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https://www.100test.com/kao_ti2020/496/2021_2022__E6_96_B0_E6_89_98_E7_A6_8F_E9_c81_496315.htm The Planet Earth The 2000 Antarctic Ozone Hole Was Largest Ever The 2000 Antarctic Ozone Hole was the largest ever observed. Earths wetter upper atmosphere may delay global ozone recovery. NASA researchers have found that an increase in water vapor in the stratosphere, stemming partially from greenhouse gases, may delay ozone recovery and increase the rate of climate change. To check on the long-term stratospheric cooling and ozone depletion, NASA put data from satellites and other remote sensors into its GISS global climate model. It was the first study to link greenhouse gases to increased ozone depletion over populated areas. Water and ozone. Climate models show cooler stratospheric temperatures happen when there is more water vapor present. Water vapor also leads to the breakdown of ozone molecules. The stratosphere is the dry layer of the atmosphere above the troposphere, where temperatures increase with height. According to satellite data, upper atmospheric temperatures around the world - at altitudes of 20 to 35 miles high -- have cooled between 5.4 and 10.8 degrees Fahrenheit over recent decades. Driving forces. NASA found two driving forces behind the change in stratospheric moisture: Increased emissions of the greenhouse gas methane are transformed into water in the stratosphere, accounting for about a third of the observed increase in moisture there. More water is transported from the lower atmosphere. Warmer air holds more

water vapor than colder air, so the amount of water vapor in the lower atmosphere increases as it is warmed by the greenhouse effect. Greenhouse gases, such as carbon dioxide and methane, may enhance the transport of water into the stratosphere. The increased transport of water vapor to the stratosphere seems likely to have been induced by human activities. Ozone destruction. Rising greenhouse gas emissions account for all or part of the water vapor increase, which causes stratospheric ozone destruction. When more water vapor works its way into the stratosphere, the water molecules can be broken down, releasing reactive molecules that can destroy ozone. If the trend of increasing stratospheric water vapor continues, it could increase future global warming and impede ozone stratospheric recovery. The impact on global warming comes about because both water vapor and ozone are greenhouse gases, which trap heat leaving the Earth. When they change, the Earths energy balance changes too, altering the surface climate. Warmer ground. Increased water vapor in the stratosphere makes it warmer on the ground by trapping heat, while the ozone loss makes it colder on the ground. Water vapor has a much larger effect, so that overall the changes increase global warming. Although ozone depletion cools the Earths surface, repairing stratospheric ozone is important to block harmful ultraviolet radiation. Other greenhouse gas emissions also need to be reduced. UARS satellite. NASA combined seven years of data from the Upper Atmosphere Research Satellite (UARS) Halogen Occultation Experiment (HALOE) with data collected on the ground to paint a complete picture of the upper atmosphere. NASAs

HALOE was aboard the UARS spacecraft when it was launched September 12, 1991 as part of the Earth Science Enterprise Program. The spacecrafts mission at launch was to improve understanding of stratospheric ozone depletion by analyzing vertical profiles of ozone, hydrogen chloride, hydrogen fluoride, methane, water vapor, nitric oxide, nitrogen dioxide, and aerosols. Fourteen years of lower stratospheric measurements have revealed large increases in water vapor. Though some older studies conflict with lower stratospheric observations of water vapor trends, new studies agree with the increases, showing they have been taking place for more than four decades. What Is An Ozone Hole? Ozone molecules are made up of three atoms of oxygen. They comprise a thin layer of the atmosphere that absorbs harmful ultraviolet radiation from the Sun. Most atmospheric ozone is found between approximately six miles and 18 miles above the Earths surface. An ozone "hole" is what scientists call an "ozone depletion area" of in that region of Earths atmosphere. Really big hole. The largest-ever ozone hole was detected on September 6, 2000, by the Total Ozone Mapping Spectrometer (TOMS) aboard a NASA satellite known as Earth Probe (TOMS-EP). The Antarctic ozone hole is three times larger than the entire land mass of the United States, making it the largest such area ever observed. The hole had expanded to a record size of 11 million square miles. The previous record was 10.5 million square miles in September 1998. Scientists were surprised by its enormous size. The lowest readings in the Antarctic ozone hole usually are observed in late September or early October each year. Frail layer. The year 2000

observations reinforced concerns about the frailty of Earths ozone layer. Although production of ozone-destroying gases had been curtailed under international agreements, concentrations of the gases in the stratosphere have been reaching their peak. Due to their long persistence in the atmosphere, it will be many decades before the ozone hole is no longer an annual occurrence. Antarctic vortex. The year 2000 saw an extremely intense Antarctic vortex -- an upper-altitude stratospheric air current that sweeps around the Antarctic continent, confining the Antarctic ozone hole. Variations in the size of the ozone hole and of ozone depletion accompanying it from one year to the next are not unexpected. NASA instruments have been measuring Antarctic ozone levels since the early 1970s. Since the discovery of the ozone hole in 1985, TOMS has been a key tool for monitoring ozone levels above Earth. TOMS-EP and other ozone-measurement programs are important parts of a global environmental effort of NASAs Earth Science enterprise, a long-term research program designed to study Earths land, oceans, atmosphere, ice and life as a total integrated system. To learn more: Goddard Institute for Space Studies Upper Atmosphere Research Satellite Halogen Occultation Experiment Largest ozone hole detected by TOMS TOMS ozone data and pictures NASA Says Wet Upper Atmopsphere Delays Ozone Recovery NASA Press Release: Wetter Atmopsphere May Delay Ozone Recovery Inner Planets:MercuryVenusEarthMars Outer Planets:JupiterSaturnUranusNeptunePluto Other Bodies:MoonsAsteroidsComets The Voyagers 100Test 下载频道开