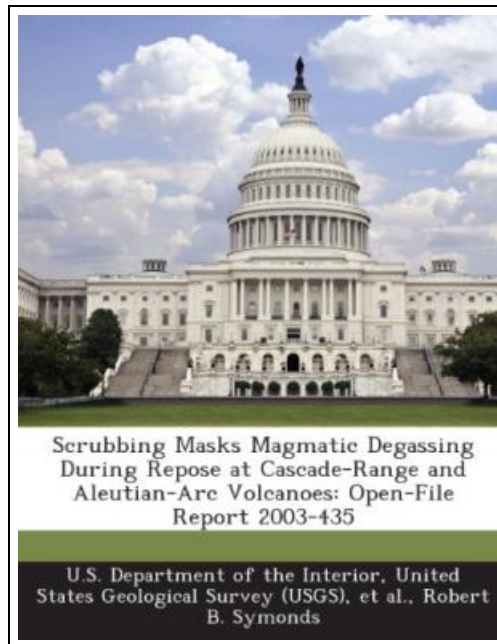


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Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book \*\*\*\*\* Print on Demand \*\*\*\*\*.Between 1992 and 1998, we sampled gas discharges from  $\approx 173^{\circ}\text{C}$  fumaroles and springs at 12 quiescent but potentially restless volcanoes in the Cascade Range and Aleutian Arc (CRAA) including Mount Shasta, Mount Hood, Mount St. Helens, Mount Rainier, Mount Baker, Augustine Volcano, Mount Griggs, Trident, Mount Mageik, Aniakchak Crater, Akutan, and Makushin. For each site, we collected and analyzed samples to characterize the chemical ( $\text{H}_2\text{O}$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{N}_2$ ,  $\text{CH}_4$ ,  $\text{H}_2$ ,  $\text{HCl}$ ,  $\text{HF}$ ,  $\text{NH}_3$ ,  $\text{Ar}$ ,  $\text{O}_2$ ,  $\text{He}$ ) and isotopic ( $\delta^{13}\text{C}$  of  $\text{CO}_2$ ,  $3\text{He}/4\text{He}$ ,  $40\text{Ar}/36\text{Ar}$ ,  $\delta^{34}\text{S}$ ,  $\delta^{13}\text{C}$  of  $\text{CH}_4$ ,  $\delta^{15}\text{N}$ , and  $\delta\text{D}$  and  $\delta^{18}\text{O}$  of water) compositions of the gas discharges, and to create baseline data for comparison during future unrest. The chemical and isotopic data show that these gases contain a magmatic component that is heavily modified from scrubbing by deep hydrothermal ( $150^{\circ}$  -  $350^{\circ}\text{C}$ ) water (primary scrubbing) and shallow meteoric water (secondary scrubbing). The impact of scrubbing is most pronounced in gas discharges from bubbling springs; gases from boiling-point fumaroles and superheated vents show progressively less impact from scrubbing. The most effective strategies for detecting gas precursors to future CRAA eruptions are to measure periodically the emission rates of  $\text{CO}_2$  and  $\text{SO}_2$ , which have low and high respective solubilities in water, and to monitor continuously  $\text{CO}_2$  concentrations in soils around volcanic vents. Timely resampling of fumaroles can augment the geochemical surveillance program by watching for chemical changes associated with drying of fumarolic pathways (all CRAA sites), increases in gas geothermometry temperatures (Mount Mageik, Trident, Mount Baker, Mount Shasta), changes in  $\delta^{13}\text{C}$  of  $\text{CO}_2$  affiliated with magma movement (all CRAA site), and increases in  $3\text{He}/4\text{He}$  coupled with intrusion of new magma (Mount Rainier, Augustine Volcano, Makushin, Mount Shasta). Repose...



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