

This paper presents an analysis of the seismic activity of the Cordón Caulle volcano before and during its large eruption of 4 June, 2011. The data processing includes mainly the detection and classification of the seismic events, the hypocentre relocation using a refined velocity model, the determination of focal mechanism of the main events and the evaluation of the b-value as a function of time. Using the results of this data processing and other types of observations, a detailed chronology of the unrest and eruptive sequences, divided in 7 phases, is proposed.

The seismic activity during the unrest and pre-eruptive periods is interpreted in light of the 'top-down model' of precursory seismicity by Roman and Cashman (2018). During the eruption itself, several phases, explosive, effusive, declining and resurging, are identified and the corresponding behaviour of the seismicity is analysed.

It is important to present the seismic observations associated with such a large eruptive event. The manuscript is generally well written and clear. It will deserve publication in SE when two main issues and some minor ones are clarified.

First, a large part of the analysis and interpretation is based on the temporal variations of the b-value. According to fig. 2D, this parameter varies between 0.3 and 1.2 approximately, which is a huge interval that I've never seen in the literature. The largest variations occurred in a few days at the beginning of the eruption. In contrast with the unrest period, the eruptive phase is characterized by a strong tremor which may have modified the magnitude completeness M_c of the catalogue. This point should be discussed thoroughly. I suggest the authors to use more robust methods that are not dependent on the estimation of M_c . For example:

B-Positive: A Robust Estimator of Aftershock Magnitude Distribution in Transiently Incomplete Catalogs
van der Elst, NJ
JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH
Volume 126, issue 2, Article Number e2020JB021027
DOI 10.1029/2020JB021027
Published FEB 2021

Inverse Migration of Seismicity Quiescence During the 2019 Ridgecrest Sequence
Marsan, D ; Ross, ZE
JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH
Volume 126, Issue 3, Article Number e2020JB020329
DOI 10.1029/2020JB020329
Published MAR 2021

Furthermore, the authors interpret the b-value variations as due to stress variations in the structure. However, if we use the relationship found by Scholz (2015) between b and s_1-s_3 , we'd calculate variations of several hundreds of MPa for the deviatoric stress associated to the b-value variations obtained in the present paper. This point should be clarified and its physical implication should be discussed.

Second, the authors discuss the behaviour of the harmonic tremor that appeared during the effusive phase. They refer to a previous paper of their research group (Bertin et al., 2015) which presents a very elementary analysis of particle motion of the tremor and which indicates that horizontally

polarized P-waves are dominant in the wavefield. This observation is very intriguing. They conclude that the source is very shallow and due to the oscillation of volcanic layers excited by the magma flow. This conclusion and interpretation are poorly founded. The wave polarization analysis should be carried out with much more details and using several stations, following for example the approach of Haney et al. (2020). Alternative source mechanisms should be discussed because the model of Omer (1950) can hardly account for harmonic tremor with regularly spaced spectral peaks.

Third, the final unrest phase and the onset of the eruption are critical periods. I suggest to present an enlargement of fig. 2 from the end of May to beginning of June in order to present with more details the behaviour of the seismic activity and other parameters of interest.

Minor comments.

Figure 1. The labels of the main map and of the inset are mixed. Separate them and indicate that red rectangle shows limits of main map.

Line 132-134. The results of the analysis of wave polarization with Matsumura's method are not presented in the paper. Show them.

Line 156. The sentence is not clear.

Line 169. The magnitude of completeness may have changed during the study period. In order to convince the readers that the b-value is well defined, several Gutenberg-Richter diagrams should be displayed for large, medium or small b-values. See also first main comment.

Line 334. Are the depths of 3.8-6.4 km the depths of the 2 point sources or a range of depth common of these sources?

Fig 5 and other. Squares and crosses representing polarities in beach balls are not visible.

394. Suppress 'during'.

403. Explain your arguments.

452. Suppress 'Oscillation of'.

489. Replace 'seismicity' by 'events'.

538. The top-down model is verified for volcanoes after repose intervals of some decades. This is the case of Cordon Caulle. This could be mentioned.

599 & 636. Into → In

628. Replace 'has' by 'as'.

660. 'a stabilization of b-value to pre-eruptive conditions': what do you mean?

665-667. How do you interpret this LP seismicity in September-November?

785. pages are 221-239.

826. Singer or Asinger?

835. 2016

