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Early melting of winter snowfall advances the Arctic springtime

The early arrival of spring in parts of the Arctic is driven by winter snow melting sooner than in previous decades and by rising temperatures, research suggests.

The findings, from a study of plants at coastal sites around the Arctic tundra, help scientists understand how the region is responding to a changing climate and how it may continue to adapt.

Researchers studied the timing of activity in seasonal vegetation, which acts as a barometer for the environment. Changes in the arrival of leaves and flowers – which cover much of the region – can reflect or influence shifts in the climate.

A team from the University of Edinburgh, and universities in Canada, the US, Denmark and Germany, gathered data on the greening and flowering of 14 plant species at four sites in Alaska, Canada and Greenland.

They sought to better understand which factors have the greatest influence on the timing of spring plants in the tundra – temperatures, snow melt or sea ice melt.

Variation in the timing of leaves and flowers appearing on plants between the sites was found to be linked to the timing of local snow melt and, to a lesser extent, temperatures.

Across the tundra, leaves and flowers were found to emerge as much as 20 days sooner compared with two decades ago. Within the same timeframe, spring temperatures warmed by 1 degree Celsius each decade on average, while loss of sea ice occurred around 20 days sooner across the different regions.

Overall snow melt, which advanced by about 10 days over two decades, had the greatest influence on the timing of spring.

The study, published in *Global Change Biology*, was funded by the UK Natural Environment Research Council.

Dr Isla Myers-Smith, of the University of Edinburgh's School of GeoSciences, who took part in the study, said: "In the extreme climate of the Arctic tundra, where summers are short, the melting of winter snows as well as warming temperatures are key drivers of the timing of spring. This will help us to understand how Arctic ecosystems are responding as the climate warms."

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