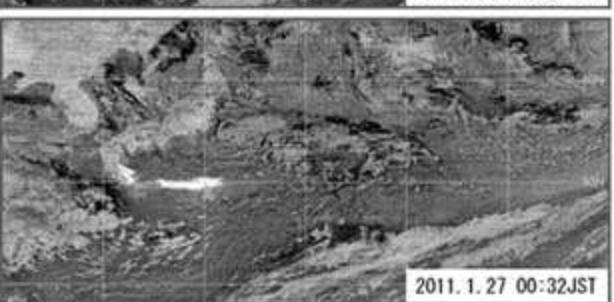
2011.1.26 15:32JST



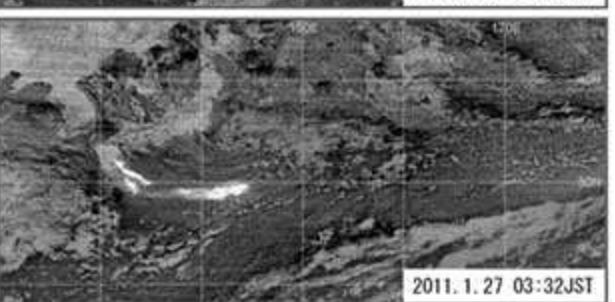
2011.1.26 18:32JST



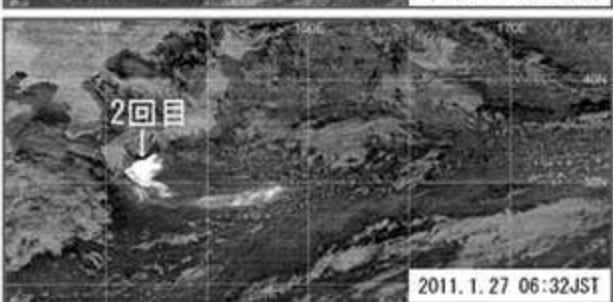
2011.1.26 21:32JST



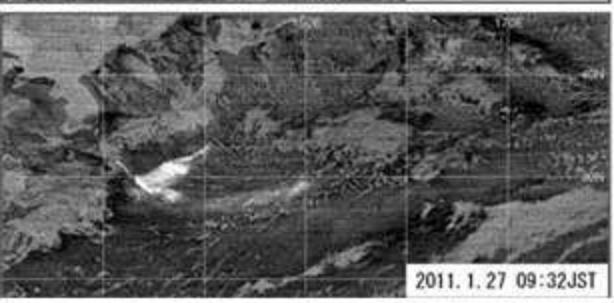
2011.1.27 00:32JST



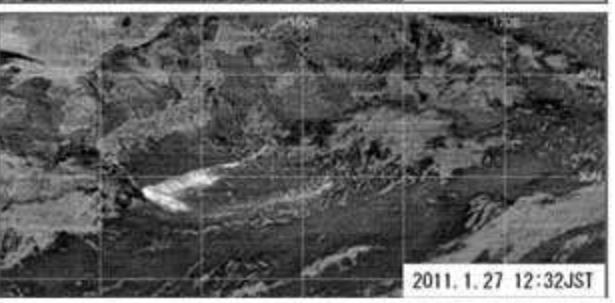
2011.1.27 03:32JST



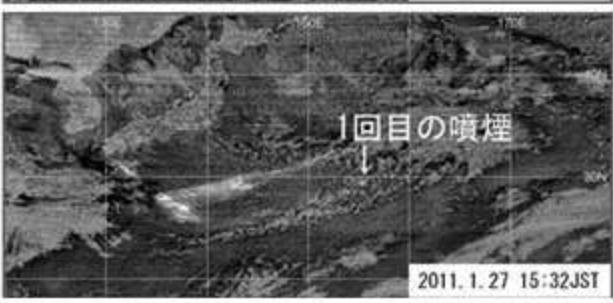
2011.1.27 06:32JST



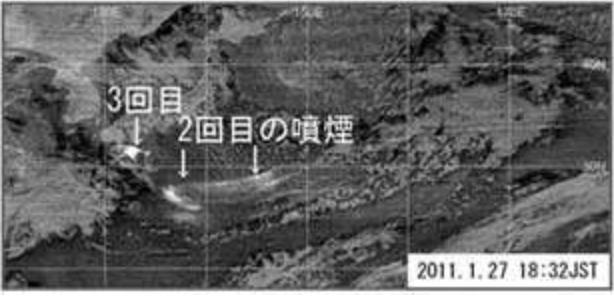
2011.1.27 09:32JST



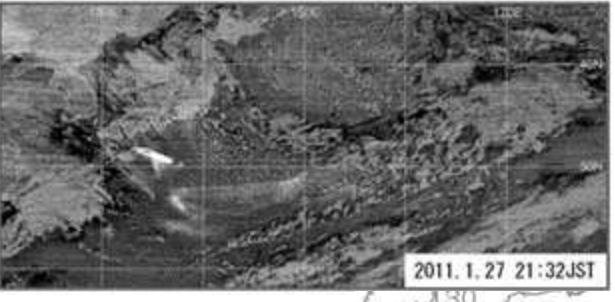
2011.1.27 12:32JST



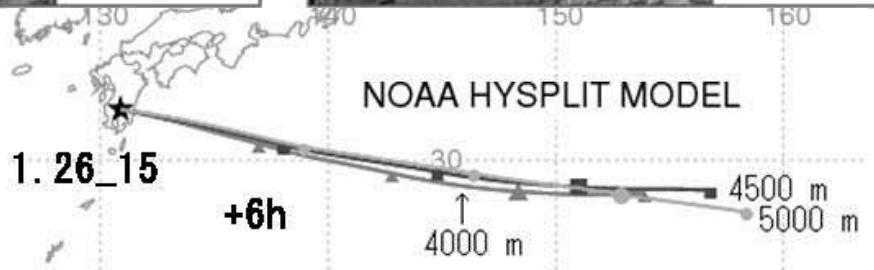
1回目の噴煙



2011.1.27 18:32JST

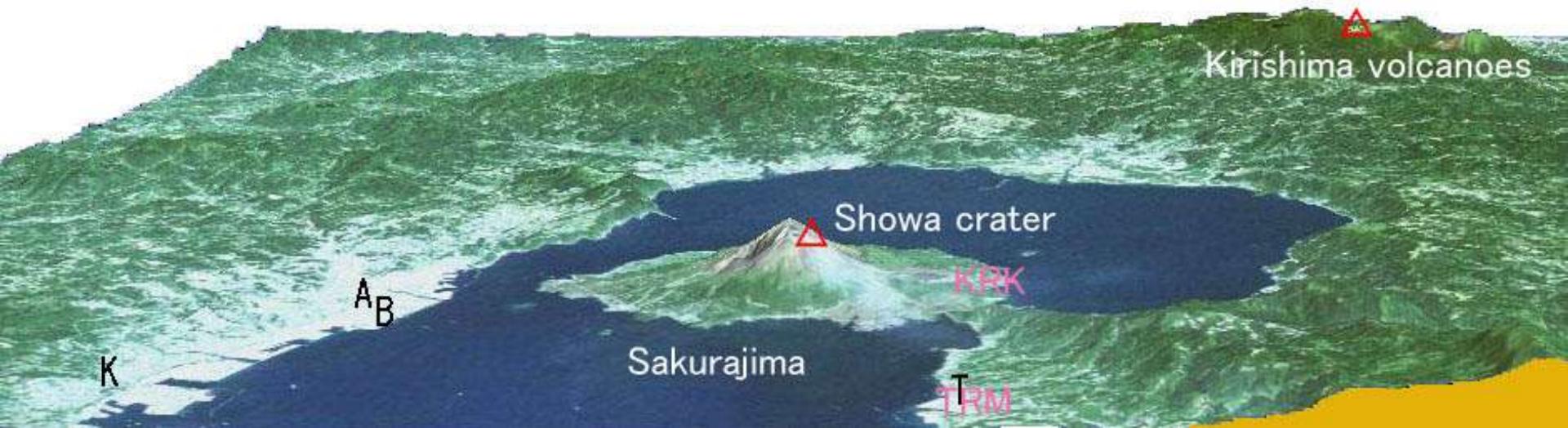


2011.1.27 21:32JST



3. Sakurajima volcano

Increased activity of Showa crater during 2009-2015



Web-cam sites

A: Kagoshima Univ., 11km W from the crater (+Fish eye 2013-)

B: Site near Kamoike port, 10km WSW (NIR, + manual photo.)

K: Kinkodai, 17km SW

T: Tarumizu city office, 10km SSE

Radar sites

KRM: Kurokami, Special obs. 29 Mar.-8 June '14. Ka-band Radar

TRM: Tarumizu station, MLIT. X-band MP Radar

2013.5.08_16:27 3300m Eruption

B NIR



13-508_1625



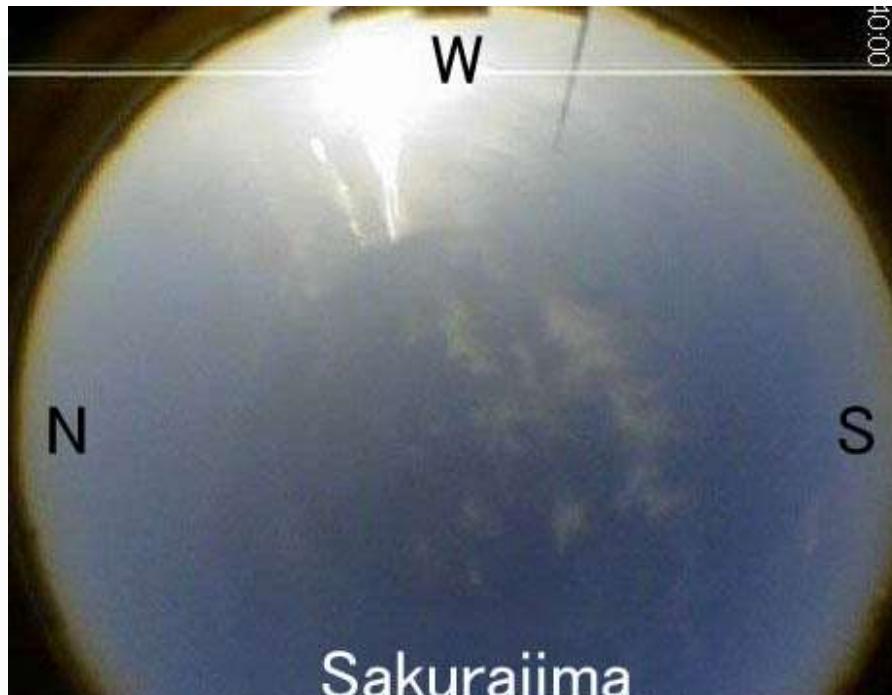
13-508_1631



13-508_1637



13-508_1643



13-508_1638

13-508_1639



13-508_1644



13-508_1645



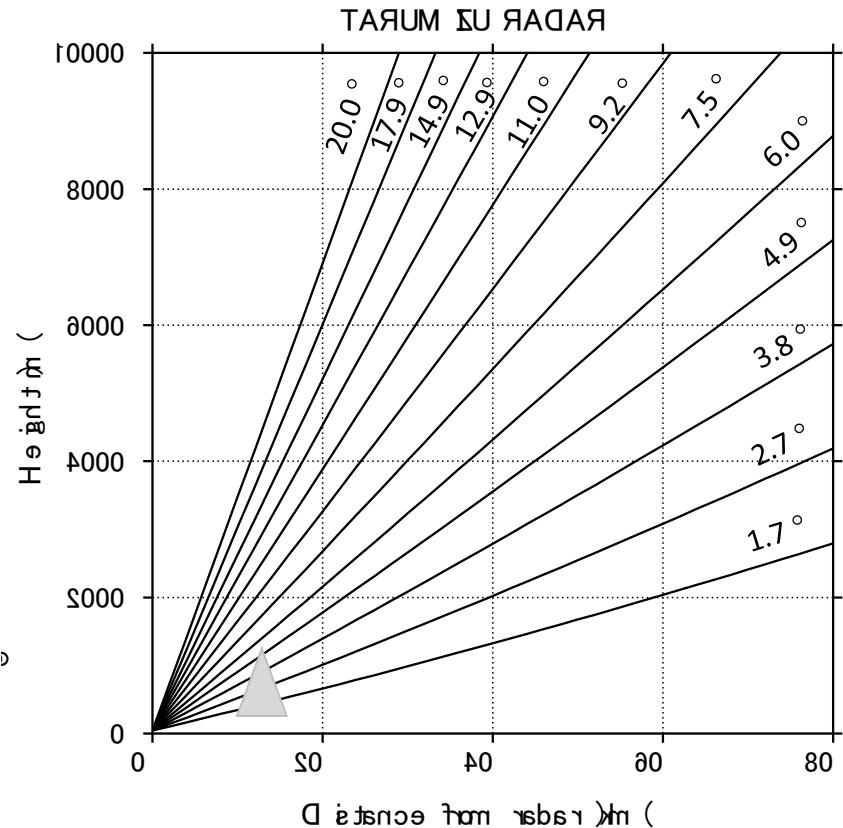
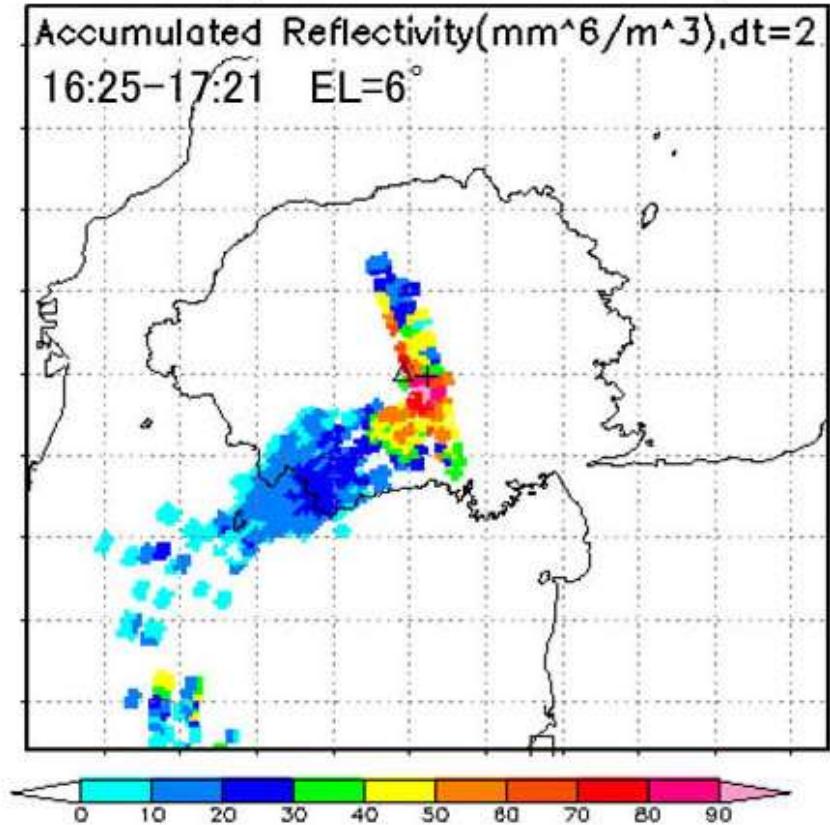
13-508_1629

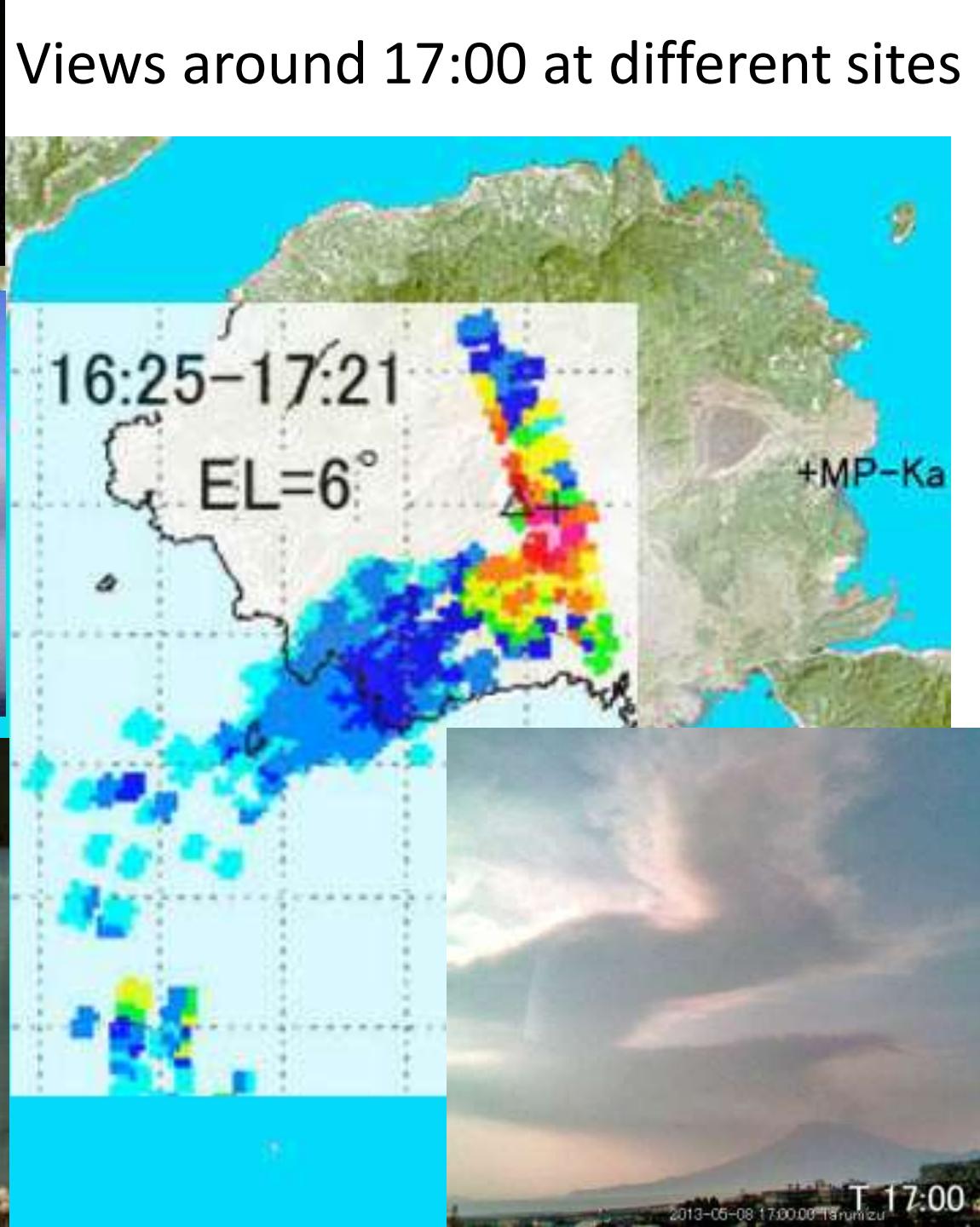
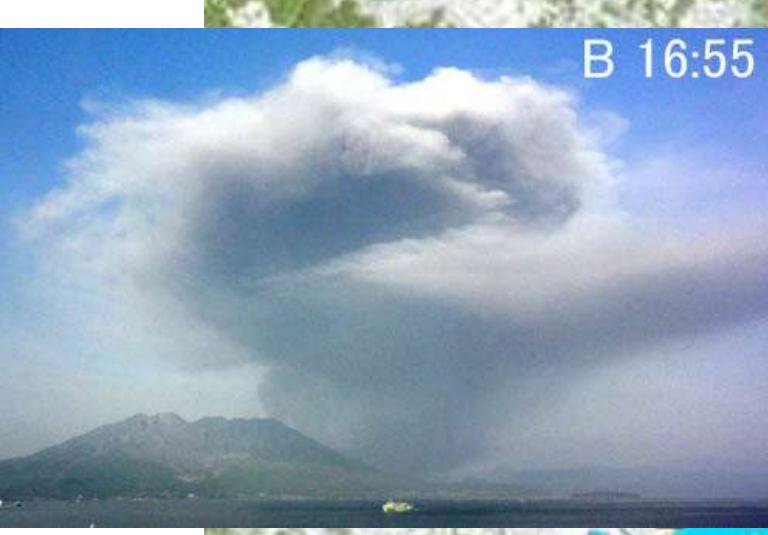


13-508_1630



2013.5.08 _16:27 3300m Eruption





Eruption 2013.8.18_ 16:31 over 5000m

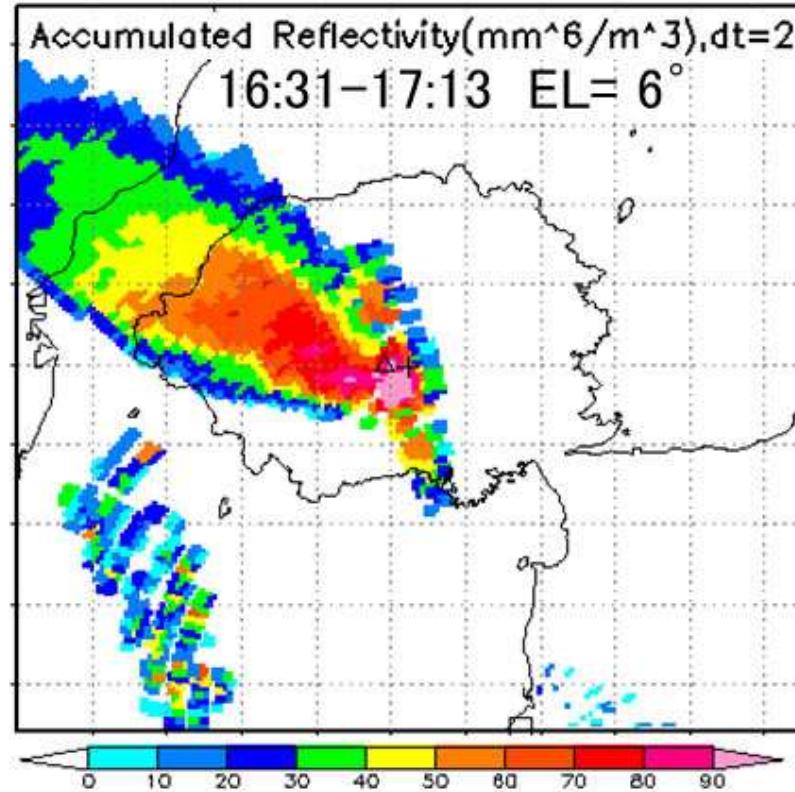


B 16:38 Manual photo.



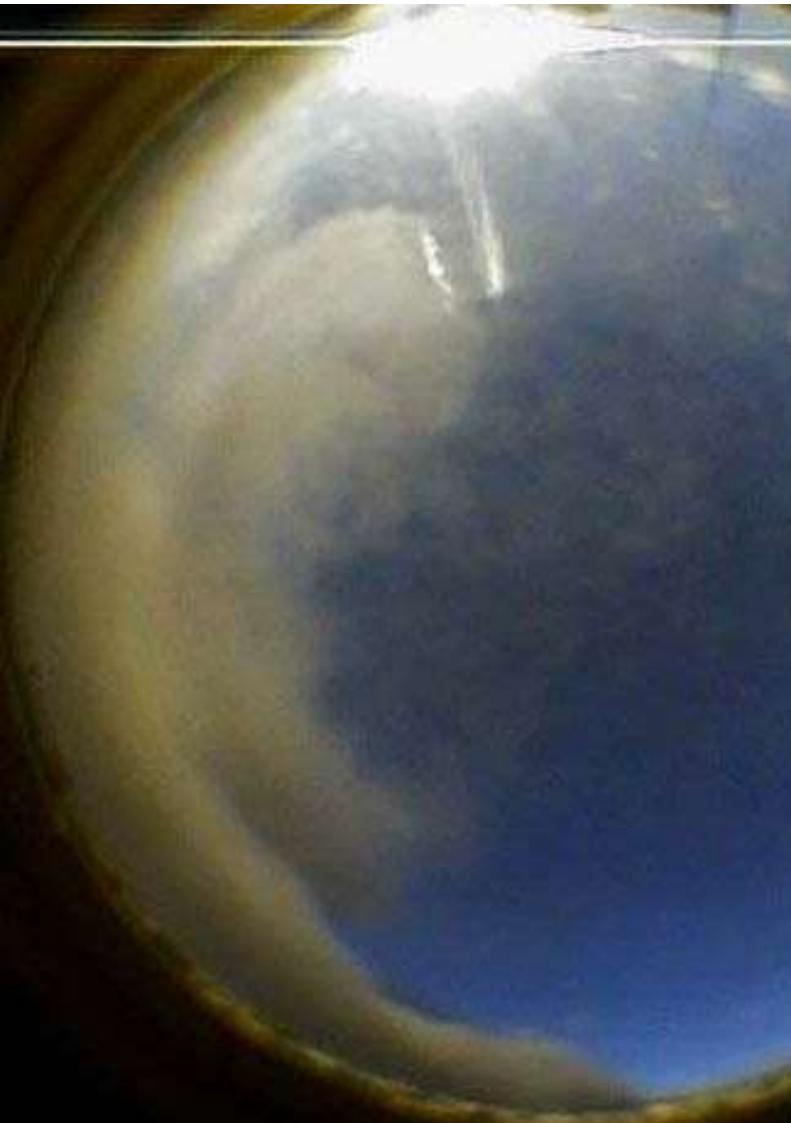
K 16:38

T 16:40



2013-08-18 16:40:00 Tarumizu

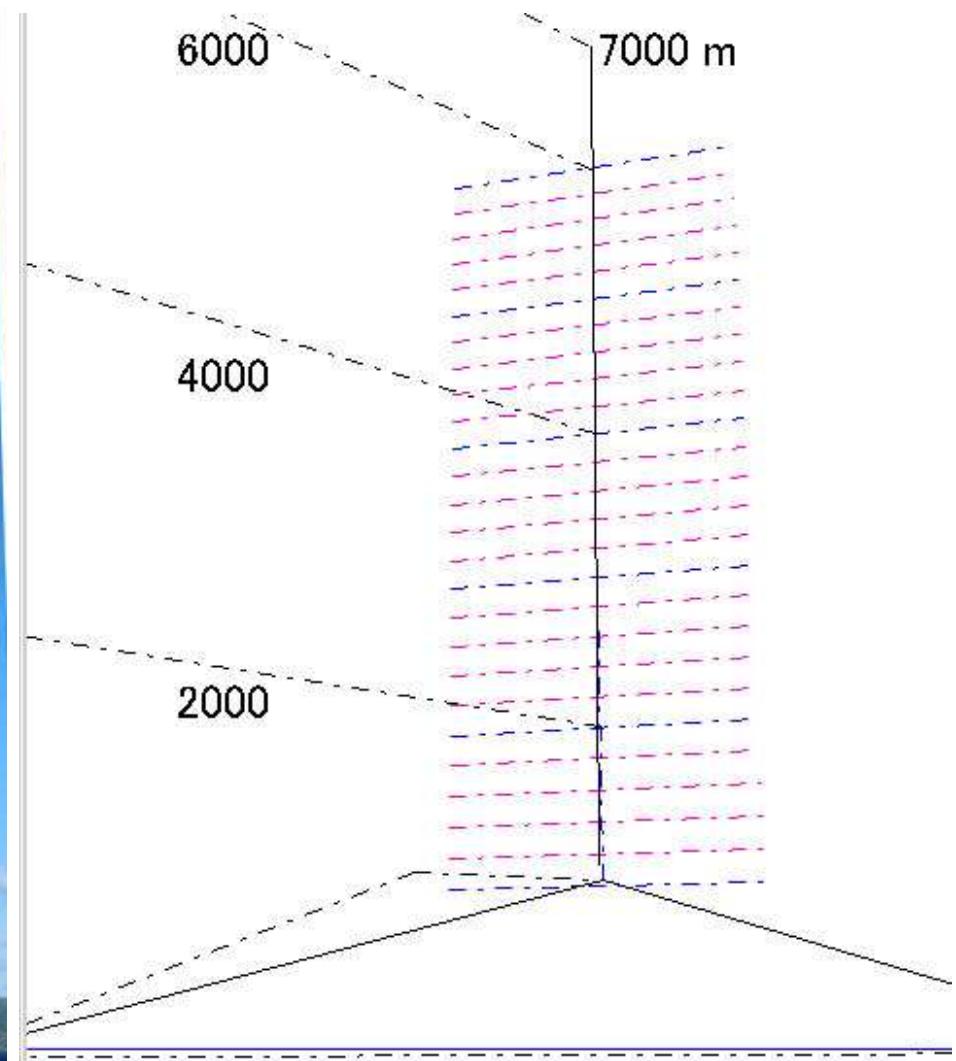
Fish-eye 16:30-17:30
every 10 min.



17:20

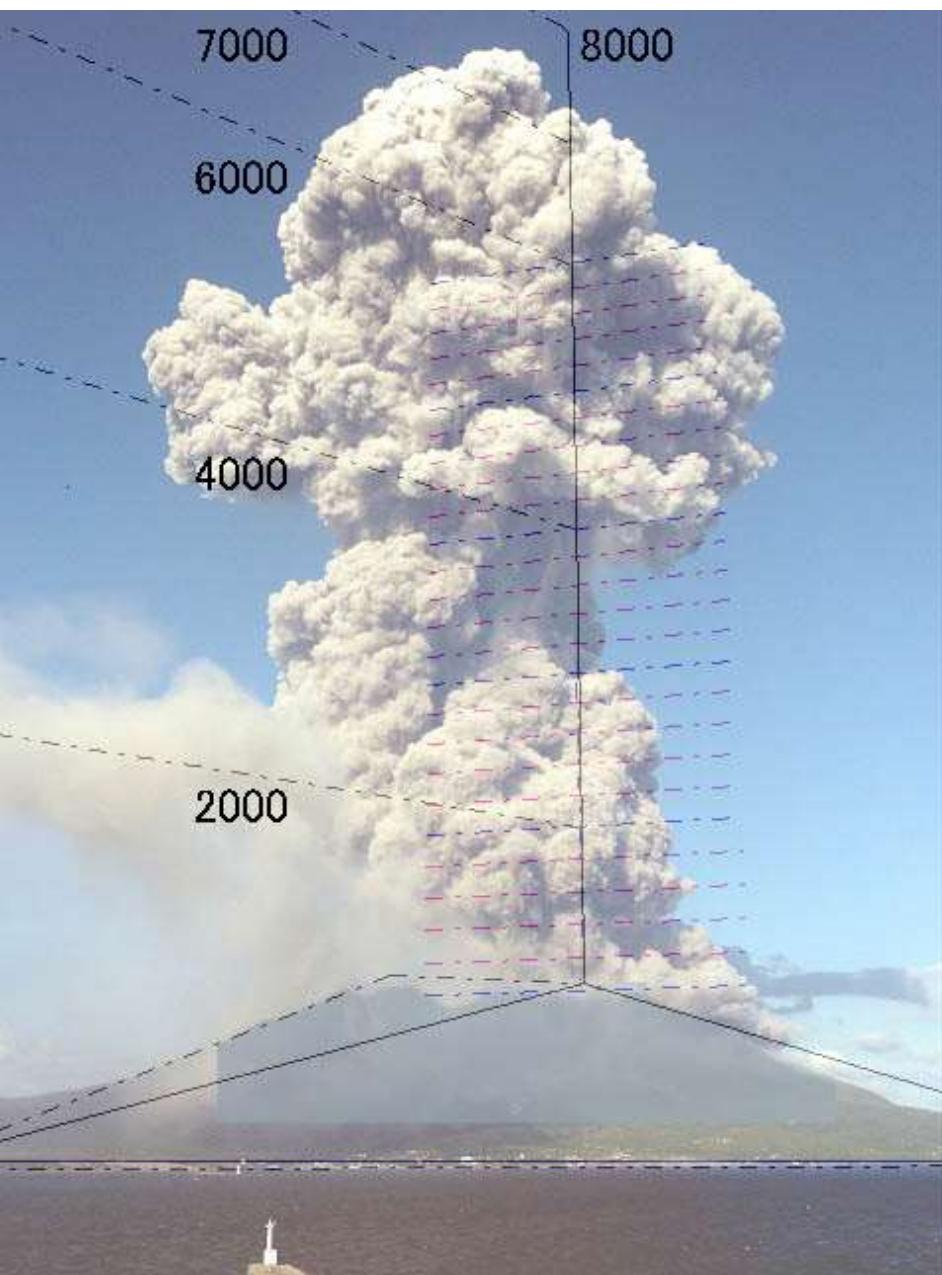
Original data every 30 s.

Height of eruption column 16:35

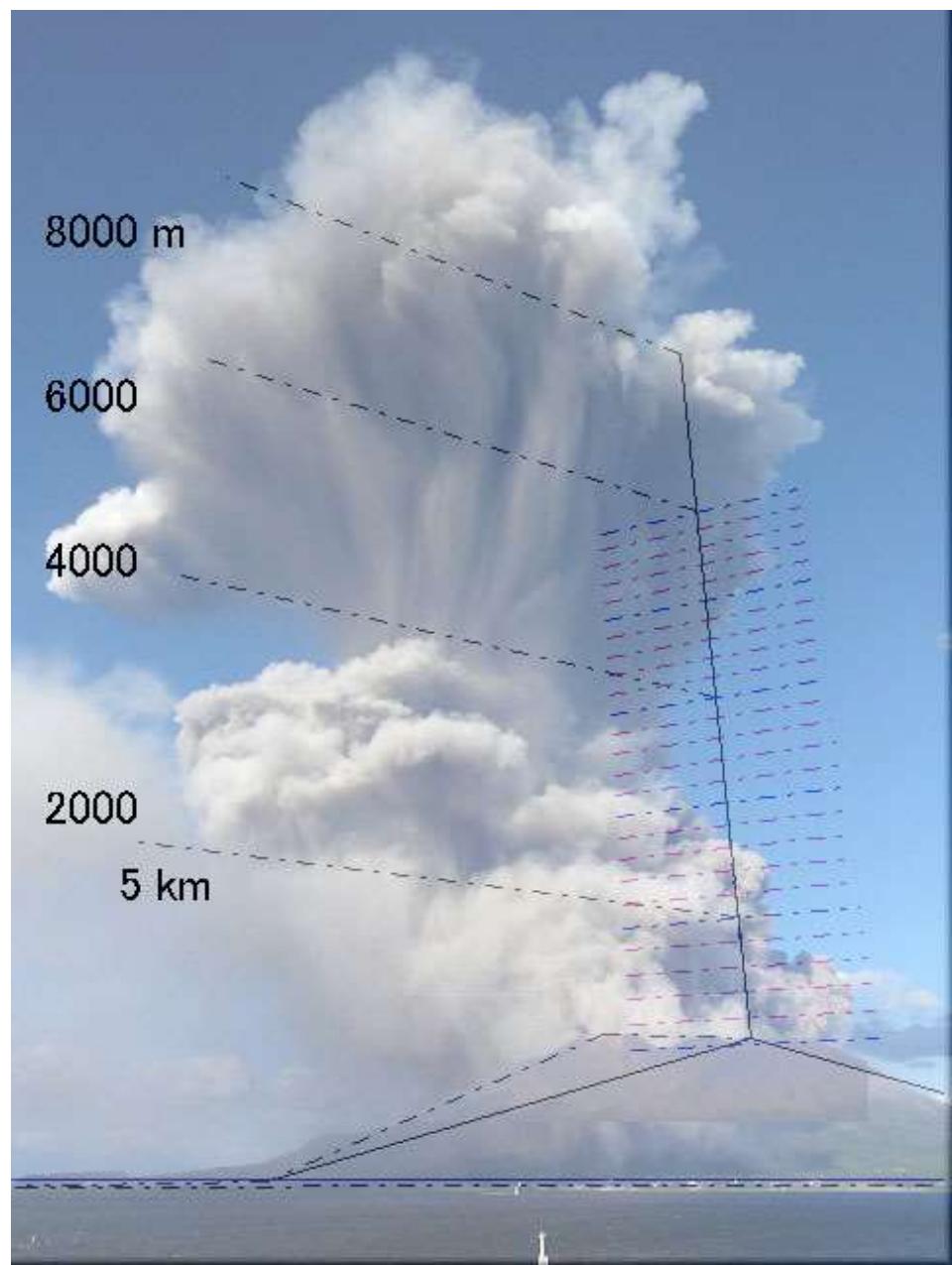


3D projection analysis of
photographs from B:WSW10km

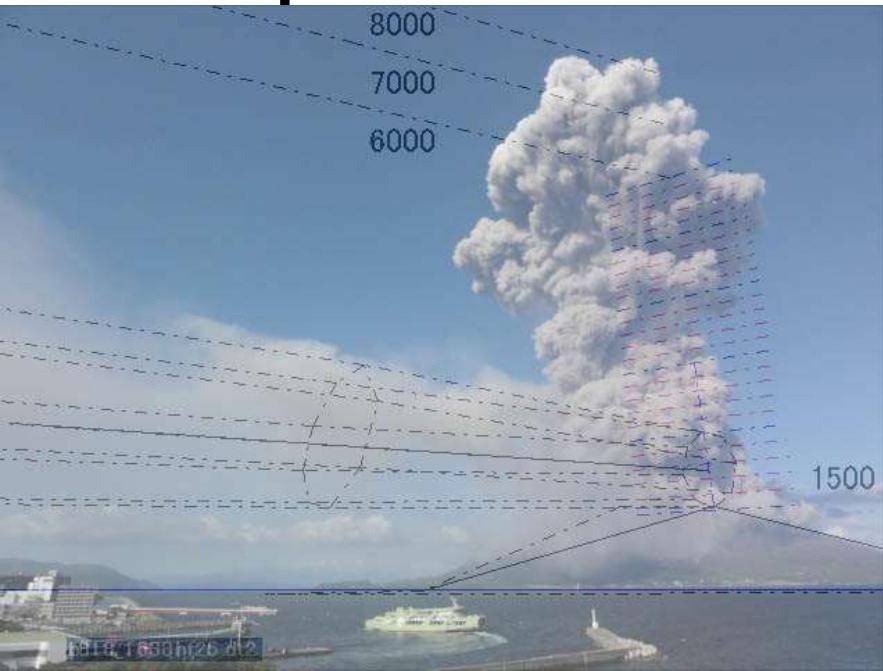
16:36



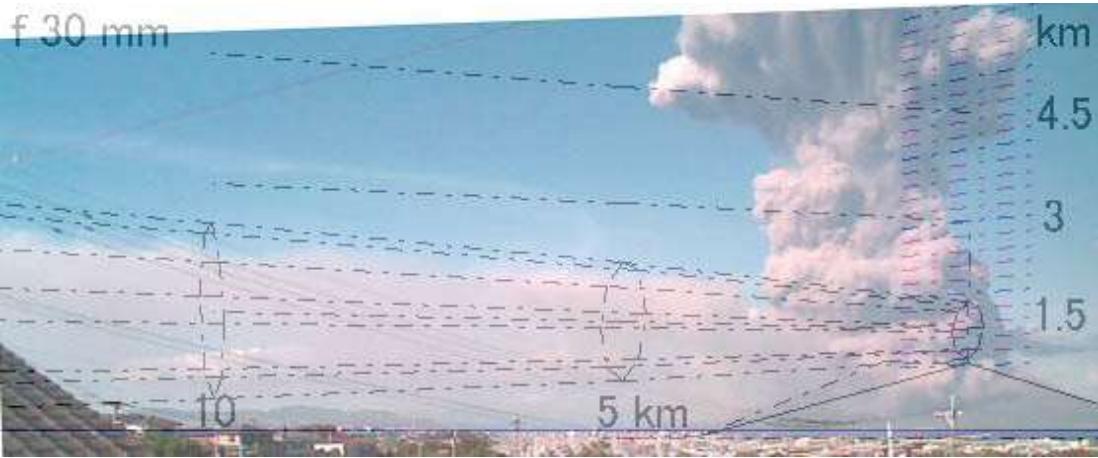
16:42



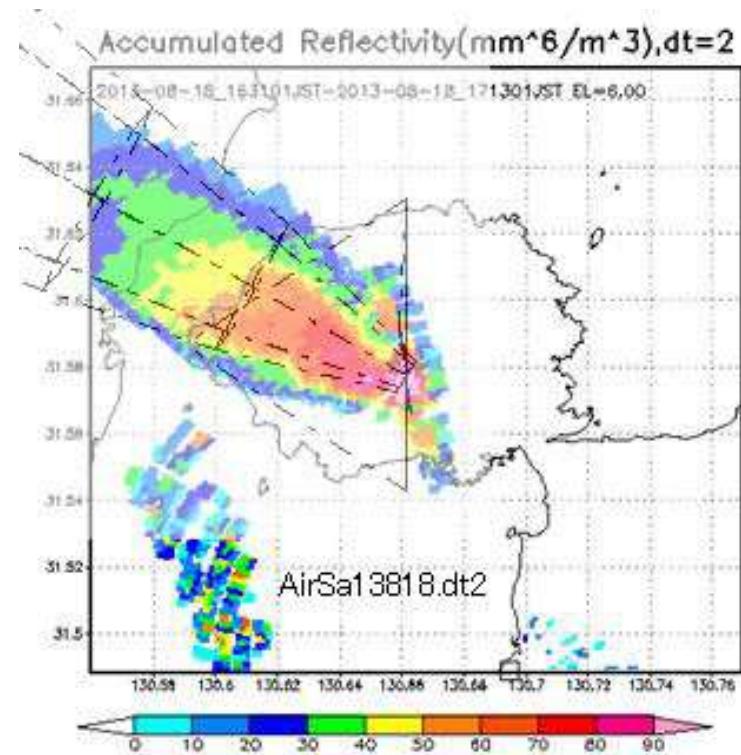
Flow pattern simulation



B
16:38



K(SW17km) 16:40



A photograph of a cloudy sky with a perspective grid overlay. The grid consists of several parallel dashed lines forming a triangular shape, with numerical labels 1.5, 3, and 4.5 indicating distances or height levels. The background shows a bright sun and scattered clouds.

T(SSE10km) 16:40

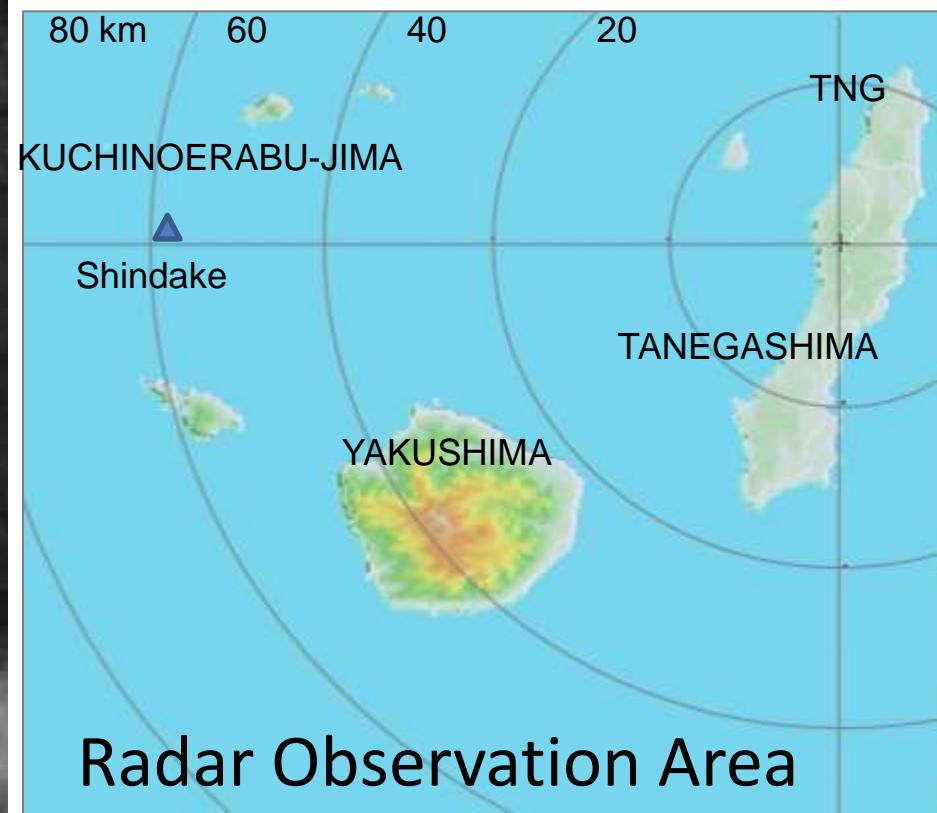
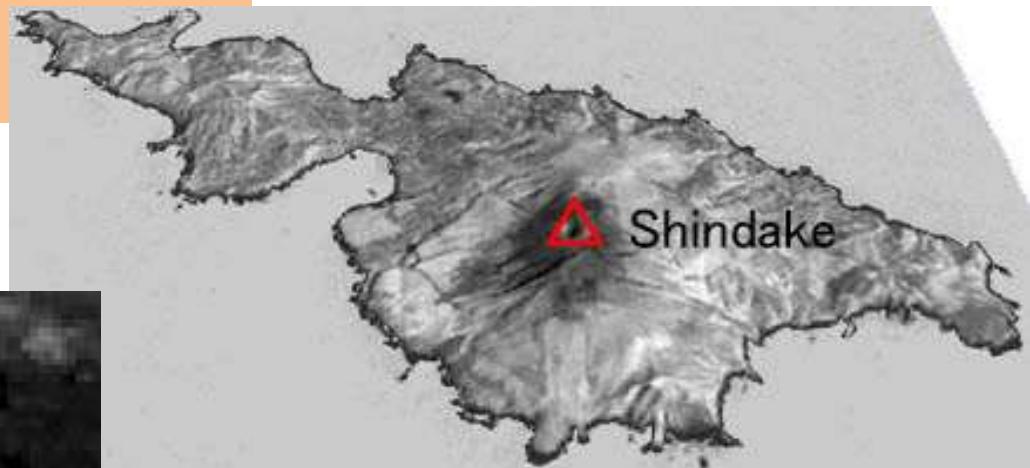
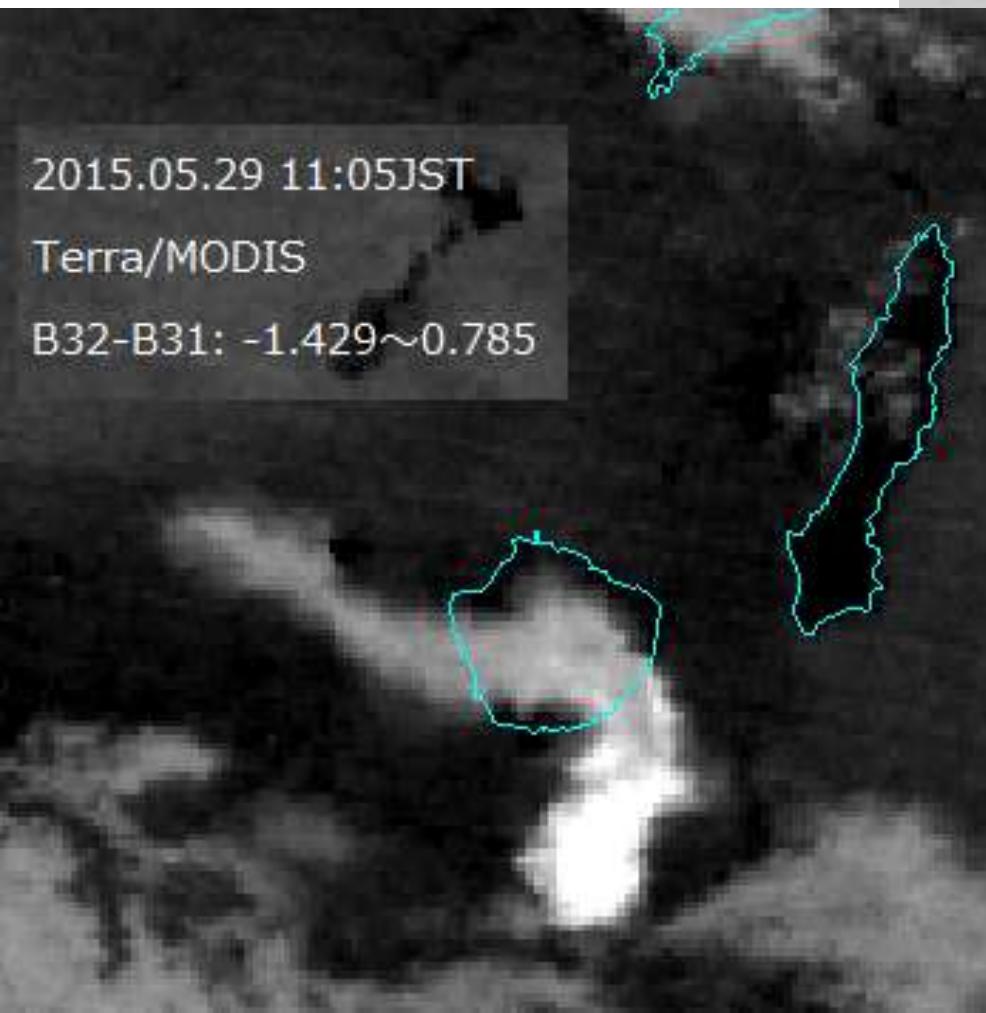
Sakurajima eruptions from Showa crater, etc.

- Movies of notable eruptions
<http://es.educ.kumamoto-u.ac.jp/volc/sakushowa/notable/>
- Volcanic eruption clouds in southwest Japan observed from the ground and satellites, IAVCEI Conf. , Kagoshima, 2013.7
K.K., S.T., N.I., C.K.+ I. HARADA and J. PARK
- Mechanism of high concentration events of sulfur dioxide at the surface around Sakurajima Volcano, , IAVCEI Conf. , 2013.7, KINOSHITA, SAKAMOTO, KANAGAKI and IINO
- Papers and presentations in
<http://wwwkav.mydns.jp/volc/index-e.html>
- Volcanic clouds at Sakurajima in the 21th century
<http://wwwkav.mydns.jp/volc/sa21c/sa-menu.htm>

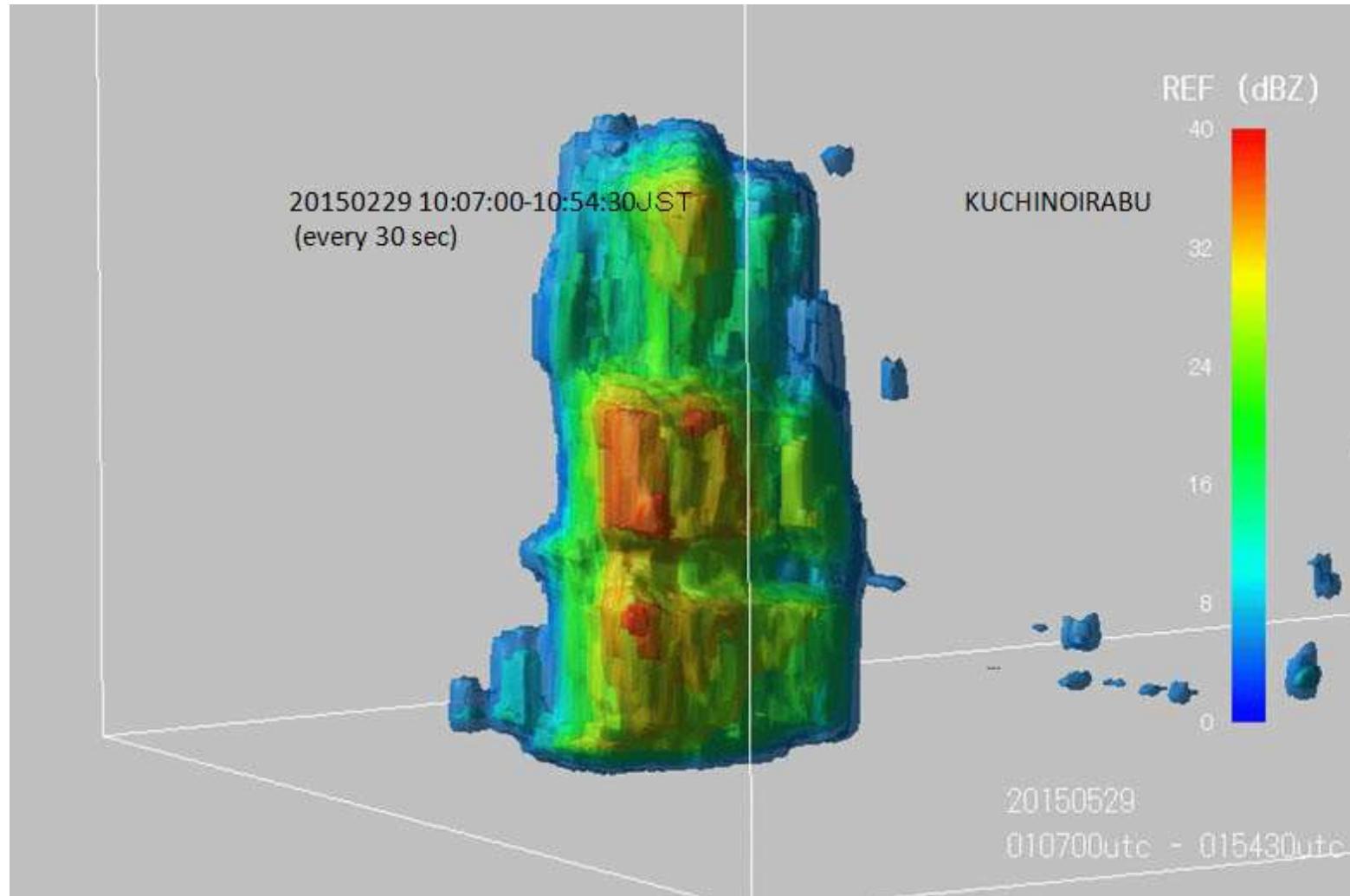
4. Kuchierabujima eruption on 29 May 2015

3D View from S

66 min. after explosion at 9:59 JST



Radar 3-D View of Volcanic Ash Cloud



Thank you very much!

Acknowledgements

- We are grateful to Aso Volcano Museum and Tarumizu City Office for the support of web-camera observation, and Tokyo Univ. Information Sciences, Earthquake Res. Inst./Inst. Industrial Sci., Tokyo Univ. and NASA LAADS web. for providing the satellite data.
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