SATREPS
Science and Technology Research Partnership for Sustainable Development Program

10th Nov 2015

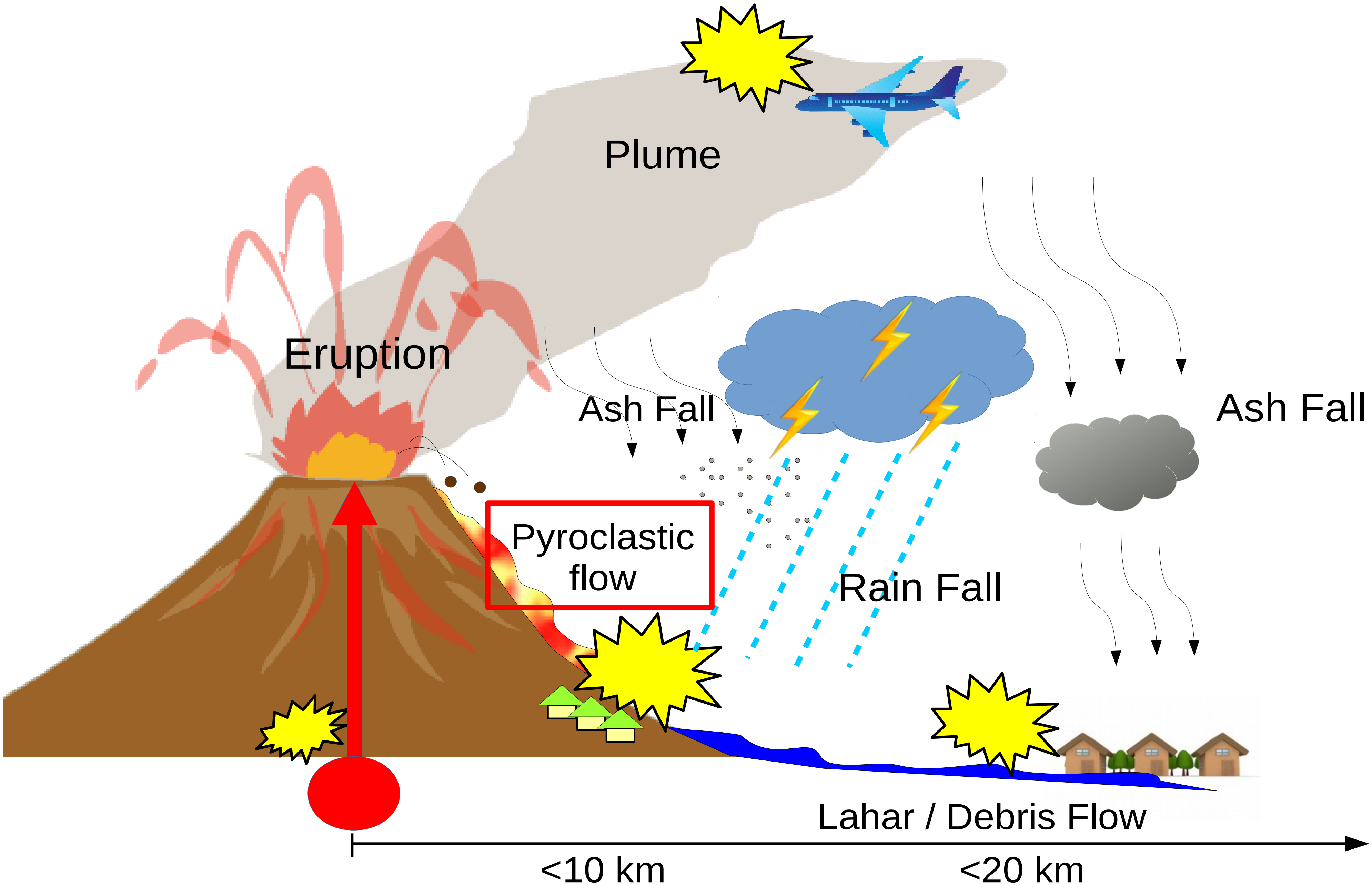
G5 Japan

Sediment Disaster Information provided by MSD Simulator

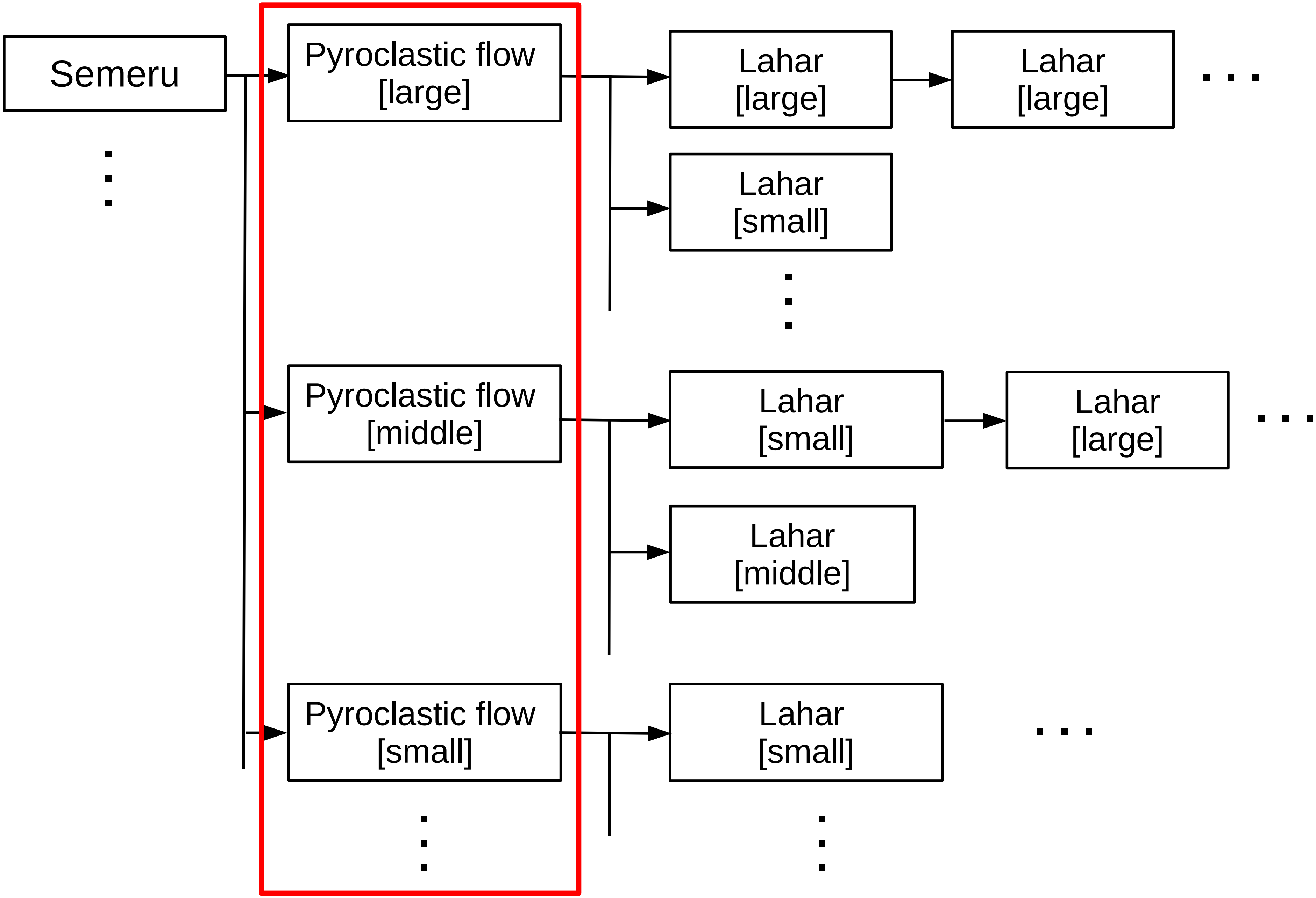
- Pyroclastic flow in Semeru Volcano -

Kuniaki Miyamoto
（University of Tsukuba, Japan）

Disasters due to eruption and following disasters in volcanic area

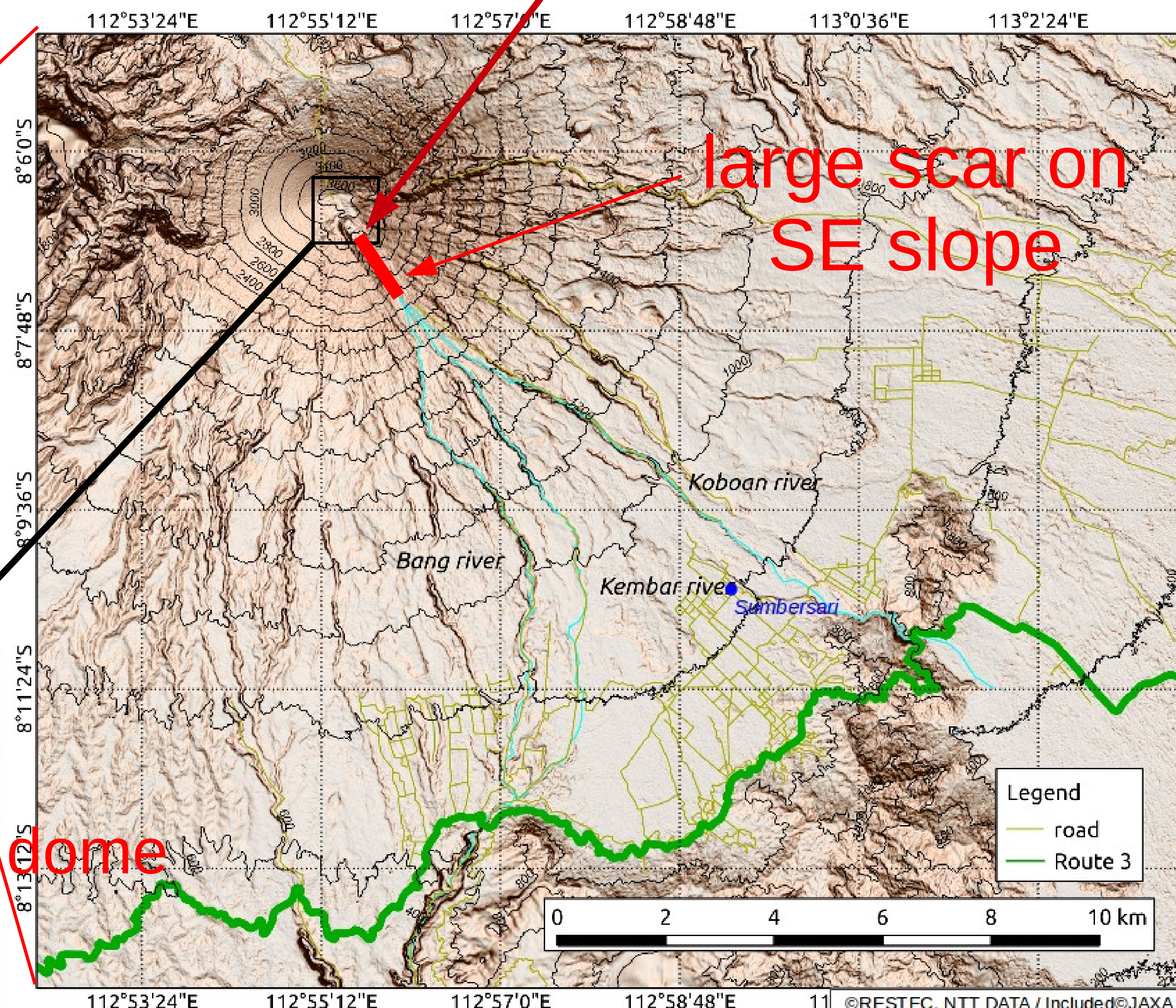


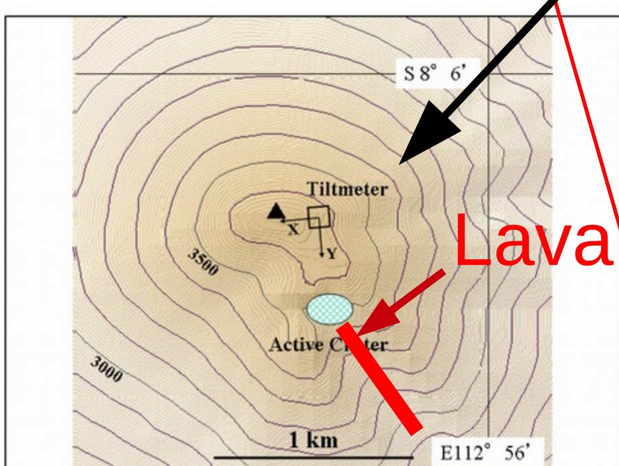
Event chains at Semeru



Topography and flow direction of pyroclastic flow

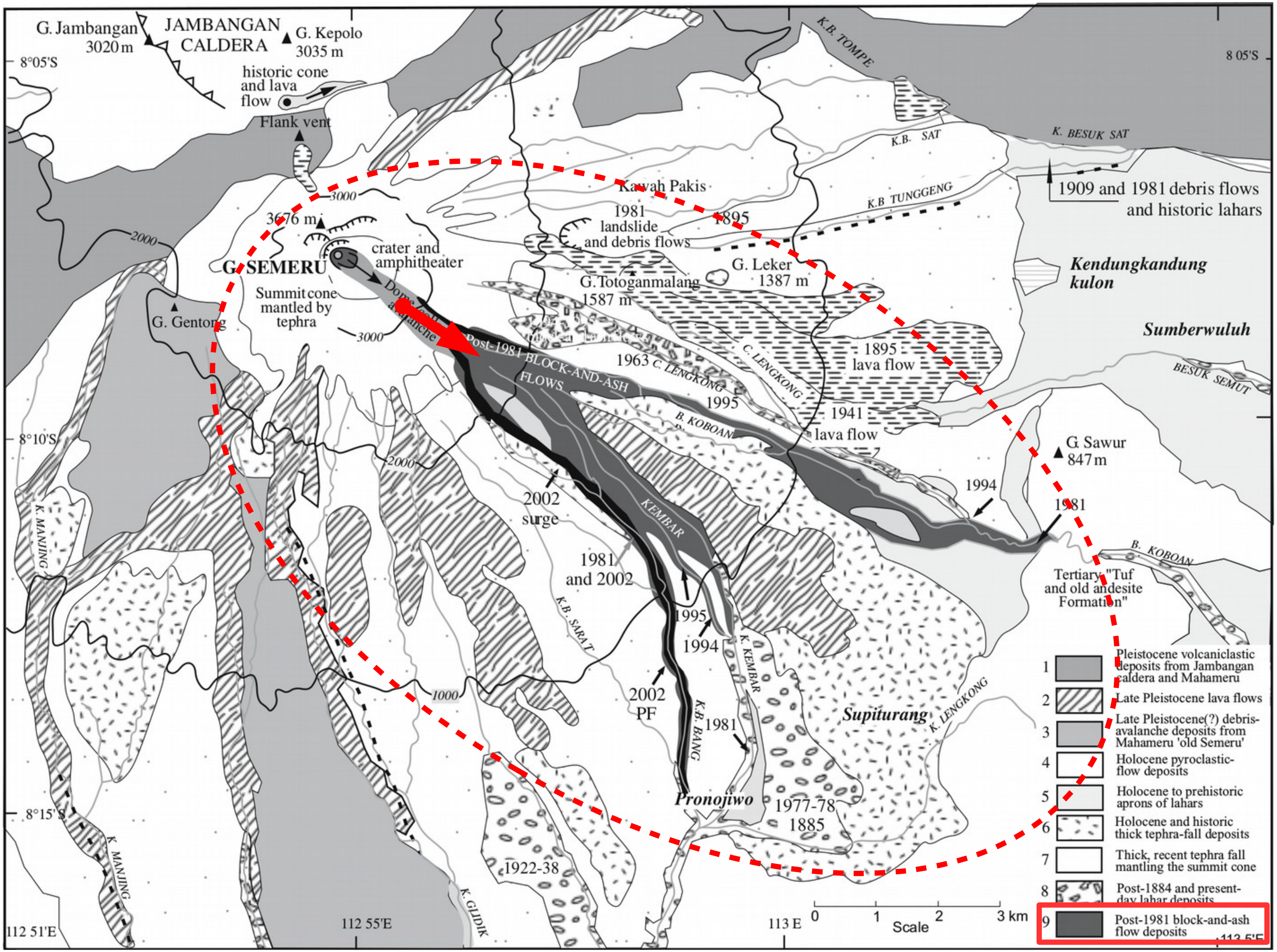
Lava dome





Badan Geologi (2012)

Pyroclastic flow inundation after 1981 (Thouret, 2007)



Volume of pyroclastic flows at Semeru, Merapi and Unzen

Semeru volcano		Merapi volcano		Unzen volcano
Volume of Pyroclastic flow ($\times 10^6$ m^3)		Volume of Pyroclastic flow ($\times 10^6$ m^3)		Volume of Pyroclastic flow ($\times 10^6$ m^3)
		34~46	(2010/10~11/ー)	
		29.4	(1961/05/08)	
6.8	(1994/02/03)	7.7	(1969/01/07~08)	
6.4	(1977/12/01)	6.5	(1997/01/07)	
6.2	(1981/03/28)	4.5	(1984/06/13~15)	
5	(1985/05/10)	3	(1992/02/02)	
5	(1988/05/10)	2.5~3.0	(1994/11/22)	
3.25	(2002/12/29)	2.9	(1973/12/19~20)	
		2.5	(1986/10/10)	2.4 (1991/09/15)
		1.9	(1975/07/10)	0.5 (1991/06/03)
		1.7	(1973/09/22~23)	0.7 (1991/06/08)
		1	(1994/12/07)	
		1	(2006/06/09)	
		0.8	(1976/11/05)	
		0.4	(1976/05/06)	

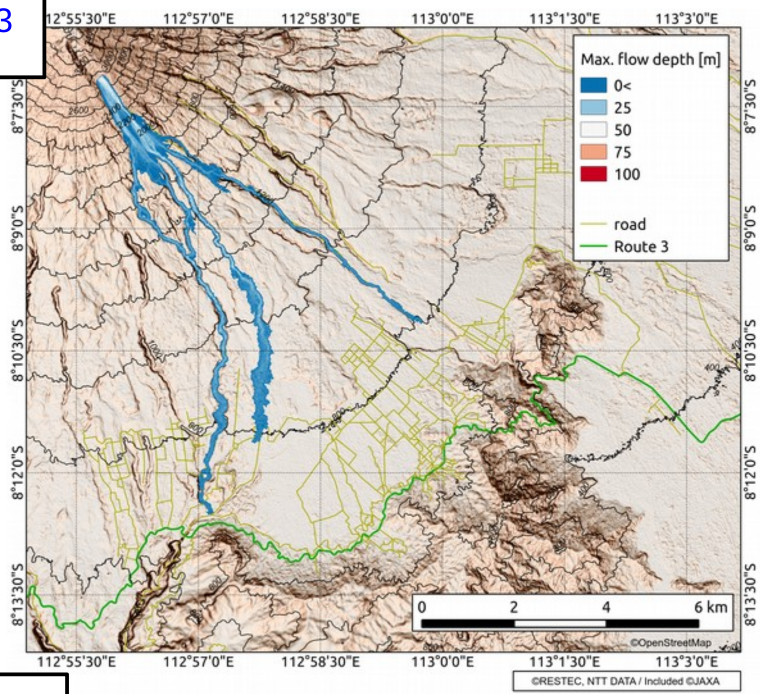
[Source GVP;Badan geologi(2012);Thouret et al.(2007); Bignami et al.(2013);Lavigne et al.(2000);Ratdomopurbo et al.(2013);Nakada et al.(1999)]

Cases of pyroclastic flow simulation

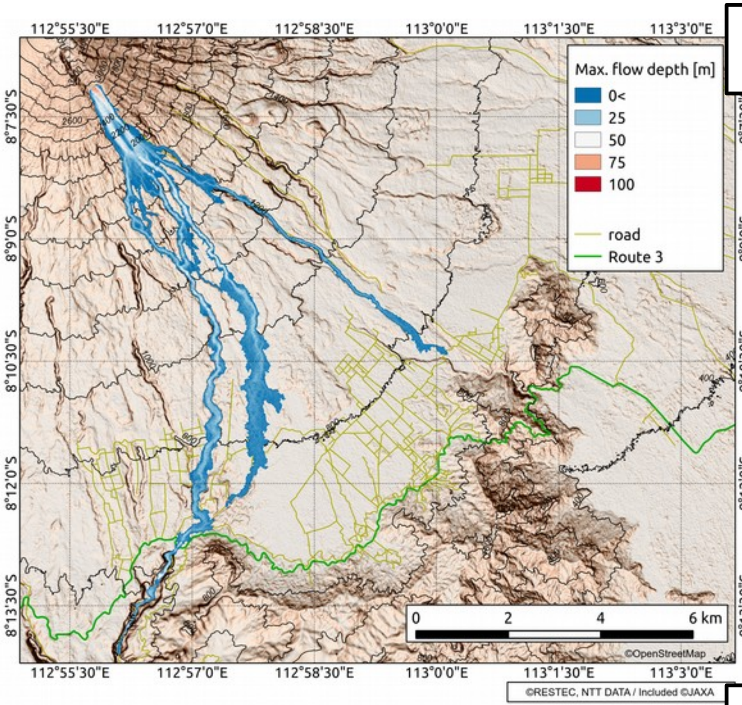
Case	Volume ($\times 10^6$ m^3)	Duration (sec)	Discharge ($\times 10^3$ m^3/s)
A1	5	300	17
A2	10	300	33
A3	20	300	67
A4	40	300	130

Comparison of maximum flow depth

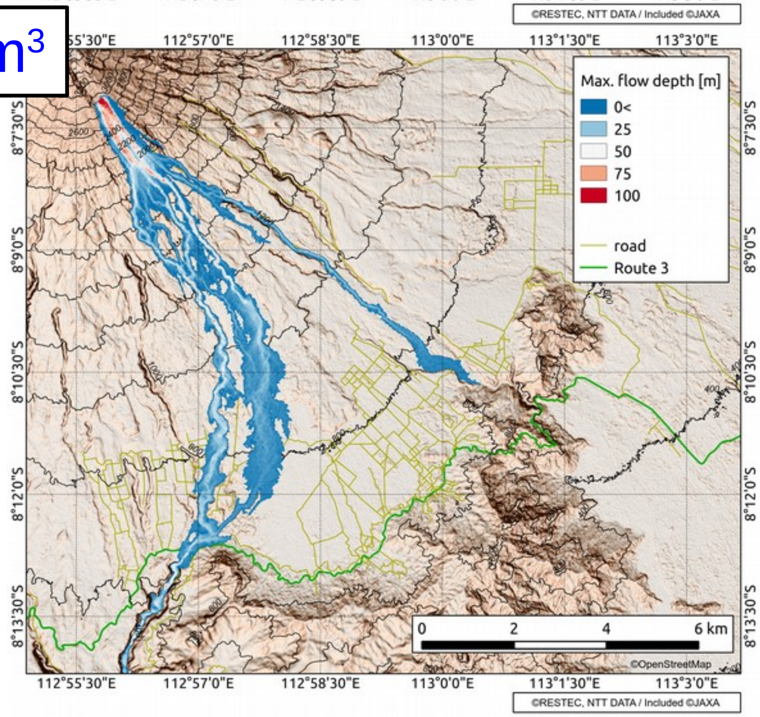
5×10^6 m^3



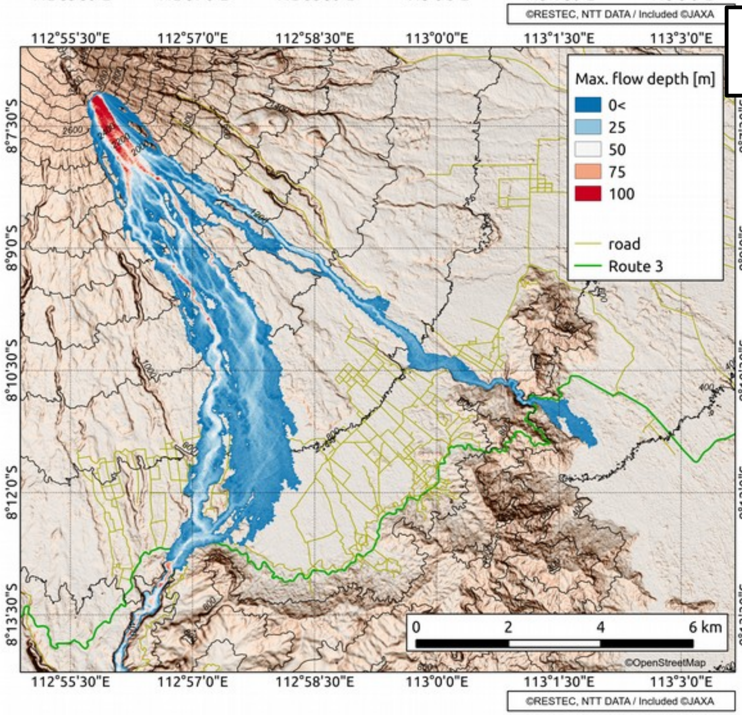
10×10^6 m^3



20×10^6 m^3

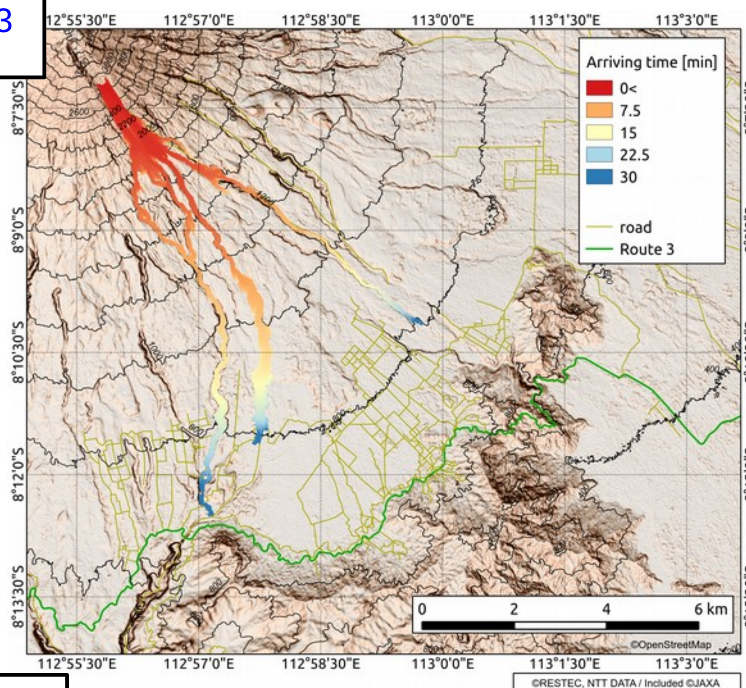


40×10^6 m^3

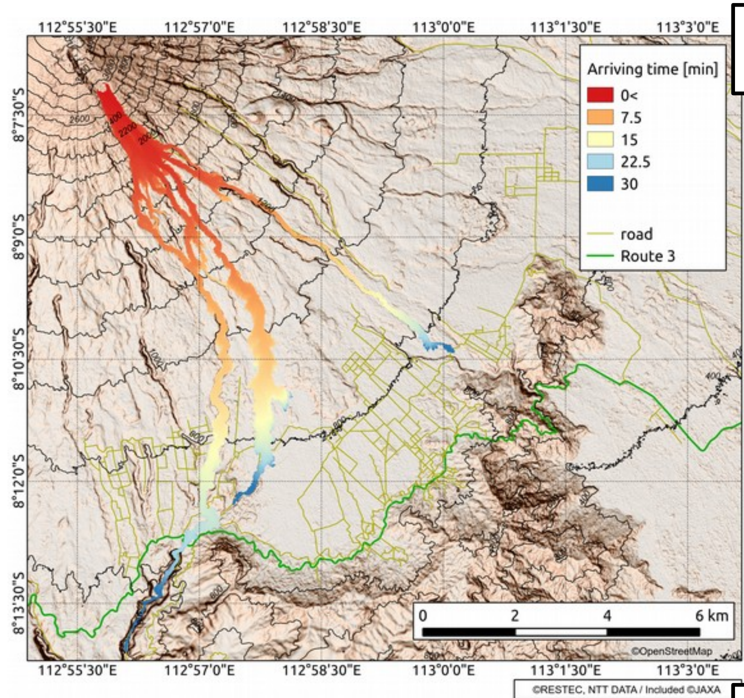


Comparison of travel time

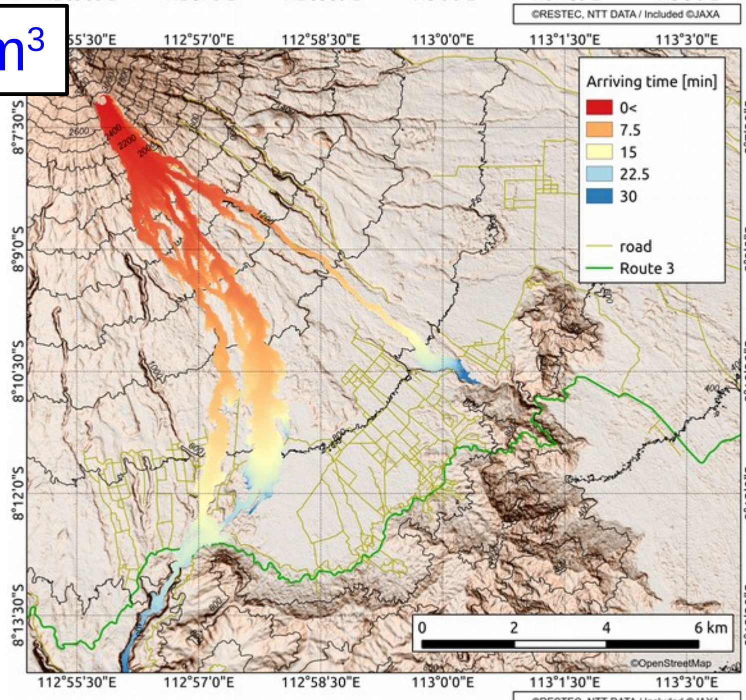
5×10^6 m^3



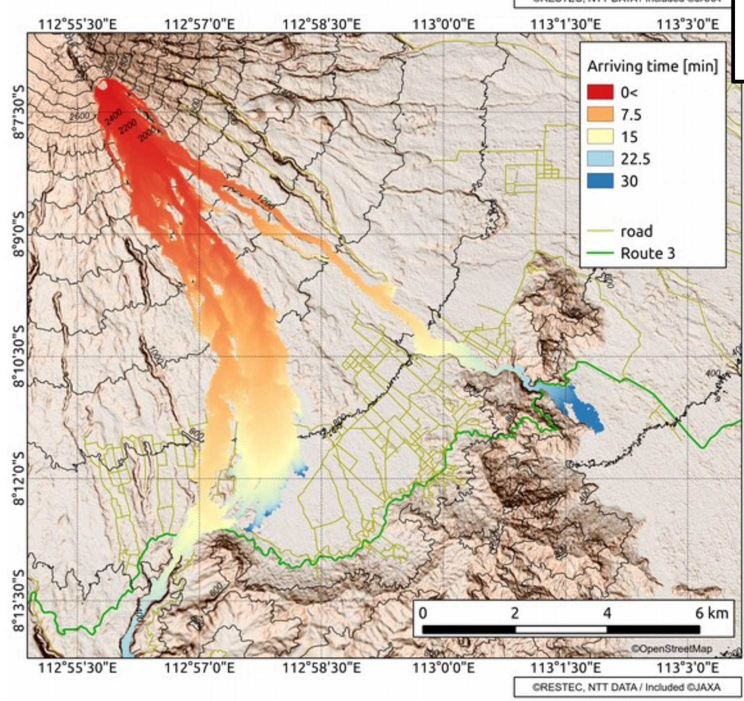
10×10^6 m^3



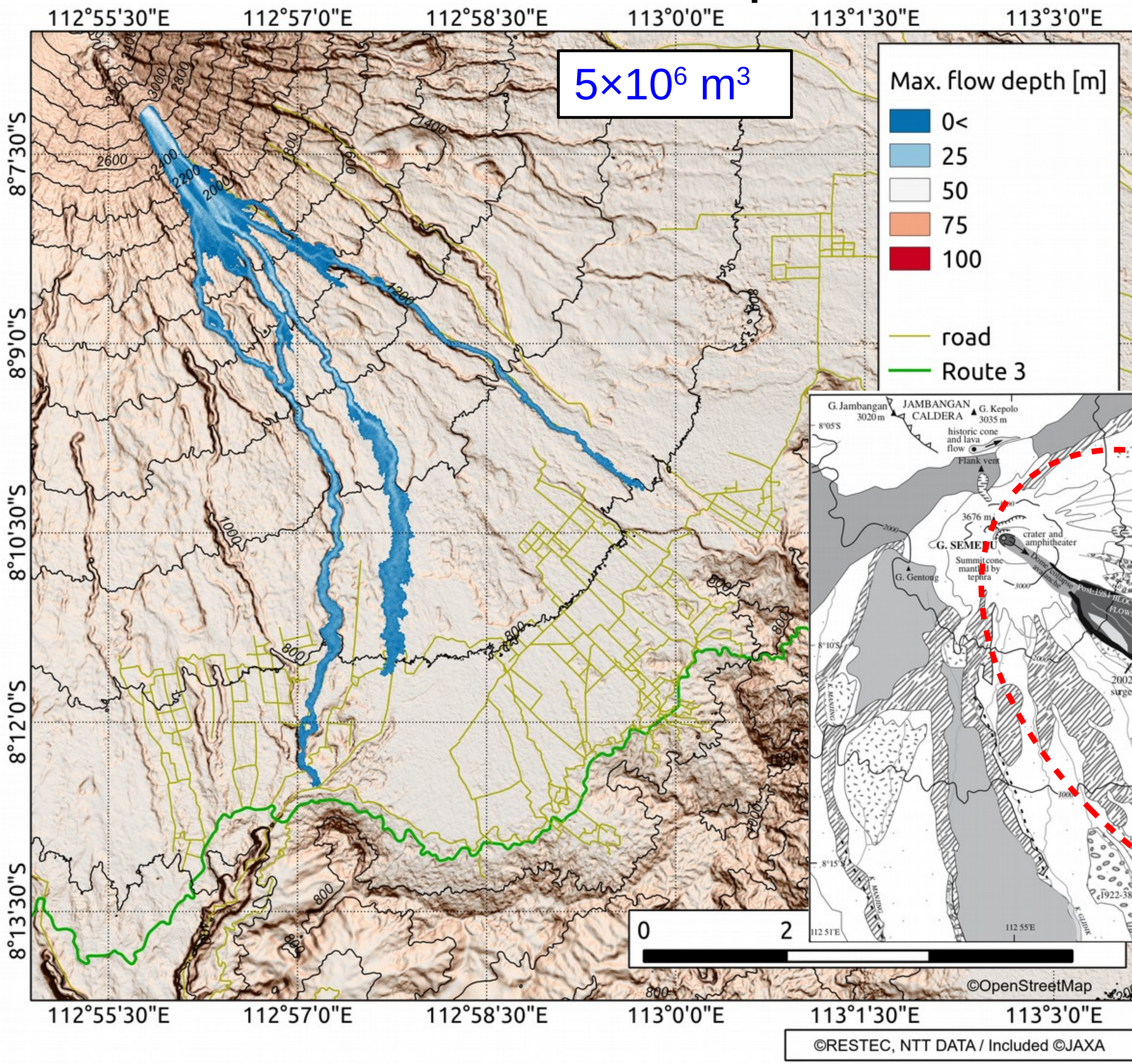
20×10^6 m^3

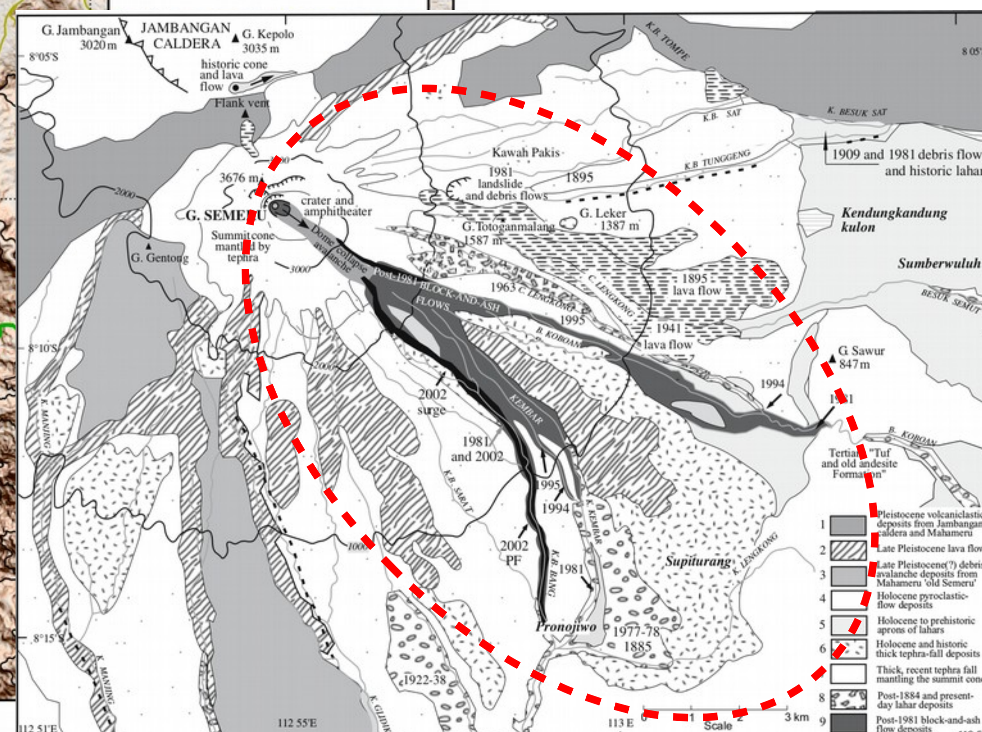


40×10^6 m^3



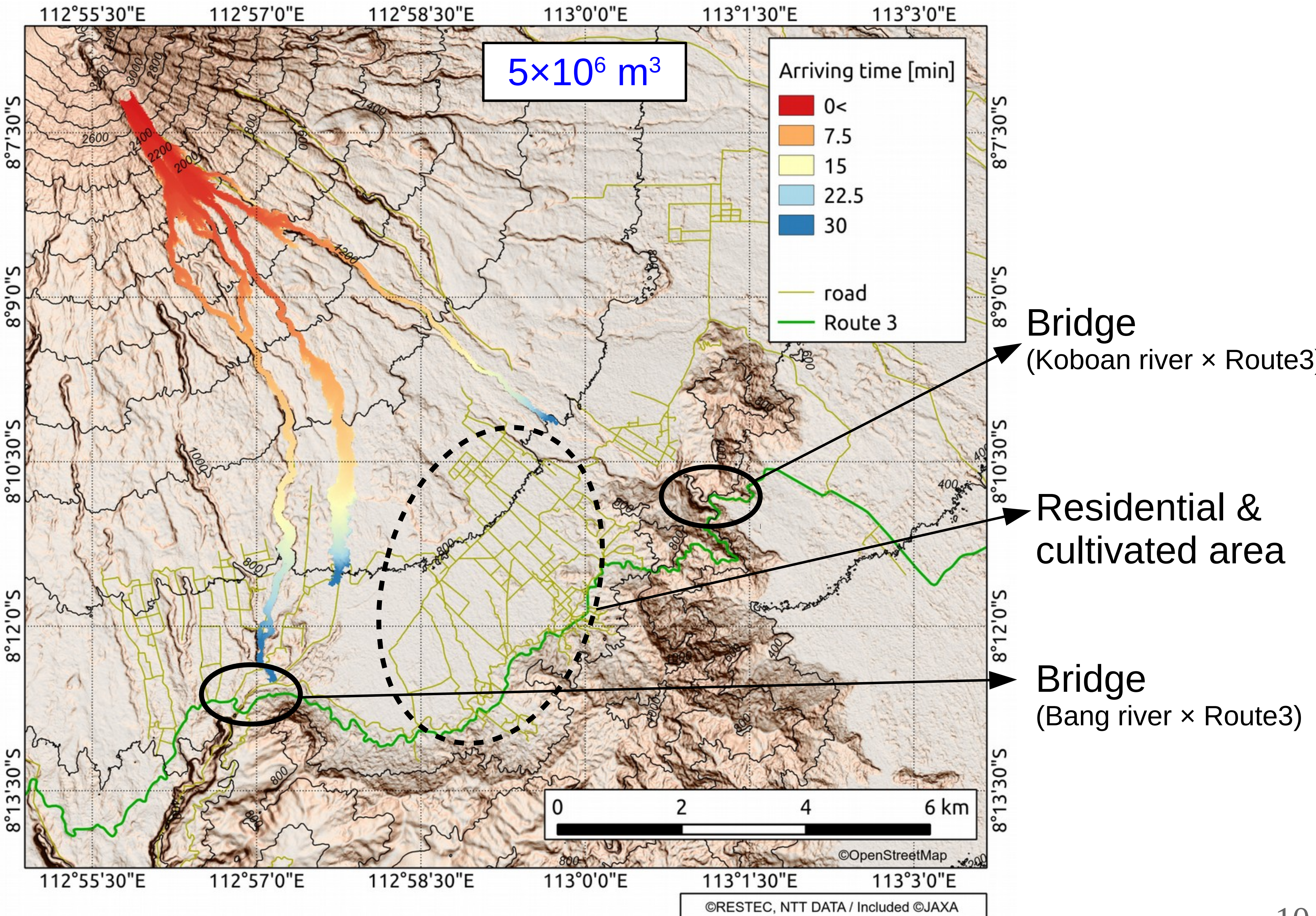
Maximum flow depth in 5×10^6 m^3 case



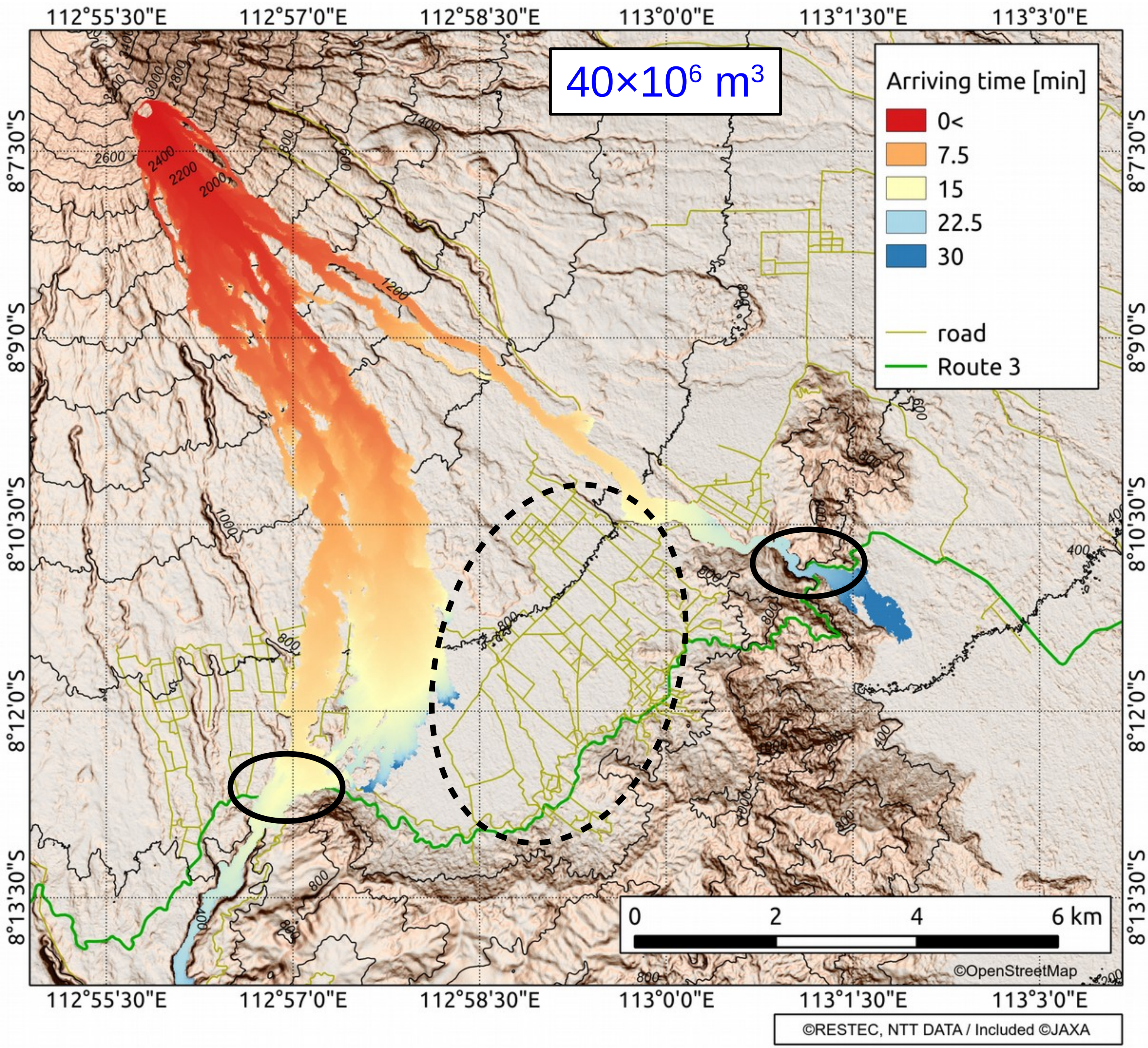


Thouret et al. (2007) and therein

Travel time in 5×10^6 m^3 case



Travel time in 40×10^6 m^3 case



SUMMARY

1. Four pyroclastic flow simulations were conducted ranging from 5×10^6 m^3 to 40×10^6 m^3
2. Simulation results said

   (1) current residential area is almost safe against several million m^3 of pyroclastic flow.

   However,

   (2) several ten million m^3 of pyroclastic flow could directly affect a part of the residential area and could run over the bridges of national road located at both sides of residential area and could isolate the area.
3. Further issue:
   Following lahars could also affect the area.
   Therefore, it is necessary to evaluate the possible affected area by following lahars. It means that the disaster scenarios, possible disaster chains, should be discussed.

Thank you for your attention

Terima Kasih