

Figure SM1. Wadati diagram showing P arrival time referenced to the origin time of each earthquake, and the time difference between the S and the P arrival time. The slope of the line provides an estimate of V_p/V_s .

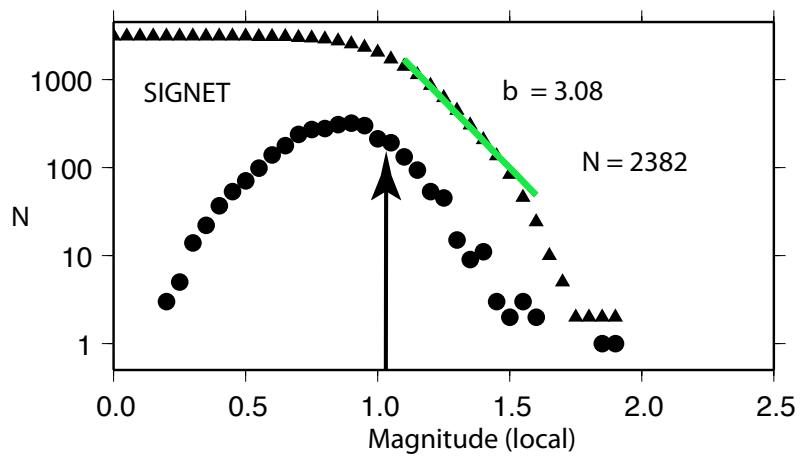


Figure SM2. Estimate of b-value from cumulative frequency (triangles) plot using methods of Aki [1965]. Dots are frequency distribution of magnitudes. Magnitude of completeness is estimated at $M_L = 1$.

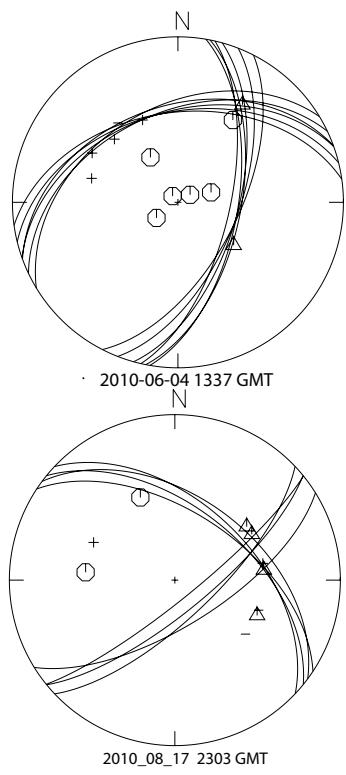


Figure SM3. Examples of nodal planes from first motion focal mechanism solutions for earthquakes listed in Table 1, shown as lower hemisphere projections. Symbols: hexagons are compressive first arrivals, + are emergent compressive arrivals, triangles are dilatational first arrivals, - are emergent dilatational arrivals.

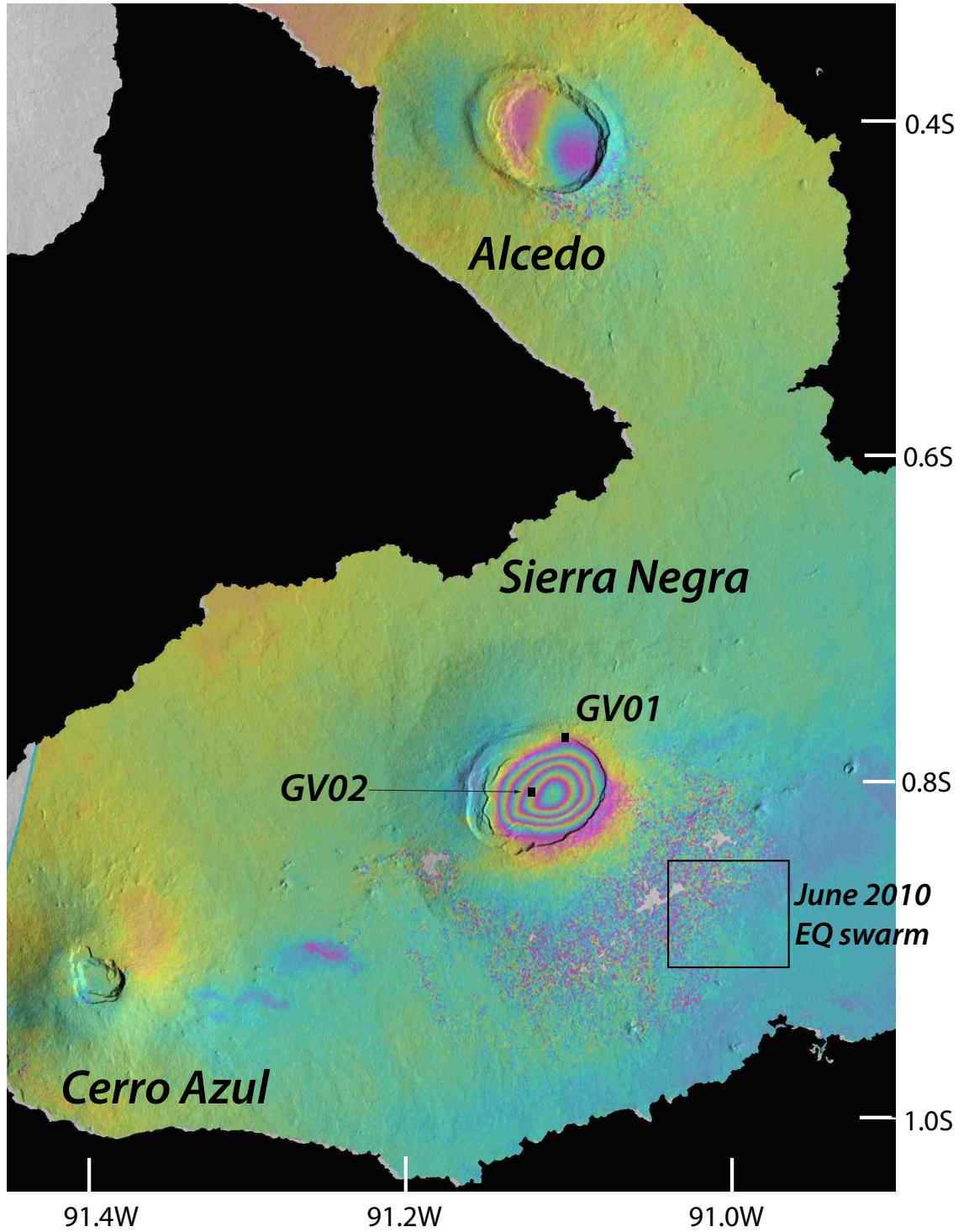


Figure SM4. ALOS ascending wrapped interferogram spanning 23/10/2009-06/10/2010. Each color cycle represents ~ 11.5 cm of displacement in the line-of-sight direction. This time period includes the June 2010 dike intrusion with earthquakes associated with this event within the box (see Figure 6).

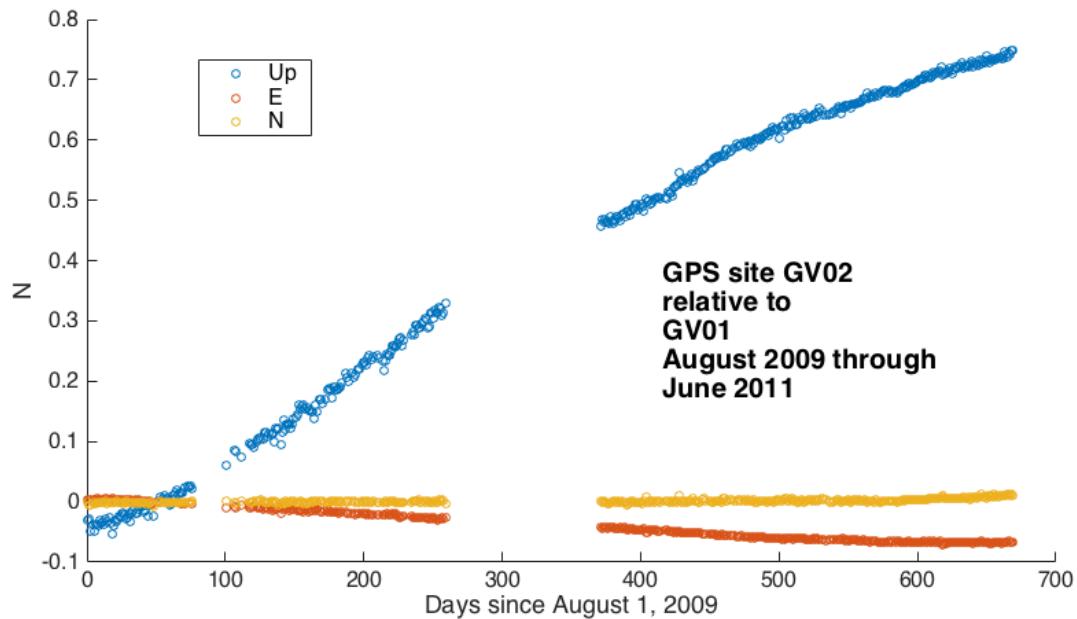


Figure SM5. Vertical, N and E variations at continuous GPS site GV02 within the center of Sierra Negra caldera relative to continuous GPS site GV01 on the NE flank (see Fig. 4 for locations).

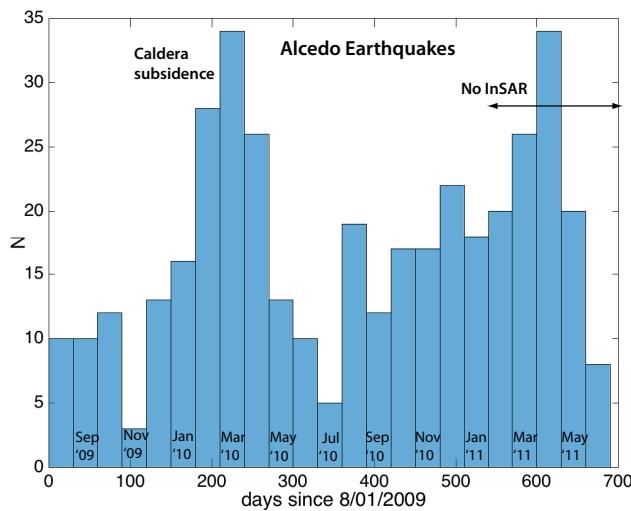


Figure SM6. Number of earthquakes beneath Alcedo volcano binned by month since August 2009. Vertical InSAR time series indicate that the caldera subsided by ca. 12 cm between end

December and April 2010 [Baker et al., 2012]. No InSAR data are available after December 2010.

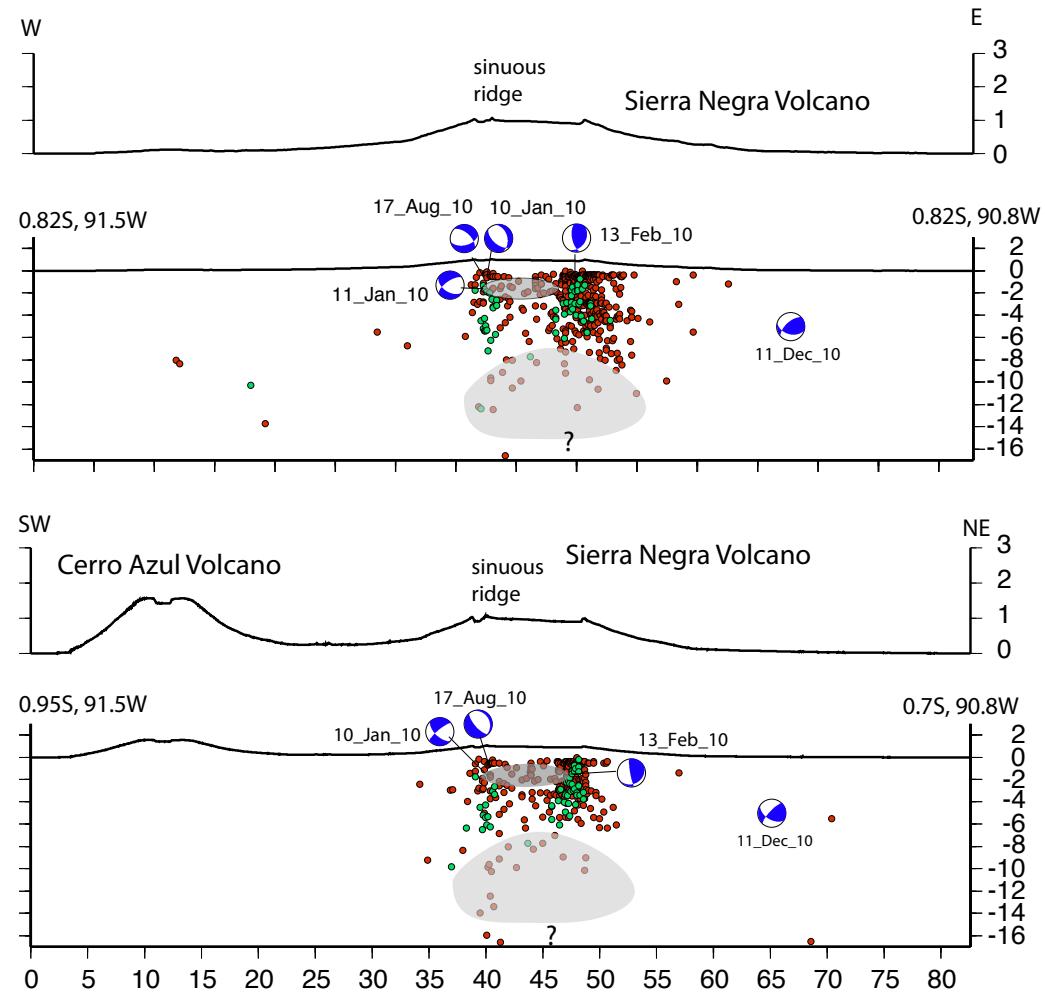
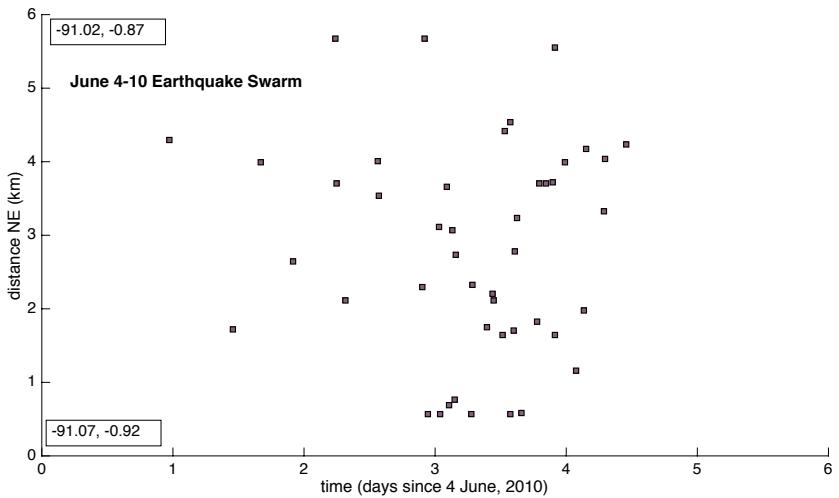
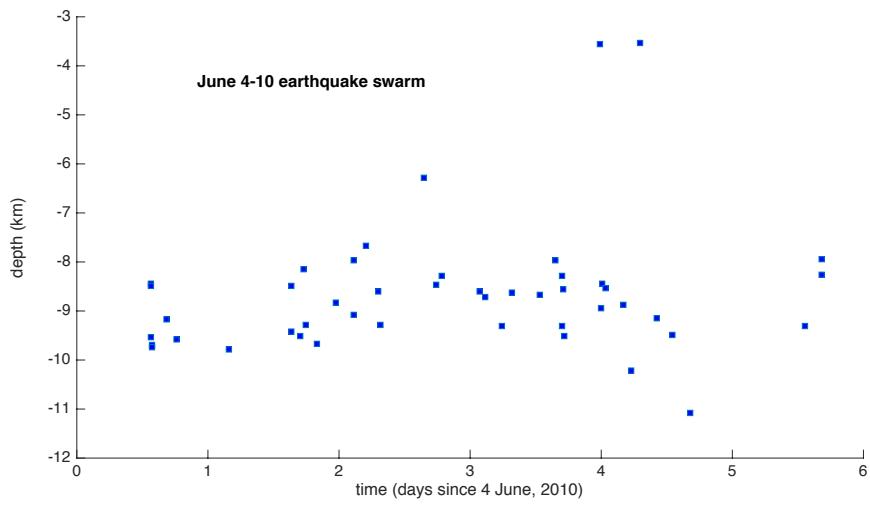


Figure SM7. Profiles of seismicity with focal mechanisms projected into the line of section along an E-W transect of Sierra Negra volcano (top), and a SW-NE transect of Cerro Azul and Sierra Negra (bottom). As in Figure 9, red are earthquake locations from 3D velocity model, and green are from cluster analyses. Grey ellipses are inferred shallow sill and magma chamber imaged in wavespeed tomography.



A.



B.

Figure SM8. Time distribution of hypocenters relocated using double difference cluster analyses for the June 2010 earthquake swarm on the SE flank of Sierra Negra volcano. A) Distance from southwest end of 7.8 km-long swarm with respect to time in days since 4 June, 2010. B) Depth of earthquakes with respect to time in days since 4 June, 2010.

References

Aki, K., 1965. Maximum likelihood estimate of b in the formula $\log N = a - bM$ and its confidence limits, Bull. Earthquake Res. Inst., Tokyo Univ. , 43, 237-239.