Mauna Loa's Smoking Gun

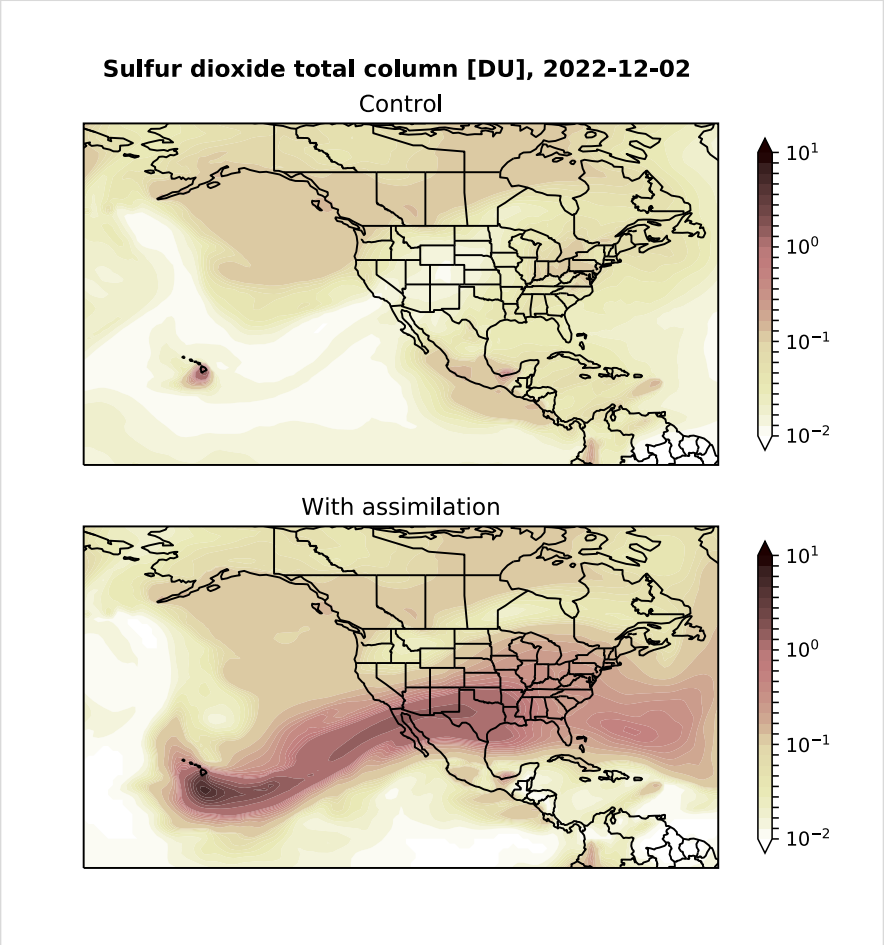

***Figure 1:** Daily average total column of SO_2 for Dec. 2, 2022, without (top) and with (bottom) assimilation of OMI SO_2.*

Hawaii's Mauna Loa began erupting on Nov. 27, 2022. The resulting volcanic plume of sulfur dioxide (SO_2) can be seen from space with satellite instruments such as NASA's Ozone Monitoring Instrument (OMI). Combining these observations with atmospheric models such as GEOS provides a powerful tool to simulate and predict the nature of these plumes in near real-time. Experiments using the GEOS model highlight the value of actively assimilating OMI SO_2 into the model in order to realistically capture active volcanic plumes. Without assimilation (control run), the model solely relies on historical estimates of persistent degassing, missing the large release of SO_2 from Mauna Loa's eruption. On the other hand, the assimilation experiment adds SO_2 over the source region, as informed by OMI. Once released, the SO_2 gets lifted and dispersed eastward by the atmospheric winds.

The capability to assimilate tropospheric trace gases is the latest extension of GMAO's constituent assimilation system. This feature will be included in future GMAO products.