



Global Union Against Radiation Deployment from Space

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Frequent Rocket Launches Destroy Ozone, Worsen Climate Change

Serious implications for SpaceX, OneWeb, and Boeing

Thirteen companies are competing to cover the entire Earth with high-speed wireless Internet from low-orbit satellites within one to two years. This would be an ecological disaster. The biggest U.S. players are SpaceX (12,000 satellites), OneWeb (4,560 satellites) and Boeing (2,956 satellites).

The [recent finding](#), in 2018, that stratospheric ozone is still declining despite the Montreal Protocol took everyone by surprise. The increasing pace of ever-more-powerful rocket launches is a likely factor. Imminent plans for the launching of large rockets almost daily are expected to alter, if not destroy, the ozone layer and contribute significantly to climate change.

Although many new rockets burn liquid fuel not containing ozone-destroying chlorine, the assumption that this is environmentally friendly is proving wrong. Even using liquid fuel, deploying and maintaining a fleet of 20,000 satellites, each with an expected lifespan of 5 years, will likely involve enough yearly rocket launches to be an environmental catastrophe.

Martin Ross and colleagues at the Aerospace Corporation have been sounding the alarm. Their 2009 paper, "[Limits on the Space Launch Market Related to Stratospheric Ozone Depletion](#)," pointed out while liquid fuels do not contain chlorine, they produce significant amounts of nitrogen and hydrogen oxides, as well as water vapor and soot, when burned. All of which destroy ozone.

In a [November 2017 interview](#), Ross warned that black soot from rockets remains in the stratosphere for a long time where it absorbs sunlight and heats the stratosphere. [A 2011 study](#) found the atmospheric heating effect of soot from a rocket's exhaust is as much as 100,000 times that of its carbon dioxide emissions.

University of Colorado atmospheric [scientist Darin Toohey has urged](#) all rocket companies to become more transparent so scientists can better study the effect rocket launches are having on the atmosphere.

An increasing number of scientists are also calling attention to another environmental consequence of these massive Internet programs: the irradiation of Earth from satellites, drones and balloons and the effect of their radio frequency (RF) emissions on Earth's electromagnetic environment. The direct health and environmental effects of RF radiation emitted by land-based devices and infrastructure such as cell phones, cell towers, smart meters, radio stations, and radar on [people](#), [wildlife](#), and [plants](#) are [extremely well documented](#). RF impacts are the subject of scores of [international appeals by scientists](#), and are controversial for reasons having little to do with science. These effects are not dependent on power levels. Universal wireless from space would subject all locations on Earth to the consequences, both known and unknown, of this radiation.

GUARDS was formed in 2014 to prevent irreversible atmospheric and biological damage from massive deployments of altitude-based radiation-emitting intrusive technologies.

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