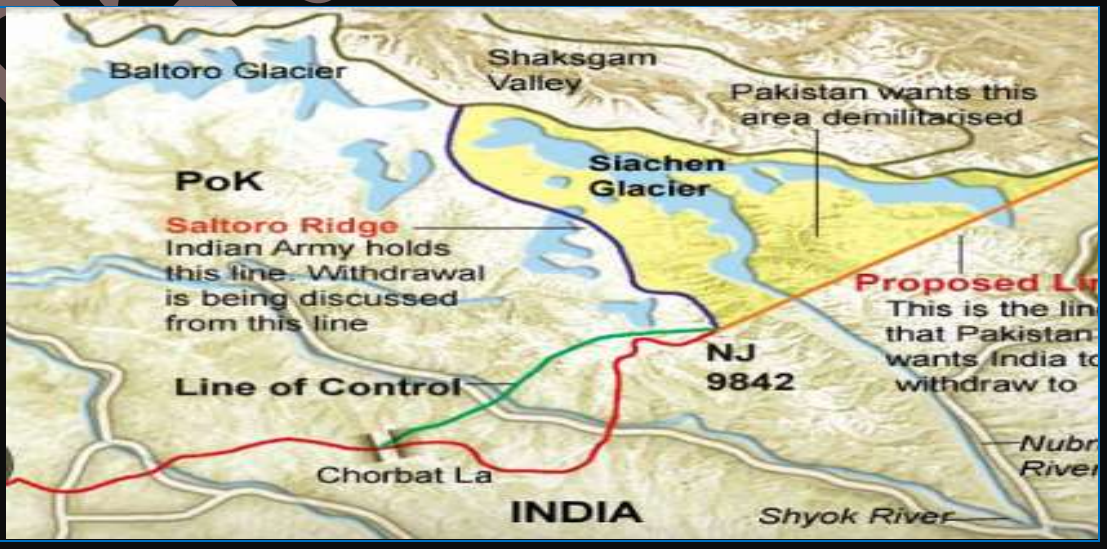
16/04/2024

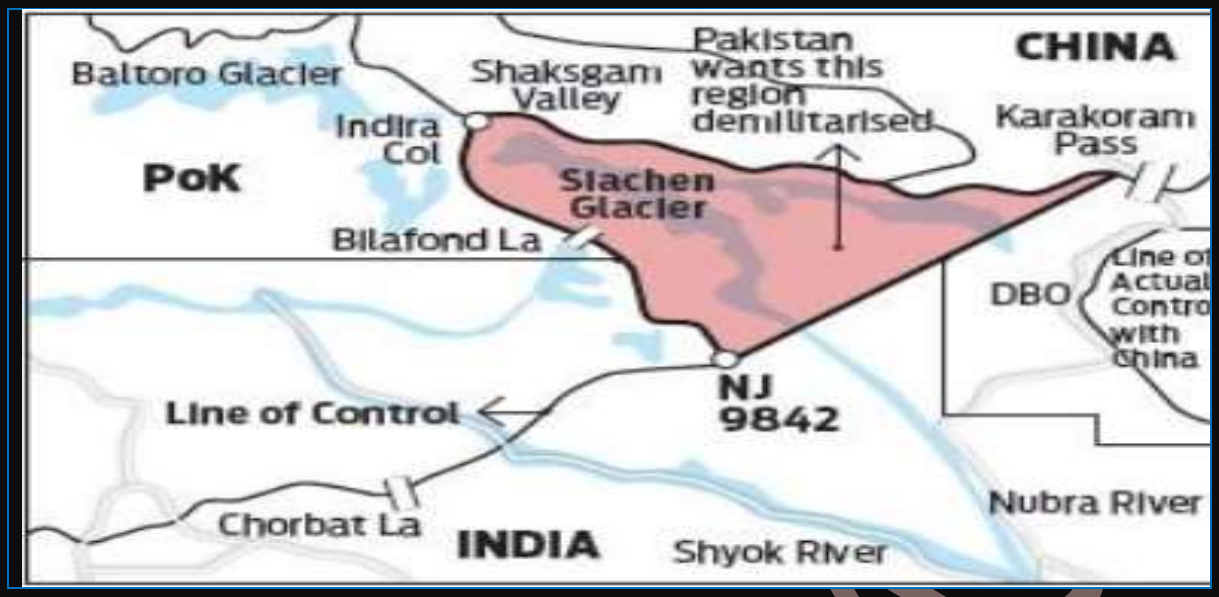
Siachen: 40 years of Op Meghdoot (16 April) (GS Paper I: Post Independence India, IR: India-Pakistan Relations)

- The **Siachen Glacier is located at a high altitude of 15,632 feet** and experiences extreme weather conditions.
- The conflict on the glacier involves India and Pakistan, with India pre-emptively occupying the glacier on the **Saltoro ridge overlooking the Nubra valley in the Karakoram ranges.**
- April 13, 2024, marks forty years since the Indian Army's preemptive action.
- Extreme weather poses the biggest challenge on the glacier, leading to the loss of around 1,150 soldiers' lives, with most casualties attributed to the harsh conditions.

Conflicting claims

- "Siachen" comes from the Balti language, meaning "**land of roses**," with "Sia" representing a rose species and "Chen" meaning "in abundance."
- Despite its floral name, Siachen is infamous as the **world's highest and coldest battlefield.**
- It holds strategic significance, situated between Pakistan on the left and China on the right.
- Siachen's origins trace back to the Partition between India and Pakistan.
- While the Line of Control (LoC) was agreed upon up to **NJ-9842 in the 1972 Simla agreement, Siachen remained unmarked.**

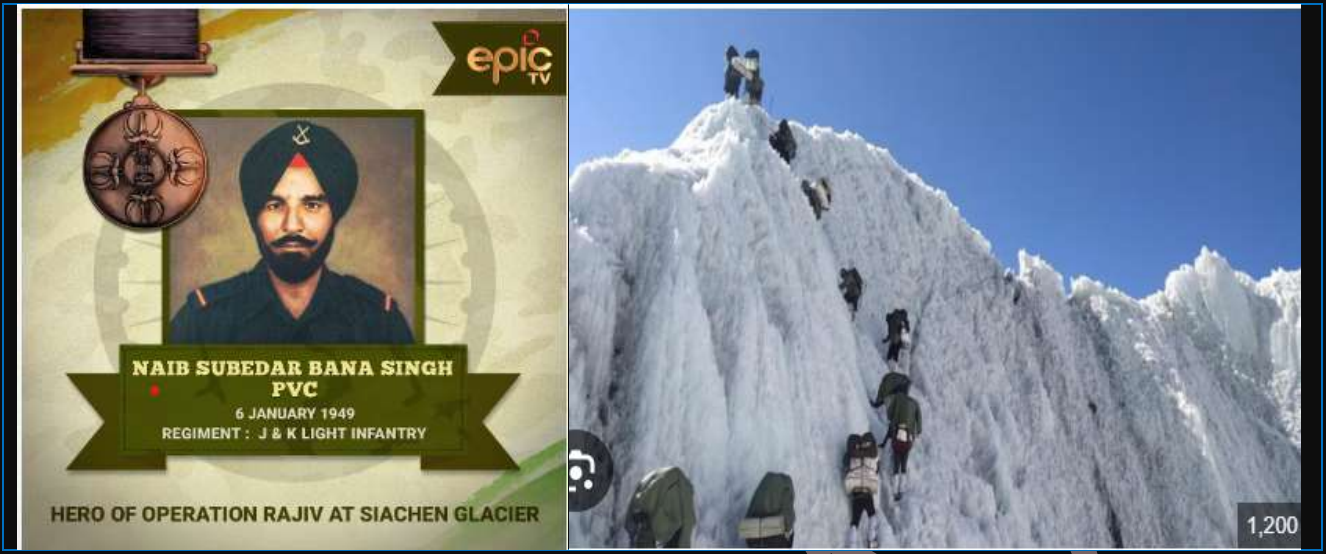




- India bases its claim on agreements from 1947 and 1949, defining the cease-fire line as extending "Northwards to the glaciers."
- Pakistan interprets the agreements differently, claiming the area "North-Eastwards" beyond the Saltoro Ridge and Siachen.
- Pakistan's claim could provide direct connectivity to China and strategic oversight over Ladakh and the Leh-Srinagar highway, posing a threat to India.

The genesis of Operation Meghdoot

- In the **1970s and 1980s, Pakistan allowed foreign mountaineering expeditions in Siachen to support its territorial claims.**
- India received intelligence of Pakistan's impending military action in 1984 and decided to act pre-emptively.
- Col. Narinder 'Bull' Kumar's mountaineering expeditions in the early 1980s aided in the planning of Operation Meghdoot.
- Operation Meghdoot was launched on April 13, 1984, to capture the 76.4 km-long Siachen glacier.
- The Indian flag was planted at **Bilafond La at an altitude of 18,000 feet by a platoon of 4 Kumaon led by Captain Sanjay Kulkarni.**
- The Ladakh Scouts were deployed via Cheetah helicopters by the Indian Air Force (IAF) during the operation.
- IAF helicopters had been operating in the glacier since October 1978, and strategic airlifters transported troops and supplies.
- About 300 troops were positioned on key peaks and passes of the glacier.
- In June 1987, Indian troops captured **Quaid post at 21,153 feet under Operation Rajiv**, later renamed Bana top in honor of Naib Subedar Bana Singh.



- Regular firing exchanges between both sides occurred from 1984 to 2003.
- The guns fell silent in 2003 following a ceasefire agreement along the LoC and the **Actual Ground Position Line (AGPL) in Siachen.**
- Operation Meghdoot continues to this day, making it the longest continuing operation globally.

A test of endurance

- **Army posts on the Siachen glacier are situated at heights of 18,000 feet and above,** with Bana post being the highest and Indira Col the highest point.
- Between 18,000 and 19,000 feet, Indian and Pakistani posts face each other, but beyond 20,000 feet, only India maintains positions.
- Operations on Siachen test human endurance and skills due to extreme conditions, especially in the early days of Operation Meghdoot.
- Initially, Indian Air Force (IAF) operations relied on helicopters and transport aircraft, with fighters joining later.
- In September 1984, a detachment of Hunter aircraft from No. 27 squadron began operations from the high altitude airfield at Leh.
- Over the next years, Hunters conducted over 700 sorties from Leh, including fighter sweeps and simulated strikes.
- Live armament sorties were later conducted at the high altitude firing range at Kar Tso, south of Leh.
- The IAF introduced Cheetal helicopters to the glacier in 2009, featuring re-engineered engines for improved reliability and load carrying capacity at high altitude.

Recent developments on the glacier

- Over the last four decades, significant advancements have occurred in technology, facilities, and logistical support on the Siachen glacier.
- Major improvements have been made in habitat, communications, mobility, logistics, medical support, and green initiatives.

- Climate change is impacting the glacier, with the **snout receding by over a kilometer** from its original position in 1984.

- Introduction of VSAT technology has revolutionized communication, providing troops with data and internet connectivity, enhancing situational awareness and telemedicine capabilities.

VSAT

- **VSAT:** Stands for Very Small Aperture Terminal.
- **Type of Communication Technology:** A two-way satellite ground station used for data, voice, and video transmission.
- VSAT is essential for providing connectivity in remote areas where terrestrial networks (like fiber or cellular) are unavailable or unreliable.

How VSAT Works

1. **VSAT Dish (Outdoor):** A small satellite dish (typically 0.75 to 1.2 meters) that sends and receives signals to/from a satellite in geostationary orbit.
2. **Indoor Equipment:** Connects to the dish and includes a modem, router, and other gear to process signals and connect to end-user devices (computers, phones, etc.).
3. **Network Hub:** A central hub manages communications between the VSAT network's various terminals.

Key Features

- **Remote Connectivity:** Provides internet, phone, or private network connections to remote sites like ships at sea, oil rigs, rural schools and clinics, or disaster relief zones.
- **Scalability:** Easily add new sites to the network.
- **Reliability:** Offers dependable communication in areas with poor infrastructure.
- **Broadband Support:** Supports a range of data speeds, including broadband for internet access and video conferencing.

Typical VSAT Applications

- **Rural internet access**

- **Corporate networks** (connecting remote offices and field operations)
- **Education and healthcare delivery** in remote areas
- **Emergency communications** (disaster response)
- **Maritime and oil & gas industries**

- All-Terrain Vehicles (ATVs) and ATV bridges, along with Chinook heavy-lift helicopters and logistic drones, have improved mobility and supply of essential provisions to remote posts, even during harsh winters.

All-Terrain Vehicles (ATVs)

- **Definition:** ATVs, also known as quads or four-wheelers, are off-road vehicles with a seat designed to be straddled by the rider and handlebars for steering.

- **Key Features:**
  - Low-pressure tires for navigating rough terrain
  - Robust suspension systems
  - Varying engine sizes and capabilities.
- **Types:**
  - Sport ATVs: Designed for performance and recreational riding.

    - Utility ATVs: Larger models focusing on hauling and work-related tasks.
- **Safety Concerns:** ATV accidents pose risks due to their open configuration and potential instability. Always wear safety gear and receive proper training.
- **Regulations:** Rules governing ATV use vary between states and countries. Check your local laws for age restrictions, licensing, and designated riding areas.

ATV Bridges

- **Purpose:** Specially designed bridges to provide safe passage for ATVs and other off-road vehicles over waterways, ravines, or obstacles in designated trails.
    - Typically made of durable materials like treated wood, steel, or aluminum.
    - Feature railings, non-slip surfaces, and adequate load capacity.
- **Benefits:**
    - Minimize environmental impact by preventing erosion caused by vehicles crossing directly through streams.
    - Enhance safety for riders.
    - Extend trail networks and expand recreational opportunities.
- **Design Considerations:** ATV bridges must factor in the expected weight of vehicles, water flow (if over a waterway), and environmental regulations.

- New logistics chains ensure fresh rations and vegetables for forward posts, along with special clothing, mountaineering equipment, and advanced rations to withstand extreme temperatures.
- Various aircraft of the Indian Air Force (IAF), including Rafale, Su-30MKI, Chinook, Apache, and others, support Operation Meghdoot, with helicopters serving as a lifeline for troops in remote areas.
- Medical facilities in Partapur and Base Camp include telemedicine nodes, high altitude pulmonary edema (HAPO) chambers, oxygen generation plants, and life support systems, staffed with top medical specialists in the country.

What next?

- **Siachen and Sir Creek have been considered as relatively easier issues to resolve** compared to the complex Kashmir conflict between India and Pakistan.
- Dialogues on Siachen have occurred at the level of **Defence Secretaries between India and Pakistan**.
- India has expressed willingness for **demilitarization of the glacier but insists on authenticating the 110 km Actual Ground Position Line (AGPL) as the first step, which Pakistan has rejected.**
- Former **Army Chief Gen. Manoj Mukund Narvane emphasized the strategic importance of Siachen due to the collusive threat from China and Pakistan, underscoring the need to maintain control over the area.**
- Siachen overlooks the Shaksgam valley, which Pakistan ceded to China in 1963, complicating the situation further.
- Recent tensions between India and China in Eastern Ladakh and along the Line of Actual Control have added complexities to any potential settlement of the Siachen issue.
- Consequently, Siachen is no longer seen as an easy or "low-hanging fruit" in the context of resolving India-Pakistan conflicts.

Question: Discuss the issue of Kashmir between India and Pakistan with suggestions to resolve the issue. (150 Words/10 Marks)

Approach

- Introduce with the historical background under which the Kashmir issue started.
- Bring significance of Kashmir that makes it important for both India and Pakistan.
- Brings viable suggestions to resolve the issues.
- Conclude accordingly

Answer

India's relationship with Pakistan is the most intractable and intense of those with India's neighbors. At the core of animosities lies the question of Kashmir. The Kashmir issue is viewed differently by the two countries. For Pakistan, it is a leftover of Partition and needs to be resolved before meaningful engagement can take place between the two countries.

However, for India, it is an integral part of the country with the signing of the Instrument of Accession by the then Princely state and the common people's participation in the regular general elections in the state. However, the Kashmir Dispute has affected the bilateral ties since the independence, the two countries have gone through two wars and a limited war over Kashmir.

Reason for the persistence of the Kashmir Dispute.

- The Kashmir issue has been associated with the identity of the country. Bolster India's claim as a secular country. For Pakistan, religion is the basis of nationhood. Kashmir dilutes Pakistan's claim that religion as the basis of nationhood.
- **Wakhan Corridor** in Kashmir is a narrow land route to Afghanistan, in proximity to central Asia and China.
- On the other hand, being geographically contiguous to Pakistan, its integration with it would strengthen the Pakistani idea that religion is the basis of the nation.
- **Kashmir's strategic location in proximity to Central Asia, Afghanistan, Pakistan, and China makes it crucial.**
- The region is **rich in water resources.** The Himalayas are regarded as the Water Towers of South Asia.

The Suggested solutions to the Kashmir Issue

- The long-term solution to the Kashmir dispute can be found only in politically imaginative suggestions.
- Former PM Atal Bihar Vajpayee had suggested that any solution to the Kashmiri dispute has to be found under the paradigm of **Insaniyat (Humanity), Jamhuriyat (Democracy), and Kashmiriyat (Kashmiri Identity).**
- Former PM Manmohan Singh along with his Pakistani counterpart Pavez Mussaraf had reportedly developed an understanding to convert LoC into a **soft border which would include joint patrolling of the border, demilitarisation of the region, and free movement of people goods, and services across the LoC.**

- Conducting Plebiscite in Kashmir: Pakistan insists on it though originally suggested by the UN as part of the 1949 ceased fire agreement, it could not be conducted then since Pakistan did not withdraw its forces from the UN-demarcated cease-fire line.
- Today India rejects the idea of Plebiscite as an instrument to elicit public opinion since the demography of the region has substantially changed following the Pakistanç occupation of PoK and Gilgit-Baltistan for more than 70 years.
- **Third-Party mediation**: Pakistan suggests it, but India rejects it since it is in violation of the Shimla Agreement. Pakistan contests that this agreement was signed by it after a devastating loss and in conditions of duress. However, since the letter and spirit of the Shimla Agreement is reiterated in the Lahore Declaration India continues to insist on the validity of the Shimla Agreement.

K. Shankar Bajpai aptly describes dialogue with Pakistan as the 'right, rational choice for a mature power'. Thus India as a mature and stronger party should go the extra mile in engaging Pakistan.

How does hydrocarbon extraction happen?

(16 April) (GS Paper III: Energy)

- Over many years, geological processes compressed and heated dead life-forms in the earth's crust.
- This process created hydrocarbons, which accumulated inside rock formations.
- The Industrial Revolutions occurred when people discovered how to extract these hydrocarbons.
- Hydrocarbons were used to power engines, leading to pollution of air and water.
- Eventually, this pollution contributed to global warming.

Where are hydrocarbons located?

- Hydrocarbons exist in various forms in subterranean rock formations, including natural gas, coal, crude oil, and petroleum.
- These hydrocarbons are typically found in underground reservoirs formed when a more resistant rock overlays a less resistant one, creating a lid that traps the hydrocarbons below.
- Petroleum geologists use tools and techniques to assess these rock formations, checking for porosity and permeability.
- Porous rocks can hold more hydrocarbons, while permeable rocks allow hydrocarbons to flow more easily.
- The primary source of hydrocarbons is kerogen, which is organic matter deposited from lacustrine (lake), marine, or terrestrial ecosystems.
- Different types of kerogen yield different types of hydrocarbons: lacustrine kerogen produces waxy oils, marine kerogen produces oil and gas, and terrestrial kerogen produces light oils, gas, and coal.

- The rock containing kerogen is called the source rock, and petroleum geologists study its characteristics to understand its ability to yield hydrocarbons.
- Geologists use observational data and modeling to estimate the amount of hydrocarbons in a source rock and report it to regulatory bodies.
- Once a location is identified as a profitable source of hydrocarbons, drilling can begin to extract them.

How are the hydrocarbons accessed?

- Drilling and reservoir engineers extract hydrocarbons using various methods while minimizing damage to the reservoir.
- They start by creating a production well, strategically located to maximize drainage from the reservoir.
- A drilling machine, consisting of a drill pipe, drill collars, and a drill bit, is used to create the well.
- Steel casings, slightly narrower than the hole, are lowered into the well, and cement slurry is pumped around them to protect the tunnel from collapsing and prevent fluids from entering.
- Drilling fluid is circulated around the drill bit to prevent overheating and carry rock cuttings to the surface.
- Careful control of drilling fluid pressure prevents hydrocarbons from rushing to the surface uncontrollably.
- Blowout preventers are mechanical valves used to control and manage equipment and prevent oil eruptions.
- Mud-logging involves recording and studying properties of rock cuttings by depth.
- The drill pipe length is extended as the drill bit descends, and it can be replaced if necessary.
- Modern drilling rigs are equipped with generators and batteries to power various drilling processes.
- Offshore drilling rigs have additional facilities to enhance stability and aid extraction through water.

How are the hydrocarbons extracted?

- After drilling the production well, engineers complete the process by preparing it to drain hydrocarbons, called completing.
- The drill string is removed, and small holes are punched into the casing to allow hydrocarbons to flow into the well.
- Hydrocarbons flow into the well due to pressure differences between the well and surrounding rock, and they rise up through a narrower tube at the top.
- The completion stage transitions to the production stage, where systems at the well's head control outflow using valves.
- If pressure differences are too low, pump jacks may be used to lift hydrocarbons from the bottom of the well.
- Some wells may require workovers to enhance production, involving additional components or replacements.

- The production profile of a well has three phases: primary, secondary, and tertiary.
- Primary phase relies on natural processes like pressure differences and less dense compounds rising to the top.
- Secondary interventions induce artificial pressure to maintain flow, such as injecting water or diluting the hydrocarbon mix.
- Tertiary phase focuses on forcing the remaining hydrocarbons out using enhanced recovery methods like steam injection.
- Steam injection involves using waste heat from a gas turbine to generate steam, which is pumped into the rock to make hydrocarbons more willing to flow.

What happens when a well is depleted?

- Extraction rates determine when a well is no longer profitable, leading to its abandonment.
- Abandoned wells need to be plugged to prevent hydrocarbons and gases from escaping into the surroundings.
- Plugs can be temporary or permanent, depending on future plans for the well.
- Improperly plugged wells can deteriorate and fail over time, leading to environmental issues.
- Decommissioning a well is the most comprehensive way to conclude operations, but it's expensive and often not feasible.
- Improperly abandoned wells contribute to methane emissions, along with emissions from the production and use of extraction components.
- A 2018 study estimated that 9,000 oilfields in 90 countries released 1.7 billion tonnes of carbon dioxide in 2015 alone.