

# HEAT

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## Xinjiang Region of China Bans Glacier Tourism, Citing Risk to Ecosystem



Chinese tourists posing in the tongue of a glacier in the southwestern province of Sichuan, which has not followed the Xinjiang region's lead in banning such tourism.

**INTRODUCTION:** According to "Glaciers in China & their variations" by Liu Shiyin, China has over 46,000 glaciers and they are melting at  $-1,373 \text{ km}^3/\text{yr}$ . Glaciers provide a large part of China's water supply. The purpose of this application is to find the mass of ice melting and heat (in kilo Joules) needed to melt this huge amount of ice.

**QUESTIONS:** (a) Convert  $1,373 \text{ km}^3$  of ice to  $\text{m}^3$ ? , (b) Convert the volume of ice to kg.? (c) Find heat in KJ extracted from increased air temperature due to global warming causing climate change?

BEIJING — Glaciologists in [China](#) and elsewhere have said for years that [climate change](#) is the [main cause of glacier erosion](#), which **(((threatens the water sources of much of humanity)))** Officials in the far northwestern Chinese region of Xinjiang now say another factor is putting the fragile glaciers at risk: tourism.

The **Xinjiang government announced this month that it was banning tourism on glaciers across the region**, which is one-sixth of the Chinese land mass. Many glaciers are found in Xinjiang, and in the Tianshan range in particular, which runs east-west through the middle of the vast region.

Officials want to ensure that tourists [observe the glaciers from a distance](#), not atop the glaciers themselves, according to a report published on Thursday by Xinhua, the state news agency.

The report said that, **over the last 50 years, the average temperature in Xinjiang had risen 0.33 to 0.39 degrees Celsius a decade, or about 0.6 to 0.7 degrees Fahrenheit, nearly three times the global average. China has 46,377 glaciers, and about 47 percent of the national ice reserves are in Xinjiang**, a rugged region of deserts, forests and soaring mountains that shares borders with more than half a dozen countries.



**HINTS:**  $1 \text{ km}^3 = 10^9 \text{ m}^3$ , density of ice =  $d_{\text{ICE}} = 910 \text{ kg./m}^3$ ,  $d = \text{mass}/\text{volume}$   
 $d = m/V$ , Latent Heat of fusion of ice =  $L_{\text{ICE}} = 334 \text{ KJ/kg.}$ ,  $L = \text{heat}/\text{mass} = Q/m$

**ANSWERS:** (a)  $1373 \times 10^9 \text{ m}^3$ , (b)  $\sim 1.25 \times 10^{15} \text{ kg.}$ , (c)  $\sim 4.18 \times 10^{17} \text{ KJ}$

**AUTHOR COMMENT:** Putting into perspective how much ice loss/year  $1,373 \text{ km}^3$  is, the amount ( $\text{km}^3$ ) of ice in Greenland & Antarctica respectively is 2,850,000 & 26,500,000.

Tourists at the bottom of a large glacial ice fall in Sichuan Province. **China has 46,377 glaciers**, but glaciologists say many of them are in rapid retreat.

It quoted Chen Xi of the Chinese Academy of Sciences as saying that **glaciers in the Tianshan range have receded 15 to 30 percent in the last three decades.** Scientists say the main cause of climate change is greenhouse gas emissions, mostly from industrial coal use. China emits more greenhouse gases — [carbon dioxide](#) being the primary one — than any other country. The United States is second in emissions.