In order to better understand the causes of the Arctic's changing climate, the authors used observations and analyses. They found that temperatures in the Arctic have shown a strong increase over the last few decades, warming at a rate that is higher than the global average. They also noted that the Arctic is warming faster than the rest of the globe due to the loss of sea ice, which exposes darker ocean surfaces that absorb more heat.

The authors analyzed observational data and nine CMIP5 global climate models to tease apart the effects of different factors. They found that greenhouse-gas and aerosol influences are significant contributors to the observed warming. However, the effects of these factors are being partly offset by changes in ocean conditions and sea ice, which also have a warming effect.

The authors also discussed the uncertainties in the data and the methodologies used by different groups. They noted that the warmest years combined show an overall warming trend since the middle of the last century and that each group places 2014 as the warmest year on record. However, with a likelihood of only 48%, we are still limited in how confident we can be of our ranking. With a likelihood of 18%, 13%, 6% and 5%, respectively, this makes 2014 easily the most likely candidate for the warmest year on record, followed by 2010, 2005, 2013 and 1998, with likelihoods of about 75%, 70%, 57%, 42% and 35%, respectively.

So, what does this mean for the ranking of 2014 as the warmest year on record? The answer is that the methodologies and data sets used by each group differ slightly, and the uncertainties in the data are significant. However, the authors did find that the observed Arctic warming is consistent with climate model projections that include greenhouse-gas and aerosol influences.

Recent research published in Nature Climate Change by PCIC’s Mohammad Reza Najafi and Francis Zwiers, and Nathan Gillett from the Canadian Centre for Climate Modelling and Analysis, indicates that the observed Arctic warming is consistent with climate model projections that include greenhouse-gas and aerosol influences.