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Illinois Wesleyan University, iwumag@iwu.edu

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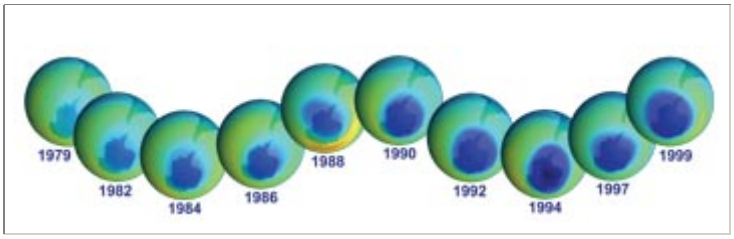

The above sequence illustrates the growth of the Antarctic ozone hole. The ozone layer protects the Earth from harmful UV radiation. *(Image provided by NASA)*

NASA's *Aura* satellite has a big job ahead of it. Thanks to Rich Cebula '78 and the dozens of other scientists and technicians who have worked on the project, Aura is now poised to begin its mission, continuously monitoring ozone levels in Earth's lower and upper atmosphere, tracking the gases active in ozone chemistry, and improving our ability to predict ozone change.

Stratospheric ozone has decreased by 3 percent globally between 1980 and 2000, and has thinned by 50 percent over Antarctica. Because the ozone layer blocks harmful ultraviolet (UV) radiation from the Earth's surface, this decline, if it continues, is not good news for life on the planet. Too much UV-radiation exposure can cause people to develop skin cancers and eye problems, harms other animals, and also affects photosynthesis in plants, a factor that can adversely affect the entire land and marine food chains.

Although the ozone layer is naturally thicker in some places and thinner in others, in the 1980s, scientists noticed the ozone layer was unusually thin over Antarctica during its winter months. This became known as the "ozone hole." Since it was first observed, this "hole" has appeared in Antarctica every year during the late winter and spring.

Severe thinning of the ozone layer has actually been observed over both poles — the Arctic and the Antarctic — and in other places over the globe, especially Northern Europe. Scientists discovered that atmospheric ozone was being destroyed by chlorofluorocarbons (CFCs), which are man-made chemicals used in aerosol sprays and refrigerants. Since 1987, many countries have stopped or reduced production of these chemicals. However, those chemicals will linger in the atmosphere for decades before the ozone layer will recover.

Since fewer chlorofluorocarbons are now being released into the atmosphere, is the ozone layer getting back to normal? Scientists hope the Aura mission will help them answer that question. Recent measurements by earlier satellite instruments seem to suggest that the ozone layer may be decreasing at a slower rate than in the past. However, getting rid of CFCs may not be enough to help the ozone recover. Climate change — caused at least in part by the presence of the man-made greenhouse gases carbon dioxide, methane, and nitrous oxide — could also slow down that recuperation. Part of Aura's mission is to provide better information about air quality and pollution, greenhouse gases, and climate change.

Aura's Ozone Monitoring Instrument (OMI), whose data Cebula will help analyze, is also measuring "bad" ozone located in the Earth's troposphere, extending about 10 miles from sea level to just below the stratosphere. When ozone exists in the troposphere, it acts as an air pollutant. Gasoline and diesel engines give off gases that create ozone and smog, especially during the hot summer months. In humans, exposure to ozone may cause lung damage. Small children and people with asthma are especially at risk. Aura will help scientists follow the sources of this ozone and its precursors.

"So the information we hope to obtain during *Aura*'s mission is not just of consequence to scientists," comments Cebula. "If you breathe the air, you have a stake in this."