

# Kinzhal & Zircon hypersonic missiles

March 11, 2023

**In news**– Russia has recently unleashed its biggest aerial strike against Ukraine using six hypersonic missiles, known as Kinzhals, or Daggers.

## **Kinzhal missile-**

- Unveiled in 2018, Kinzhal, according to the Russians, is capable of reaching speeds of Mach 10 and greater, with a range of about 1,250 miles.
- The missile is also believed to be **nuclear-capable** and usually launched by MiG-31 warplanes. It was first used against Ukraine in 2022.
- Apart from Kinzhal, Moscow reportedly has two other types of hypersonic missile systems.
- One is the **Avangard hypersonic glide vehicle**, which can fly at speeds as high as Mach 27
- And the **other is the Zircon anti-ship missile**. However, there have been no reports of Zircon or Avangard being used in a war.

## **About Zircon missile-**

- It is a scramjet powered maneuvering anti-ship hypersonic cruise missile.
- It can travel more than five times the speed of sound and manoeuvre in mid-flight, making them much harder to track and intercept than traditional projectiles.
- It could hit targets at sea and on land with a range of 1,000 kilometres (620 miles).
- The Zircon looks set to join Avangard hypersonic glide vehicles that were put into service in 2019 and the air-launched Kinzhal (Dagger) missiles in Russia's arsenal.
- Russia had placed into service its first Avangard hypersonic missile in December 2019, making it the first

country to claim an operable hypersonic weapon.

### **What is a hypersonic missile?**

- A hypersonic missile, such as Kinzhal, is capable of flying at least at the **speed of Mach 5, i.e. five times the speed of sound, and is manoeuvrable.**
- The **manoeuvrability of the hypersonic missile is what differentiates it from a ballistic missile,** as the latter follows a set course or a ballistic trajectory.
- Thus, **unlike ballistic missiles, hypersonic missiles do not follow a ballistic trajectory and can be manoeuvred to the intended target.**
- This makes them extremely lethal because by the time they are detected by ground-based radars, they are already quite near to their target.
- **There are two types of hypersonic weapons systems:**
  1. Hypersonic Glide Vehicles (HGV) and
  2. Hypersonic Cruise Missiles.
- **The HGVs are fired from a rocket before gliding to the intended target** while the **hypersonic cruise missile is powered by air-breathing high-speed engines** or 'scramjets' after acquiring their target.
- Hypersonic weapons can enable responsive, long-range strike options against distant, defended or time-critical threats (such as road mobile missiles) when other forces are unavailable, denied access or not preferred.
- Conventional hypersonic weapons use only kinetic energy i.e. energy derived from motion, to destroy unhardened targets or even underground facilities.
- These systems are one of the more recent warfare technologies being developed by China, North Korea, Russia and the United States.

### **Hypersonic technology in India-**

- India has also developed Hypersonic Technology as the DRDO successfully launched the Hypersonic Technology Demonstrator Vehicle (HSTDV) in its maiden test.
- The HSTDV was an unmanned scramjet demonstration aircraft for hypersonic speed flight.
- It could cruise at a speed of Mach 6 and move up to an altitude of 32.5 km in 20 seconds.
- According to DRDO, besides its utility for long-range cruise missiles of the future, the dual-use technology will have multiple civilian applications also.
- It can be used for launching satellites at a low cost too.