

ABSTRACT

The Arctic is one of the regions of the Earth most vulnerable to climate change. Temperatures in the Arctic have risen by more than twice the global average over the past few decades and are roughly 4 °C above the temperature at the start of the Industrial Revolution, which occurred in the late 18th century. It is highly likely that anthropogenic activity is responsible for such a dramatic change. The Arctic sea ice responds to these changes by decreasing in area, thickness, age and other parameters. The most significant decline has been recorded in the summer months, when the area of the sea ice is shrinking at an average rate of 12.8 % per decade. There has also been a significant decline in the age of sea ice. Forty years ago, sea ice older than four years accounted for 30 % of the total area covered by sea ice, whereas today such old ice accounts for only 2 %. Positive climate feedbacks are contributing significantly to the rapid warming of the Arctic and increased sea ice melt. An example is the decreasing albedo (reflectivity) of the Arctic Ocean, which reflects much less solar radiation due to the shrinking sea ice, contributing to the faster warming of the region and higher sea ice melt. Models show that the warming of the Arctic will continue in the future, and temperatures in the Arctic can be expected to be 10 °C warmer by the end of the century than they were before the start of the Industrial Revolution. The sea ice will respond to these changes by melting more intensively and, according to the latest CMIP6 projections, it is very likely that by the mid-21st century the Arctic will be completely free of summer sea ice in some years.

Keywords: Sea ice, climate change, temperature, Arctic, Arctic Ocean, trends