

## Scientists find microplastics in fresh Antarctic snow for first time

(GS Paper 3, Environment)

### Why in news?

- Recently, scientists have found microplastics in freshly fallen Antarctic snow, which bring to light a serious threat to the Antarctic region.

### Key Highlights:

- Scientists have found microplastics in freshly fallen Antarctic snow **for the first time**, which they said has the potential to influence the climate by **accelerating melting of ice**.
- Previous studies have found that **microplastics have negative impacts on the health of the environment**, limiting growth, reproduction, and general biological functions in organisms, as well as negative implications for humans.

### Concerns:

- At the time, there had been few studies investigating the presence of microplastics in the air, and it was unknown how widespread this problem was.
- The researchers found that there were plastic particles in every sample from the remote sites on the Ross Ice Shelf too. They collected snow samples from 19 sites across the Ross Island region of Antarctica and found microplastics in all of these.



### Density:

- The plastic particles were also looked at under a microscope to identify their colour, size and shape.
- The researchers found an average of **29 microplastic particles per litre of melted snow**, which is higher than marine concentrations reported previously from the surrounding Ross Sea and in Antarctic sea ice.

- Just next to the scientific bases on Ross Island, Scott Base, and McMurdo Station, the largest station in Antarctica, the density of microplastics was **nearly three-times higher**, with similar concentrations to those found in Italian glacier debris.

#### **Sources of microplastics:**

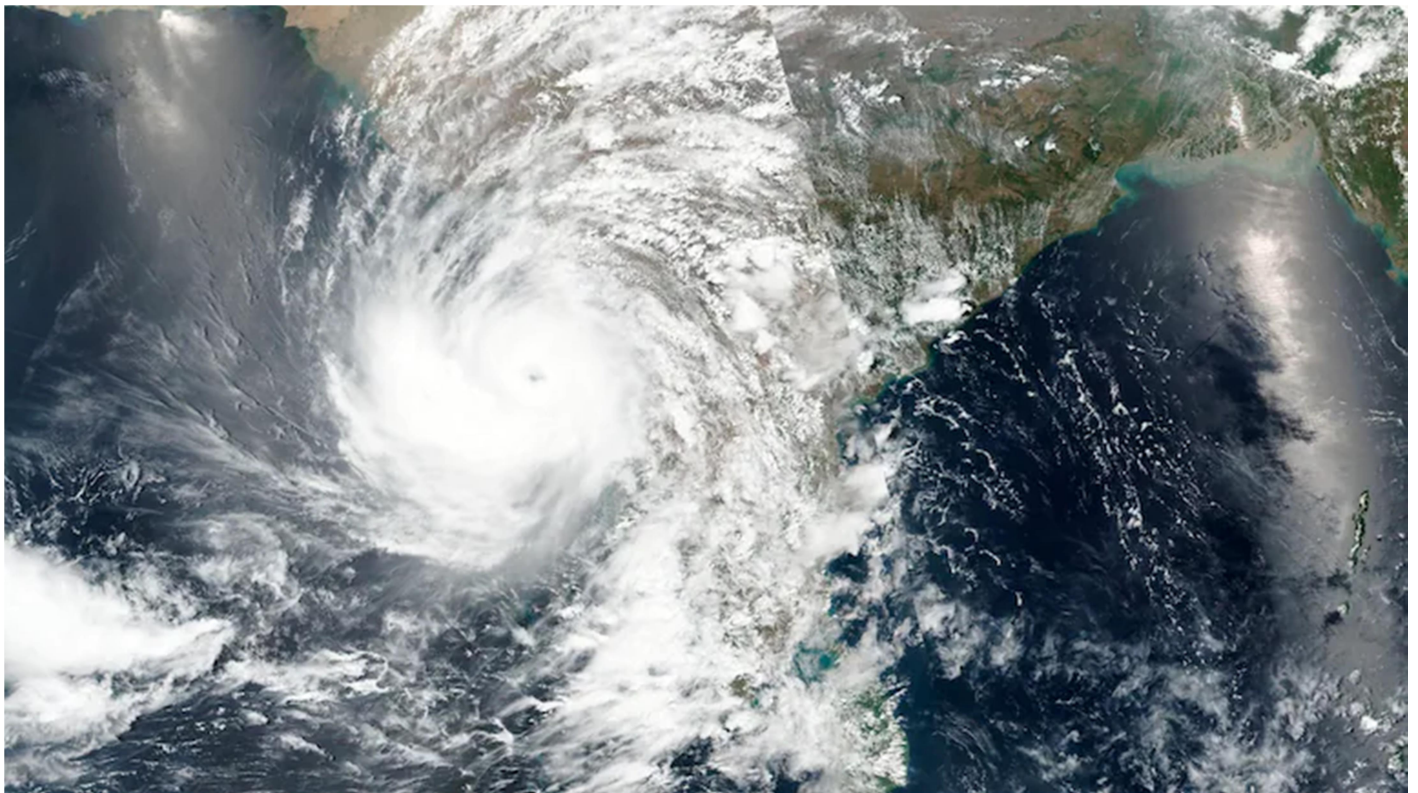
- There were 13 different types of plastic found, with the most common being PET, commonly used to make soft drink bottles and clothing.
- The possible sources of microplastics were examined. Atmospheric modelling suggested microplastics may have travelled thousands of kilometres through the air, however it is likely that the presence of humans in Antarctica has established a microplastic footprint.

## **Satellite constellation to track cyclones every hour**

**(GS Paper 3, Science and Tech)**

#### **Why in news?**

- As climate change leads to more intense and dangerous extreme events, NASA is set to launch the first two of a series of six satellites to study the formation and development of tropical cyclones.
- These satellites will observe these events almost every hour about four to six times more often than is possible with current satellites.



#### **TROPICS Mission:**

- The two satellites will be launched under the **Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS)** mission.
- NASA aims to spread the six satellites across three orbital planes to cover more of the planet more frequently.
- The satellites will not be the same as the NOAA-20 satellite that revisits a storm once every four to six hours.

#### **Key features:**

- The Tropics constellation is aimed at providing scientists with **more frequent updates**, complementing the data collected by existing low-Earth orbit weather satellites and allowing scientists to see each storm from beginning to end. The satellites will be placed at an angle near 30 degrees above the equator in different low Earth orbits.
- This will maximize the amount of time the satellites spend passing over the part of Earth where most tropical cyclones form a horizontal band stretching from about the Mid-Atlantic region of the United States to the southern coast of Australia, roughly between 38 degrees north and south latitudes.
- The satellites will be equipped with a **microwave radiometer** to measure atmospheric emissions and frequencies, beaming back information about the temperature, precipitation, moisture, and other characteristics of the storm and surrounding atmosphere. The satellite will therefore be able to develop **three-dimensional images** of the event.

#### Way Forward:

- When the constellation of six satellites is finally in orbit, it will join the TROPICS Pathfinder satellite, a proof-of-concept CubeSat that launched in June of 2021 and has been capturing images of several tropical cyclones, such as Hurricane Ida over the United States, Cyclone Batsirai over Madagascar, and Super Typhoon Mindulle over eastern Japan.

### Scientists condemn project to study ‘racial purity’ of Indian population

(GS Paper 3, Science and Tech)

#### Why in news?

- Over a 100 leading biologists, historians, anthropologists and intellectuals have written a joint letter to the Ministry of Culture protesting its purported plans to fund a project to study “**genetic similarities and differences in the DNA (genetic) profiles of Indian population groups.**”



What was the project?

- The plan was to procure the latest DNA sequencing equipment to “establishing the genetic history and trace the purity of races in India”.
- The project aimed to study the “process of genetic mutation and mixing in Indian population over the last 10,000 years.”

#### **Response of Ministry of Culture:**

- The Ministry of Culture said the project wasn’t related to establishing the “genetic history of races.”

#### **Race & Purity:**

- **The term “race”** was invented as part of the effort to classify humans into distinct groups based on physical features such as bone structure and skin colour, and social characteristics such as faith and religion. It was assumed that the groups were somehow “natural”, or that they had a meaningful biological basis.
- However, in terms of the genes that make up individual biological inheritance, all human beings, irrespective of where they come from, share the same “gene pool.” Most gene-based distinctions occur within so-called races, not between races and subsequent studies have only reinforced the strength of that conclusion, their letter notes.
- The **notion of “purity,”** in addition to being meaningless, carries with it the sense of some groups being “less pure or more pure” than others.
- Human history is replete with examples of horrible injustice , denial of benefits or even persecution meted out to “less pure” groups by “more pure” groups. **Racial stereotyping of humans has been discarded,** and there should be no attempt to revive the concept in India.

#### **Conclusion:**

- For several decades human population geneticists and anthropologists working in various Indian institutions, including the Anthropological Survey of India under the Ministry of Culture, have undertaken detailed DNA analyses of individuals collected from various communities of India, including tribal communities, and have shown that nearly every community today is an admixed community of several ancestral communities whose identities can at best be guessed, but not with great certainty.
- But if it touches on questions of “racial purity,” one guaranteed outcome will be the exacerbation of disharmony among Indians”.

### **Russia delivers more efficient nuclear fuel for Kudankulam**

**(GS Paper 3, Science and Tech)**

#### **Why in news?**

- Rosatom State Corporation of Russia has supplied the first batches of more reliable and cost-efficient nuclear fuel over the existing one, the **TVS-2M nuclear fuel**, to India for the **Units 1 and 2 of Kudankulam Nuclear Power Plant (KNPP).**



### **TVS-2M nuclear fuel:**

- Once the new TVS-2 M fuel is used in the next refuelling, the reactor will start operations with the 18-month fuel cycle.
- It means the reactor, which has to be stopped for every 12 months for removing the spent fuel and inserting the fresh fuel bundles and allied maintenance, will have to be stopped for every 18 months.

### **How TVS-2M nuclear fuel is more advantageous?**

- Compared to the current fuel model, the TVS-2M fuel assemblies have a number of advantages making them more reliable and cost-efficient.
- Firstly, it is **the rigidity of a bundle**. Because of the welded frame, the fuel assemblies in the reactor core retain their geometry. The spacer grids protect the fuel rod cladding from fretting wear and the additional spacer grid makes the fuel assemblies more vibration-resistant.
- Secondly, the **new fuel has increased uranium capacity**, one TVS-2M assembly contains 7.6% more fuel material as compared to the earlier fuel bundles.
- In addition, the special feature of the Kudankulam fuel in particular is the **new generation anti-debris filter protecting bundles from debris damage**, which may be caused by small-sized objects in the reactor core.
- Operation in longer fuel cycles also enhances the **economic efficiency of a plant**: As reactors have to undergo stoppage and refueling less frequently, the power units can produce more electricity.
- Besides, the **plant needs to buy less fuel**, and as the result, has to deal with smaller amounts of spent fuel.

### **About Kudankulam Nuclear Power Plant (KNPP):**

- Russia is building the KNPP under an Inter-Governmental Agreement (IGA) of 1988 and follow on agreements in 1998 and 2008.
- The first stage, consisting of power units No. 1 and No. 2, was commissioned in 2013 and 2017, respectively. Power units No. 3, 4 and No. 5, 6 are currently under construction.