

**Title:** Kinematic magma volume accumulation at Westdahl volcano, Alaska, from 1992 to 2019

**Abstract:** Westdahl volcano is a shield volcano located on the west end of the Unimak island in the central Aleutian arc. Persistent volcanic deformation has been revealed by GPS and InSAR measurements since its last eruption in 1992. This work is aiming to estimate the overall location of the volcanic source and its kinematic volume change throughout 1992 to 2019. Hence, we carry out a joint inversion using an unscented Kalman filter to model all the GPS and InSAR data during that period. We use GPS data from the PBO sites at Westdahl recording data since 2008 and multiple campaign surveys conducted from 1998 to 2001. The InSAR data we use are from ERS1/2 which spans the 1992-2000 period (Lu et al, 2003) and Envisat which covers the gap from 2003 to 2010 (Gong et al, 2015). Our results indicate that a Mogi source at 7.2 km depth beneath the Westdahl peak provides an adequate fit to the dataset, which is consistent with the previous studies. The volume change estimates show two exponential decayed inflating periods punctuated in 2001 and then followed by a linear inflating period starting in 2007 with the influx being about  $4.8 \times 10^6 \text{ m}^3/\text{yr}$ . During 1992-2019, the total accumulated magma volume is about  $0.16 \text{ km}^3$ .

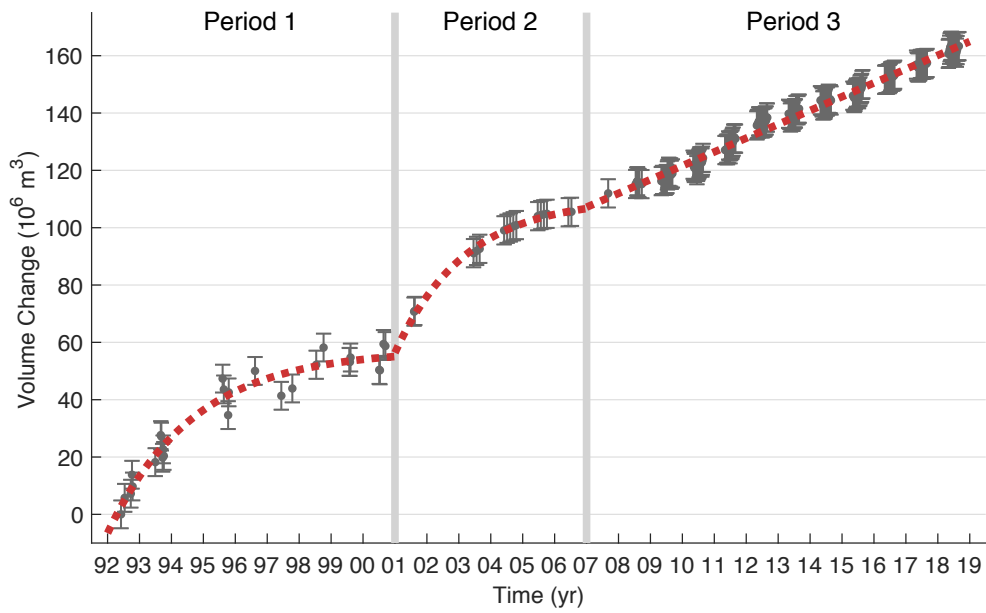


Figure 1. The gray dots with error bars are the estimates. The red lines are the fitting curves of each period. Period 1 and 2 are both assumed to be exponential decayed inflation. Period 3 is assumed to be a linear inflation.