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# TODAY'S ANALYSIS

## (03 April 2024)

### TOPICS TO BE COVERED

- OZONE ON JUPITER'S MOON.
- ARE WE TALKING ABOUT CLIMATE CHANGE IN THIS ELECTION SEASON?
- HEATWAVES IN INDIA



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## OZONE ON JUPITER'S MOON

An **international team of scientists**, including from India, **has discovered** strong evidence indicating the **presence of ozone** on **Jupiter's moon, Callisto**, shedding light on the complex chemical processes taking place on icy celestial bodies in the Solar System.

### WHAT WAS THE SOURCE OF THESE FINDINGS?

They corroborated their findings by comparing them with data from **the Hubble Space Telescope** to understand Callisto's environment and the potential habitability of icy moons in the Solar System.

### WHY LIFE EXISTS ON EARTH?

The **earth has life** not just because it found a way to originate here; it also has the **resources to thrive, evolve, and diversify**.

### WHICH KIND OF RESOURCES?

These resources include

- **Sunlight containing the "right" frequencies of radiation,**
- **Water,**

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- A **stable atmosphere** providing a stable supply of the requisite gases at the right temperature, and
- Various compounds required for the life-forms' biochemical processes.

Scientists are currently studying various celestial bodies in the Solar System that show signs of ozone, suggesting the existence of stable atmospheric conditions and, by extension, the possibility of their being able to host life.

## IMPORTANCE OF OZONE

**Ultraviolet radiation** in particular is harmful to many species (but also useful to some others). Two of its components, called **ultraviolet-B (Wavelength 290–320 nanometres)** and **ultraviolet-C (wavelength 100-280 nanometres)**

## WHAT DAMAGE CAN BE CAUSED BY UV RADIATION?

- It can **damage DNA, trigger mutations, and increase the risk of skin cancer and cataracts** in humans.
- Ultraviolet light has also been known to **inhibit plant growth** and have detrimental effects on various organisms.

This is why the **ozone layer is a crucial part of the earth's atmosphere**: it completely absorbs ultraviolet-B and ultraviolet-C radiation.

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## ABOUT CALLISTO

- **Callisto is one of Jupiter's largest moons** and the third-largest moon in the Solar System After Ganymede and Titan.
- Callisto, despite its huge size, is distinguished by its composition.
  - Despite being as big as the planet Mercury, it has less than half as much mass.
  - Callisto is primarily composed of water ice, rocky materials, sulphur dioxide, and some organic compounds.
  - These substances make the moon a potential candidate for supporting life in the solar system beyond the earth.
- Callisto's surface is heavily cratered, indicating a long history of being struck by asteroids and comets. (It may have the oldest surface in the Solar System, in fact.)
- It also lacks the extensive seismic activity seen on some of Jupiter's other moons, such as Io and Europa.
- Its surface is relatively stable devoid of any seismic activity.

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# ARE WE TALKING ABOUT CLIMATE CHANGE IN THIS ELECTION SEASON?

The **State of the Global Climate report** that was released recently is cause for concern. The report, by the **World Meteorological Organization (WMO)** of the United Nations, states that **2023 was the hottest year in the recorded history** of the planet.

Moreover, the **average temperature rise** from pre-industrial levels has been 1.45°C. The temperature rise is tantalisingly close to breaking the agreed limit of 1.5°C by different nations.

Such a rise in global temperatures, also popularly known as global warming, is definitely alarming.

## ELECTIONS AS AN OPPORTUNITY

It is election season in many democracies around the world.

In India, the election season has expectedly brought in festivities, enthusiastic audiences to televisions, passionate debates in every corner of the country and hope that the outcome of the elections will change lives.

Indeed, the **hope that every political party plants in the minds of voters** and the promises that are made in every election, make people anxiously anticipate the outcome of the elections.

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The State of the Global Climate report, therefore, has arrived at the right time to initiate discussion across the political spectrum.

## WHY ARE POLITICAL PARTIES NOT USING IT IN INDIA?

- Climate change, as a topic, may not resonate well with the voters.
- The awareness levels of the electorate & the candidate is less.
- This topic is not popular.
- Mentioning it can receive backlash from the industries.

## WHAT SHOULD BE DONE?

- **Political parties**, for example, must commit themselves to **enhancing public awareness** on climate change and clearly defining steps to reduce global warming.
- Political parties may also wish to **spell out the steps** that they would undertake to reduce the impact of global warming on India.
- All political parties are pitching the agenda of shaping **India's economic prosperity and the well-being** of its people. This is an agenda which would be incomplete without addressing the core issue of a climate change action plan.

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## HEATWAVES IN INDIA

The India Meteorological Department (IMD) on Monday announced **above-average heat wave days for India**, impacting **southern, central, east, and northwestern regions**. The announcement comes even as **India is already struggling to keep up with its power demand**.

### IMPACT OF INDIA'S STRUGGLE TO KEEP UP WITH ITS POWER DEMAND:

A Reuters analysis reported that India's hydroelectricity output fell at the steepest pace in at least 38 years. **Hydroelectric output will remain low in the coming months**, leading to a **greater dependence on coal** at a time when India has, in its **Nationally Determined Contributions** under the Paris Agreement, promised to **reduce the emissions intensity of its GDP by 45% by 2030**, compared to the 2005 level.

### THE FORECAST

- The IMD forecast has said **most of India will experience above-normal maximum and minimum temperatures**.
- The **El Niño event**, which **causes weak rainfall and more heat over India**, has **weakened** since the beginning of the year, the forecast noted. However, **moderate El**

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**Niño conditions still exist** over the equatorial Pacific, increasing the sea surface temperature.

- The **heat redistribution effects airflows above the ocean**. Since the Pacific Ocean covers almost a third of the earth, changes in its temperature and changes in wind patterns can disrupt weather worldwide.
- **January 2024 was the warmest in 175 years**, the U.S. National Oceanic and Atmospheric Administration noted. The average global land and ocean surface temperature was also higher.
- **The El Niño is**, however, likely to weaken during the upcoming season. Some models have even predicted the **possibility of La Niña conditions** developing during the monsoon, which can **intensify rainfall across South Asia**.

## WHAT IS A HEATWAVE?

- A period of **abnormally high temperatures** is called a heat wave.
- The IMD declares a heat wave if the **maximum temperature of a weather station reaches at least 40 degrees C in the plains** and **at least 30 degrees C in hilly regions**, with a departure of around **4.5-6.4 degrees C from the normal maximum temperature**.

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- The IMD can also declare a heat wave if the **actual maximum temperature crosses 45 degrees C**, and a **'severe heat wave'** if it crosses **47 degrees C**.
- **Qualitatively**, a heat wave can also occur **when the temperature of the air becomes fatal to the human body**.

Heat waves in India are typically recorded between **March and June** and tend to **peak in May**.

## WHAT IS CAUSING AN INCREASE IN HEAT WAVE DAYS?

- A study published in the journal PLOS Climate in April 2023 found heat waves all over the world are getting more "recurrent, intense and lethal" due to **climate change**.
- The ongoing **El Niño** weather condition also contributes to **higher-than-usual temperatures**, driving an increased occurrence of heat waves.

## WHAT ARE THE PROBABLE IMPACTS OF HEATWAVES?

An increase in the number of heat-wave days and their intensity **can exact steep costs** affecting **livelihoods, food production, disease spread, and more**, the study noted.

Higher temperatures can affect **human health** by **causing heat stress** and **even death**, according to the **World Health Organization**.

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## MCQs

1. Which of the following resources have enabled life on Earth?

1. Sunlight containing the “right” frequencies of radiation,
2. Water,
3. A stable atmosphere

- (A) Only 2  
(B) 1 & 2 only  
(C) 1 & 3 only  
(D) All of the above



**Ans. (D)**

2. Consider the following sentences and mark the correct one:

1. UV-B & UV-C rays can damage the DNA of all the organisms on Earth.
2. Ozone absorbs all the UV rays and not let them enter the Earth's atmosphere.

- (A) Only 1  
(B) Only 2  
(C) Both 1 & 2  
(D) Neither 1 nor 2

**Ans. (D)**

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3. Which among the following is the largest moon of the solar system?

- (A) Ganymede
- (B) Europa
- (C) Callisto
- (D) Io

**Ans. (A)**

4. In which CoP of UNFCCC, the target of **1.5 degree celsius** was adopted by the countries?

- (A) CoP 15
- (B) CoP 21
- (C) CoP 27
- (D) It was adopted out of a CoP

**Ans. (B)**

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5. Which of the following conditions makes IMD to declare a heatwave?
1. If the maximum temperature of a weather station reaches at least 45 degrees C in the plains and at least 30 degrees C in hilly regions, with a departure of around 4.5-6.4 degrees C from the normal maximum temperature.
  2. A heat wave can also occur when the temperature of the air becomes fatal to the human body.
- (A) Only 1
- (B) Only 2
- (C) Both 1 & 2
- (D) Neither 1 nor 2

**Ans. (B)**

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