SAN FRANCISCO--"As wide as all the world, great, high, and unbelievably white in the sun, was the square top of Kilimanjaro." Those evocative words by Ernest Hemingway describe a scene that could vanish within 20 years, according to new field research reported at the meeting. More than 80% of the ice on Africa's highest peak has melted since the early 20th century, joining other glaciers that are ebbing from the world's tropical mountains at an accelerating rate.

The dramatic findings, splashed on front pages and the evening news, may spur policy-makers and the public far more than abstract warnings of climatic trends, says Will Steffen, director of the International Geosphere-Biosphere Program in Stockholm, Sweden. "This is exceptionally important work," Steffen says. "Tropical glaciers are a bellwether of human influence on the Earth system." The past decade's warm years, it seems, have sounded that bell with unexpected force.

Ice in the tropics sits at the knife edge of climate change. Slight temperature increases push the snowline to ever-higher altitudes, saturating fields of ice with water. Glaciers, which normally drain slowly from an ice cap and maintain a steady size, begin to melt and retreat. Researchers have observed ice waning on peaks in Kenya, Venezuela, New Guinea, Ecuador, and elsewhere. The famous ice fields on Kilimanjaro and in Peru appear especially frail.

Aerial mapping of Kilimanjaro's summit in February 2000 revealed a 33% loss of ice since the last map in 1989 and an 82% decline since 1912, says geologist Lonnie Thompson of Ohio State University's Byrd Polar Research Center in Columbus. Just 2 weeks ago, Thompson's colleagues measured the levels at survey poles that they inserted into the ice pack last year. More than a meter of ice had melted in 12 months, out of a total thickness of 20 to 50 meters. "It won't take many more years like that to completely melt the ice fields," Thompson says.

Moreover, Thompson's group has documented runaway melting at Quelecaya, a massive ice cap in the Andes of Peru. Surveys reveal that Qori Kalis, Quelecaya's main drainage glacier, has retreated 155 meters per year since 1998. That's 32 times faster than the rate between 1963 and 1978. The area of the ice cap itself has shrunk from 56 square kilometers in 1976 to 44 square kilometers today. The hastening pace suggests that it too may dribble away within 20 years, says Thompson.

These mass meltings have both scientific and social consequences, Thompson says. Without corings from tropical ice packs, climatologists will soon lose a valuable way to reconstruct El Niño histories and other patterns in the tropics for the last several thousand years. Already, he adds, water is flowing through the porous ice and smearing out the annual chemical signals.

Citizens will feel different impacts. As Quelecaya and other Peruvian ice fields disappear, sources of irrigation and hydroelectric power will dry up. Peru and other nations may need to burn more fossil fuels to compensate, exacerbating the warming trend. And in Tanzania, government officials worry that a denuded Kilimanjaro will lose tourist appeal. "One of the attractions is to see ice at 3 degrees [latitude] south of the equator," Thompson observes.

Steffen praises Thompson's team for its long timeline of 200 years or more at sites around the globe. "That's essential for the data to have a public policy impact," he says. He envisions one other ice-related signal that might resonate as strongly: large-scale melting of Arctic sea ice (Science, 19 January, p. 424). "The question has been, 'How fast will the Earth system respond to these changes in heat' " Steffen says. From the top of Africa to the top of the world, the answer appears to be very fast indeed.