Geography · GS - I

How do the melting of the Arctic ice and glaciers of the Antarctic differently affect the weather patterns and human activities on the Earth? Explain.

EXAM YEAR	PAPER	SUBJECT
2021	GS - I	Geography

MARKS	WORD LIMIT
15	~250 words

Answer Hint

Arctic sea ice, Antarctic land ice, albedo feedback, Arctic amplification, jet stream, global sea-level rise, ocean circulation, coastal vulnerability, Indigenous livelihoods, shipping routes, climate adaptation.

Model Answer

Introduction

The Arctic and Antarctic are critical components of the global climate system. Differences in their geography, ice types and ocean circulation create distinct consequences when their ice melts.

Differences and Effects on Weather

- **Arctic sea-ice loss:** Reduced reflective ice exposes darker ocean water, increasing heat absorption and accelerating Arctic warming.
- **Arctic atmospheric circulation:** Rapid Arctic warming may influence the jet stream and persistent weather patterns, although the strength of these effects remains scientifically debated.
- **Antarctic glacier melting:** Melting land-based ice adds water to the oceans and directly contributes to global sea-level rise.
- **Ocean circulation:** Freshwater from Greenland and Antarctic ice loss can alter ocean stratification and circulation, influencing regional heat transport.

- **Albedo feedback:** Declining snow and ice increase solar energy absorption, reinforcing warming in both polar regions.

Effects on Human Activities

- **Coastal settlements:** Antarctic and Greenland ice-sheet loss increases risks to low-lying cities, islands and coastal infrastructure.
- **Indigenous livelihoods:** Arctic communities face changing ecosystems and disruptions to traditional hunting and travel.
- **Shipping and resources:** Reduced Arctic sea ice may extend seasonal shipping opportunities but also increases ecological risks and geopolitical competition.
- **Fisheries:** Changes in ocean temperatures and circulation may shift marine habitats and fish distribution.

Conclusion

Arctic sea-ice loss primarily intensifies regional warming and influences atmospheric conditions, whereas Antarctic land-ice loss is especially important for global sea-level rise. Both demand urgent climate mitigation and adaptation.

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