

atmosphere: The layer of gases surrounding planet Earth.

troposphere: The bottommost layer of the atmosphere. It extended to 11 km (7 mi) above sea level.

stratosphere: The layer of the atmosphere above the troposphere; it contains the ozone layer and extends 11-50 km (7-31 mi) above sea level.

ozone layer: A portion of the stratosphere roughly 17-30 km (10-19 mi) above sea level, that contains most of the ozone in the atmosphere.

atmospheric pressure: The weight (or gravitational force) per unit area produced by a column of air.

relative humidity: The ratio of water vapor that air contains at a given temperature to the maximum amount it could contain at that temperature.

convective circulation: A circular current (of air, water magma, etc.) driven by temperature differences. In the atmosphere, warm air rises into regions of lower atmospheric pressure, where it expands and cools and then descends and becomes denser, replacing warm air that is rising. The air picks up heat and moisture near ground level and prepares to rise again, continuing the process.

weather: The local physical properties of the troposphere, such as temperature, pressure, humidity, cloudiness, and wind, over relatively short time periods (typically minutes, hours, days, or weeks).

climate: The pattern of atmospheric conditions that typifies a geographic region over long periods of time (typically years, decades, centuries, or millennia).

front: The boundary between air masses that differ in temperature and moisture (and therefore density).

warm front: The boundary along which a mass of warm air displaces a mass of colder air.

cold front: The boundary along which in a mass of cold air displaces a mass of warmer air.

high-pressure system: An air mass with elevated atmospheric pressure, containing air that descends, typically bringing fair weather.

low-pressure system: An air mass in which air moves toward the low atmospheric pressure at the center of the system and spirals upward, typically bringing clouds and precipitation.

temperature inversion: A departure from the normal temperature distribution in the atmosphere, in which a pocket or relatively cold air occurs near the ground, with warmer air above it. The cold air, denser than the air above it, traps pollutants near the ground and can thereby cause a buildup of smog. Also called a thermal inversion.

inversion layer: A band of air in which temperature rises with altitude (that is, in which the normal direction of temperature change is inverted.) Cool air at the bottom of the inversion layer is denser than the warm air above, so it resists vertical mixing and remains stable. A key feature of a temperature inversion.

Coriolis effect: The apparent deflection of north-south air currents to a partly east-west direction, caused by the faster spin of regions near the equator than of regions near the poles as a result of Earth's rotation.

hurricanes: A type of cyclonic storm that forms over the ocean but can do damage upon its arrival on land.

tornado: A type of cyclonic storm in which warm air rises quickly in a funnel, potentially lifting up soil and objects and threatening life and great damage to property.

air pollutant: A gas or particulate material added to the atmosphere that can affect climate or harm people or other living things.

air pollution: The release of air pollutants.

outdoor air pollution: Air pollution that occurs outdoors. Also called ambient air pollution.

primary pollutants: A hazardous substance, such as soot or carbon monoxide, that is emitted into the troposphere directly from a source.

secondary pollutants: A hazardous substance produced through the reaction of primary pollutants with one another or with other constituents of the atmosphere.

residence time: (1) In a biogeochemical cycle, the amount of time a nutrient typically remains in a given reservoir before moving to another. (2) In the atmosphere, the amount of time a gas molecule or a pollutant typically remains aloft.

Clean Air Act: U.S. legislation to control air pollution, first enacted in 1963 and amended multiple times since, most significantly in 1970 and 1990. Funds research into pollution control, sets standards for air quality, encourages emissions standards for automobiles and for stationary point sources such as industrial plants, imposes limits on emissions from new sources, funds a nationwide air quality monitoring system, enables citizens to sue parties violating the standards, and introduced an emissions trading program for sulfur dioxide.

carbon monoxide (CO): A colorless, odorless gas produced primarily by the incomplete combustion of fuel. An EPA criteria pollutant.

sulfur dioxide (SO₂): A colorless gas that can result from the combustion of coal. In the atmosphere, it may react to form sulfur trioxide and sulfuric acid, which may return to Earth in acid deposition. An EPA criteria pollutant.

nitrogen oxide (NO_x): One of a family of compounds that includes nitric oxide (NO) and nitrogen dioxide (NO₂).

volatile organic compound (VOC): One of a large group of potentially harmful organic chemicals used in industrial processes. One of six major pollutants whose emissions are monitored by the EPA and state agencies.

particulate matter: Solid or liquid particles small enough to be suspended in the atmosphere and able to damage respiratory tissues when inhaled. Includes primary pollutants, such as dust and soot as well as secondary pollutants such as sulfates and nitrates. An EPA criteria pollutant.

lead: A heavy metal that may be ingested through water or paint, or that may enter the atmosphere as a particulate pollutant through combustion of leaded gasoline or other processes. Atmospheric lead deposited on land and water can enter the food chain, accumulate within body tissues, and cause lead poisoning in animals and people. An EPA criteria pollutant.

scrubber: Technology to chemically treat gases produced in combustion in order to reduce smokestack emissions. These devices typically remove hazardous components and neutralize acidic gases, such as sulfur dioxide and hydrochloric acid, turning them into water and salt.

catalytic converter: Automotive technology that chemically treats engine exhaust to reduce air pollution. Reacts exhaust with metals that converts hydrocarbons, CO, and NO_x into carbon dioxide, water vapor, and nitrogen gas.

criteria pollutants: One of six air pollutants—carbon monoxide, sulfur dioxide, nitrogen dioxide, tropospheric ozone, particulate matter, and lead—for which the Environmental Protection Agency has established maximum allowable concentrations in ambient outdoor air because of the threats they pose to human health.

nitrogen dioxide (NO₂): A foul-smelling reddish brown gas that contributes to smog and acid deposition. It results when atmospheric nitrogen and oxygen react at the high temperatures created by combustion engines. An EPA criteria pollutant.

tropospheric ozone: Ozone that occurs in the troposphere, where it is a secondary pollutant created by the interaction of sunlight, heat, nitrogen oxides, and volatile carbon-containing chemicals. A major component of photochemical smog, it can injure living tissues and cause respiratory problems. An EPA criteria pollutant. Also called ground-level ozone.

toxic air pollutant: Air pollutant that is known to cause cancer, reproductive defects, or neurological, developmental, immune system, or respiratory problems in humans, and/or to cause substantial ecological harm by affecting the health of nonhuman animals and plants. The Clean Air Act identifies 187 toxic air pollutants, ranging from the heavy metal mercury to volatile organic compounds (VOCs) such as benzene and methylene chloride.

smog: Term popularly used to describe unhealthy mixture of air pollutants that often form over urban and industrial areas as a result of fossil fuel combustion.

industrial smog: “Gray-air” smog caused by the incomplete combustion of coal or oil when burned.

photochemical smog: “Brown-air” smog formed by light-driven reactions of primary pollutants with normal atmospheric compounds that produce a mix of over 100 different chemicals, tropospheric ozone often being the most abundant among them.

ozone-depleting substances: One of a number of airborne chemicals, such as halocarbons, that destroy ozone molecules and thin the ozone layer in the stratosphere.

halocarbons: A class of human-made chemical compounds derived from simple hydrocarbons in which hydrogen atoms are replaced by halogen atoms such as bromine, fluorine, or chlorine. Many are ozone-depleting substances and/or greenhouse gases.

chlorofluorocarbons (CFCs): A type of halocarbon consisting of only chlorine, fluorine, carbon, and hydrogen. CFCs were used as refrigerants, as fire extinguishers, as propellants for aerosol spray cans, as cleaners for electronics, and for making polystyrene foam. They were phased out under the Montreal Protocol because they are ozone-depleting substances that destroy the stratospheric ozone.

ozone hole: Term popularly used to describe the thinning of the stratospheric ozone layer that occurs over Antarctica each year, as a result of chlorofluorocarbons (CFCs) and other ozone-depleting substances.

Montreal Protocol: International treaty ratified in 1987 in which 180 (now 196) signatory nations agreed to restrict production of CFCs in order to halt stratospheric ozone depletion. This was a protocol of the Vienna Convention for the Protection of the Ozone Layer. It is widely considered the most successful effort to date in addressing a global environmental problem.

acid deposition: The settling of acidic or acid-forming pollutants from the atmosphere onto Earth's surface. This may take place by precipitation, fog, gases, or the deposition of dry particles.

acid rain: Acid deposition that takes place through rain.

atmospheric deposition: The wet or dry deposition on land of a wide variety of pollutants, including mercury, nitrites, organochlorines, and others. It is one type of atmospheric deposition.

indoor air pollution: Air pollution that occurs indoors.

sick building syndrome: A building-related illness produced by indoor pollution in which the specific cause is not identifiable.