



International Workshop on:
**Optimizing the use of
Volcano Monitoring Database
to Anticipate Unrest**



26 – 29 November 2018 | Yogyakarta, Indonesia



The most challenging task during volcanic crisis is to interpret the monitoring data, to better anticipate the evolution of the unrest that allow implementation of timely mitigation actions. The volcanologist needs to make an informed decision on what is likely to happen next. In addition to real time monitoring data, the volcanologist needs to rely on historical unrest and past eruption episodes at the same volcano. Such analysis requires a standardized and organized database of past events. However, many volcanoes have limited instrumental records of past eruptions (or none!) and thus an assessment needs to be made by comparing its activity to analogue volcanoes that may have more complete records. This requires the existence of global database, such as WOVOdat.

WOVOdat is intended to provide reference data useful during volcanic crises, for comparative studies, and basic research on pre-eruption processes.

Activities during the workshop would be: exchanging experiences between observatory staffs/participants on handling volcano monitoring data, strategize and improve on monitoring data management and past unrest data analysis to better anticipate future unrest/eruption, and hands on experiences in using WOVOdat online interface.

WORKSHOP PROGRAMME

26 November 2018, Monday

Opening		
0830 – 0900	Registration, Meet & Greet	
0900 – 0930	Opening ceremony - Head of Geological Agency of Indonesia - Head of CVGHM	
0930 – 1030	Coffee Break	
WOVOdat development & progress		
1030 – 1100	WOVOdat: Current Progress and Plans	Fidel Costa
1100 – 1200	WOVOdat: Web Interface & Online Tools	Christina Widiwijayanti & Nang Thin Zar Win
1200 – 1300	Lunch Break	
Monitoring the Volcanic Unrest (Part – I)		
Convener & reporter: Sarah Ogburn, Benoit Taisne		
<p>We invite each volcano observatory/institution representative to give 30 minutes oral presentation on case example(s) of past volcanic unrest/eruption, e.g.:</p> <ul style="list-style-type: none"> What type of observable indicator of unrest, captured by monitoring instruments or from other observations What type of monitoring data were available before and during the eruption How was the unrest evolving towards eruption How the eruption progressed through time (dome extrusion, phreatic, explosion, lava flow, etc.) When and how eruption end Alert level changes, if any Hazard phenomena (tephra falls, PDC, lahar, etc.) Lesson learnt from this unrest/eruption Plans to improve monitoring system & data management in the future etc. 		
1300 – 1330	PHIVOLCS – Philippines	Winchelle Ian Sevilla
1330 – 1400	RVO – Papua New Guinea	Mikhail Herry
1400 – 1430	SERNAGEOMIN – Chile	Jonathan Quijada Jara
1430 – 1500	MVO – Montserrat, B.W.I.	Roderick Stewart
1500 – 1530	Coffee Break	
1530 – 1700	CVGHM – Indonesia (West Indonesia, East Indonesia, BPPTKG)	Kristianto, Devy Syahbana, Agus Budi Santoso

27 November 2018, Tuesday

Monitoring the Volcanic Unrest (Part – II)		
Convener & reporter: Benoit Taisne, Sarah Ogburn		
0830 – 0900	NIED – Japan	Hideki Ueda
0900 – 0930	ERI – Japan	Yosuke Aoki
0930 – 1000	USGS – USA	Sarah Ogburn & Jeremy Pesicek
1000 – 1030	Coffee Break	
1030 – 1100	IPGP – France	François Beauducel
1100 – 1130	INGV – Italy	Giuseppe Puglisi
1130 – 1200	IMO – Iceland	Kristín Vogfjörð
1200 – 1300	Lunch Break	
Group Discussion: How volcano monitoring data management can be optimized to anticipate future unrest/eruptions		
<p>Split into group of 5–6 people. Each group will prepare a short summary, then present and discuss with other group.</p> <p>Topics to discuss e.g.:</p> <ul style="list-style-type: none"> Lesson learnt from various unrest cases: long /short term unrest, failed eruption, unrest for different eruptive styles, etc. How to improve & strategize to better anticipate next unrest/eruptions: <ul style="list-style-type: none"> volcano monitoring system & operational, volcano monitoring data management (historical data, real time data), Improve alert level decision/action. 		
1300 – 1500	Discussion & Preparation of Short Presentation	
1500 – 1515	Coffee Break	
1515 – 1615	10–15 minutes Presentation by Each Group	Moderator: Fidel Costa & Chris Newhall
1615 – 1700	Final Discussion Lead by Moderator(s)	

28 November 2018, Wednesday

Monitoring Data Management (from instrument to data archiving)

Convener & reporter: Christina Widiwijayanti, François Beauducel

Exchange information on optimizing data streaming & archiving:

- Real time volcano monitoring data management system
- Automation at the volcano observatory level: data input & data processing (real time)
- Historical data archiving & management
- National and regional effort on developing volcano database/data portal
- WOVOdat data population

0830 – 0915	WebObs	François Beauducel
0915 – 1000	USGS & VMAP Monitoring Data Management and VALVE	Sarah Ogburn & Jeremy Pesicek
1000 – 1030	Coffee Break	
1030 – 1100	PHIVOLCS Monitoring Data Management	Mary Jane Catapang & Robert Garlope
1100 – 1130	CVGHM Monitoring Data Management & MAGMA Indonesia	Hetty Triastuty, Hery Kuswandarto, & Suparjan
1130 – 1200	EOS: "How to link continuous raw data analysis in real-time with derived product in databases?"	Devy Syahbana Benoit Taisne
1200 – 1300	Lunch Break	
1300 – 1330	SERNAGEOMIN Monitoring Data Management	Jonathan Quijada Jara
1330 – 1400	MVO Monitoring Data Management	Roderick Stewart
1400 – 1430	Japan Volcanological Data Network (JVDN)	Hideki Ueda
1430 – 1500	IMO - Iceland Monitoring Data Management	Kristín S. Vogfjörð
1500 – 1530	EPOS & EUROVOLCS	Daniilo Reitano & Giuseppe Puglisi
1530 – 1600	Coffee Break	

IT System & Data Sharing

1600 – 1630	WOVOdat: Optimizing Internet Security Settings, System Maintenance, etc. IT related issues to be reported, exchanged, and solved	Nang Thin Zar Win & Christina Widiwijayanti
1630 – 1700	Open Discussion on Data Sharing Discussion on issues related to data sharing (data policy, automation, synchronization, portal/link, data repository DOI, etc.)	Fidel Costa & Chris Newhall
1700 – 1800	Tour at BPPTKG facilities	
1800 – end	Dinner at "Gadjah Wong restaurant"	

29 November 2018, Thursday

Bayesian Event Tree Analysis & WOVOdat Tools

Convener & reporter: Yosuke Aoki, Fidel Costa

One of WOVOdat objective is to construct Bayesian probabilistic event tree, based on past unrest data, to improve eruption forecasts. The key is to find unrest patterns and indicators from multi-parameter datasets. This had been administered with the aid of advanced analytics tools that allow analyzing big amount of data using machine learning algorithms.

0830 – 0930	Bayesian Event Tree analysis (Long term event tree)	Chris Newhall
0930 – 1000	Coffee Break	
1000 – 1100	Bayesian Event Tree analysis (Short term event tree)	Laura Sandri
1100 – 1130	VMAP Event Tree	Sarah Ogburn & Jeremy Pesicek
1130 – 1200	WOVOdat tools: Comparing unrest; Finding analog unrest; Analytics tools	Christina Widiwijayanti & Nang Thin Zar Win
1200 – 1300	Lunch Break	

Exercise Using WOVOdat Tools

Split into group of 5-6 people to discuss:

- Group exercise in comparing hypothetical new unrest data with historical unrest in the database and using WOVOdat analytics tools
- Topics to discuss e.g. during volcanic crisis (fresh unrest & ongoing eruption) what type of information is most useful, what is missing, what can be improved
- Each group will prepare a short summary for 10 minutes presentation

1300 – 1500	Group exercise and discussion	Christina Widiwijayanti & Nang Thin Zar Win
1500 – 1530	Coffee Break	
1530 – 1700	Summary of the workshop topics by each reporter & discussion	
1700 – 1730	Wrap Up & Closing	Fidel Costa

Workshop References:

- Aspinall, W.P., Woo, G., Voight, B., Baxter, P.J., 2003, Evidence-based volcanology: application to volcanic crises. *J. Volc. Geotherm. Res.* 128, 273-285.
- Lindsay, J., Marzocchi, W., Jolly, G., Constantinescu, R., Selva, J., and Sandri, L., 2010, Towards real-time eruption forecasting in the Auckland Volcanic Field: testing of BET_EF during the New Zealand National Disaster Exercise 'Ruaumoko', *Bull. Volcanol.*, 72, 185-204.
- Marzocchi, W., Sandri, L., Selva, J., 2008, BET-EF: a probabilistic tool for long- and short-term eruption forecasting. *Bull. Volcanol.* 70, 623-632.
- Newhall, C., and Pallister, J., 2015, Using Multiple Data Sets to Populate Probabilistic Volcanic Event Trees, in Papale, P. and Shroder, J.F. (Eds.), *Volcanic Hazards, Risks and Disasters*, Elsevier, 203-232.
- Newhall, C. G., Costa, F., Ratdomopurbo, A., Venezky, D. Y., Widiwijayanti, C., Win, N. T. Z., 2017, WOVOdat – an online, growing library of worldwide volcanic unrest. *J. Volc. Geotherm. Res.* 345, 184–199.
- Sandri L., Jolly, G., Lindsay, J., Howe, T., and Marzocchi, W., 2012, Combining long- and short-term probabilistic volcanic hazard assessment with cost-benefit analysis to support decision making in a volcanic crisis from the Auckland Volcanic Field, New Zealand, *Bull. Volcanol.* 74:705-723.
- Sandri, L., Tonini, R., Rouwet, D., Constantinescu, R., Mendoza-Rosas, A.T., Andrade, D., Bernard, B., 2017, The Need to Quantify Hazard Related to Non-magmatic Unrest: From BET_EF to BET_UNREST. In: *Advances in Volcanology*. Springer, Berlin, Heidelberg.
- Sobradelo, R., and Marti, J., 2015, Short-term volcanic hazard assessment through Bayesian inference: retrospective application to the Pinatubo 1991 volcanic crisis, *J. Volc. Geotherm. Res.*, 290: 1 - 11



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