The evolution of extreme high and low temperatures in Sweden during 1882-2020

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Abstract: The ongoing climate change has been increasingly reflected in climate observations around the world, both in terms of averages and extremes, and attributed to anthropogenic climate forcing. When it comes to changing extremes, attribution to climate change is now especially well-established for heat-related extremes worldwide. Understanding changes in extremes is important for climate adaptation as well as for the general perception of ongoing climate change in society. On more regional and local scales, both detection and attribution of changes in extremes are more challenging than globally, due to the often high variability and in some cases the limited length and quality of available observational records.

In this study, we analyse the evolution of record high and low temperatures in Sweden, using high-quality temperature data from meteorological data from SMHI. We compare the number of records high and low temperature from a number of measurement sites to theoretical expectations. For example, a study of data from 36 stations during 1882-2020 shows that the daily records of high and low temperature (Tmin and Tmax) depart from a stationary climate (Fig. 1 and Table 1.) and the ratio between record high and record low temperature has a statistically significant increasing trend (Fig. 2).

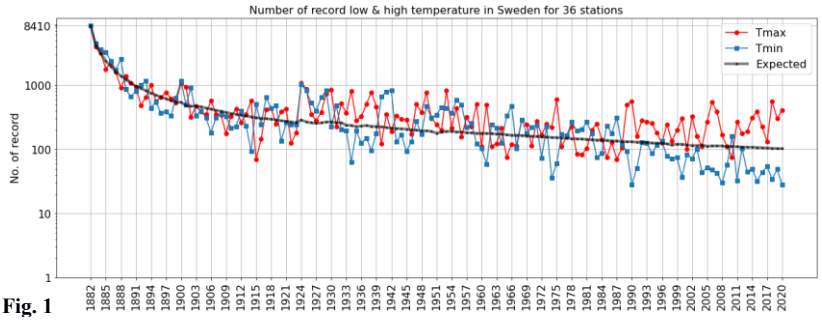

Fig. 1

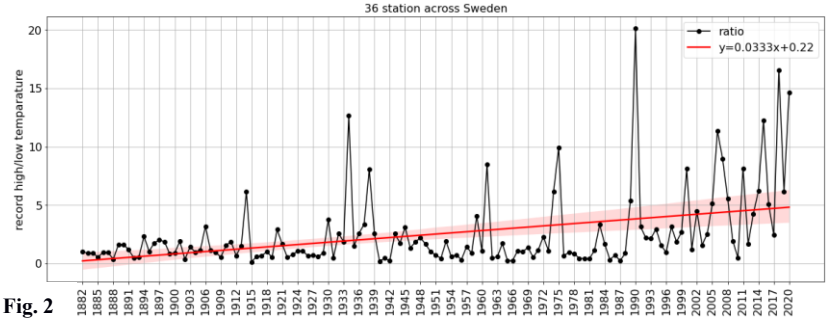

Fig. 2

Record year	***Tmax***	***Tmin***	***Expected***
2000	300	37	120
2001	101	83	117
2002	323	72	115
2003	159	101	115
2004	111	44	117
2005	266	52	112
2006	546	48	113
2007	386	43	113
2008	167	30	113
2009	110	57	110
2010	76	159	111
2011	269	33	110
2012	175	104	109
2013	190	45	108
2014	310	50	108
2015	392	32	107
2016	224	44	106
2017	133	54	105
2018	563	34	104
2019	303	49	103
2020	410	28	103

Table. 1.

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