



## **Polluting the stratosphere: an assessment of the impact of pyro-cumulonimbus**

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In the last five years, a growing body of literature on the phenomenon of pyro-cumulonimbus “eruptions” has revealed discoveries and opened up new mysteries to research. The pyro-cumulonimbus, “pyroCb” for short, is an extreme manifestation of forest fire and convection working symbiotically to generate plumes energetic enough to irreversibly pierce the tropopause. PyroCbs in the literature have been associated with injections of aerosols into the stratospheric overworld as well as long-range tropospheric pollution. Very recent investigations into pyroCb have revealed that this phenomenon has occurred with surprising regularity, and in both northern and southern hemispheres. Moreover, it has been learned that the historical record in the satellite era includes several cases of stratospheric aerosol layers, formerly attributed to volcanic eruptions, of pyroCb polluting the stratosphere.

This paper will provide an overview of the known works on pyroCb and also introduce new findings. The overview will focus on the frequency and uniqueness of the pyroCb phenomenon. For instance we will explore how often the pyroCb has had a measurable impact on the stratosphere since 1979, when TOMS and solar occultation instruments were first deployed. Recent results will include new revelations such as a surprising impact of pyroCb on lower stratospheric abundances of ozone.