# Low Ozone Over Brahmaputra River Valley

## Why in News

Recently, scientists at the **Aryabhatta Research Institute of Observational Sciences** (ARIES), **Nainital** (Uttarakhand) have evaluated the **near surface ozone** in the **Brahmaputra River Valley** (BRV).

- ARIES is an **autonomous research institute under the Department of Science and Technology** (DST), Government of India.

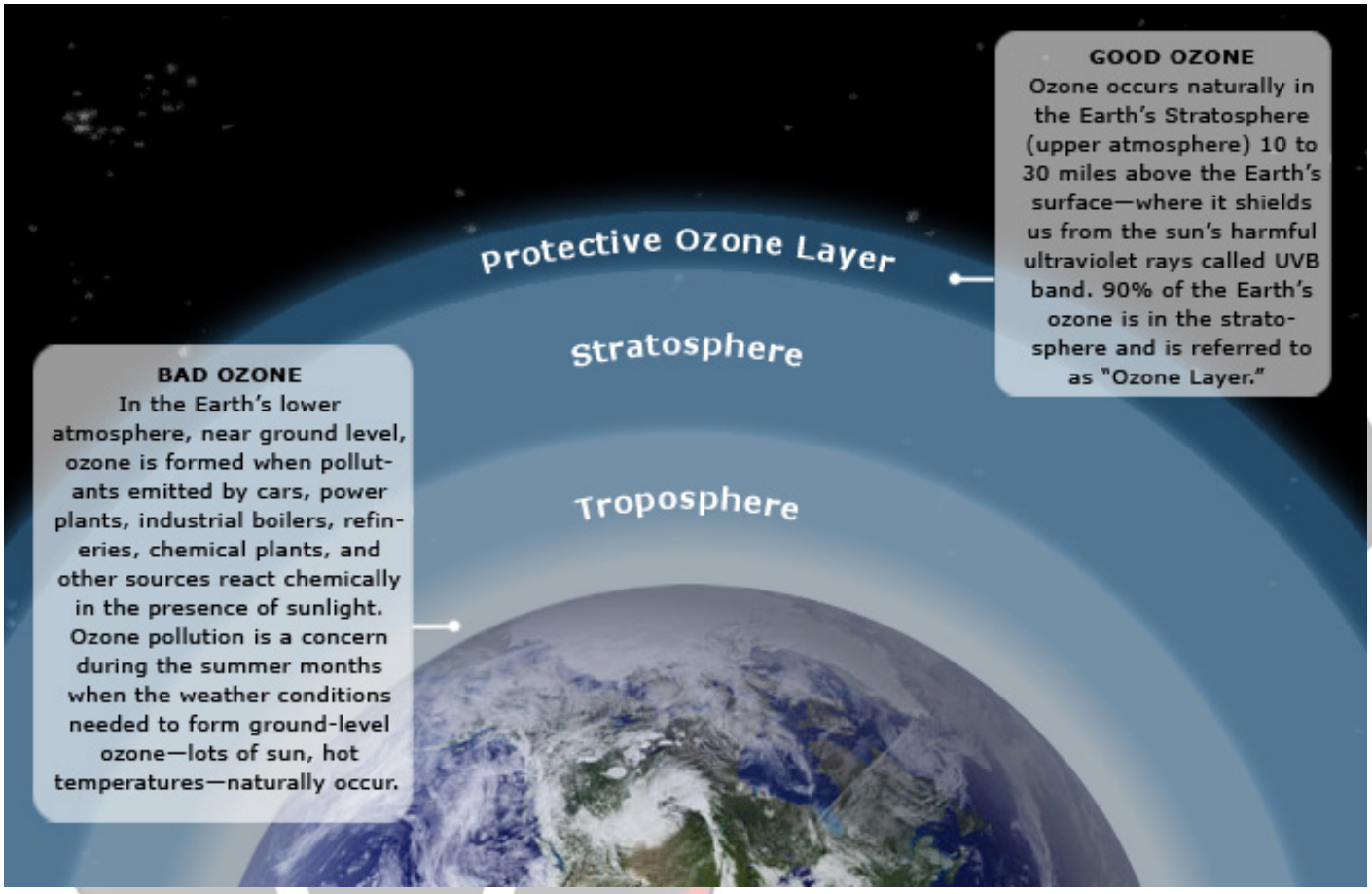
## Key Points

- Scientists analysed the **variability of ozone** ($O_3$) **and other air pollutants over the BRV region.**
- They assessed **seasonal characteristics of ozone** to identify the emission source of ozone and its precursors, especially **methane** ($CH_4$) and **non-methane hydrocarbons** (NMHCs).
    - NMHCs such as **ethane, ethene, propane, propene,** etc. play an important role in **controlling ozone concentrations.**
- They also studied the **relationships between the meteorological parameters** like air temperature, wind speed, solar radiation, soil temperature, rainfall, etc. and **ozone** in a tropical setting.
- **Findings:**
    - Scientists have found **relatively low concentration of ozone over BRV (Guwahati - Assam)** compared to the other urban locations in India.
    - The pattern of $O_3$ concentrations in the BRV indicated that it was **strongly influenced by local oxides of nitrogen (NOx) sources** with an **adjacent national highway** being the likely major source.
    - The **mean ventilation coefficient was greater than 6000 $m^2s$** during the day in the pre-monsoon season indicating pollutant dispersion.
        - The **ventilation coefficient,** which is the product of mixing depth and the average wind speed, is an atmospheric condition which gives an indication of the air quality and pollution potential i.e. the ability of the atmosphere to dilute and disperse the pollutants over a region.
        - The **higher the coefficient,** the more efficiently the atmosphere is able to dispose of the pollutants and **better is the air quality.**
        - **Low ventilation coefficients lead to** poor dispersal of pollutants causing stagnation and **poor air quality leading to possible pollution related hazards.**
    - **High $O_3$ winter concentrations** were observed, likely driven by local biomass burning providing reactive **volatile organic compounds** (VOCs) that contributed to ozone formation.
        - VOCs are compounds that have a **high vapor pressure and low water solubility.**

- Many VOCs are **human-made chemicals** that are used and produced in the manufacturing of paints, pharmaceuticals, and refrigerants.
- VOCs are common **ground-water contaminants.**

◦ In the **pre-monsoon season,** an **impact of solar radiation** (SR) on the **photochemical formation of $O_3$** was observed.

- **Tropospheric, or ground-level ozone**, is **created by chemical reactions between** NOx and VOC.
- It usually increases when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources **chemically react in the presence of sunlight,** impacting human health.




**Source: PIB**