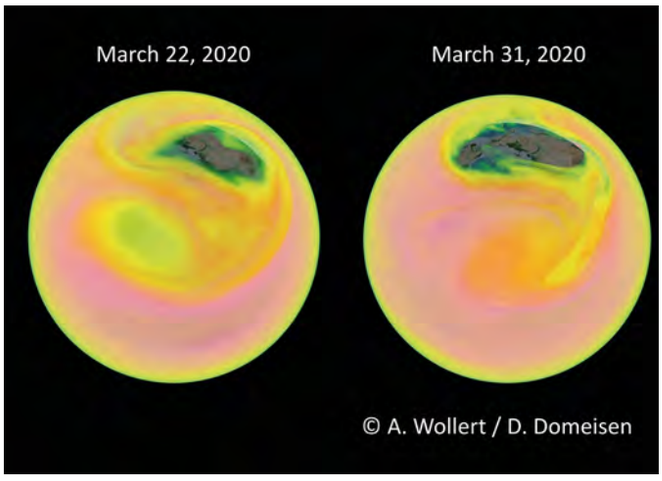
CENTER FOR CLIMATE SYSTEMS MODELING

SCIENCE HIGHLIGHTS FROM C2SM

C2SM explains this winter's record Arctic ozone hole and presents new findings why southern Europe is a climate change hot spot.



RECORD ARCTIC OZONE HOLE EXPLAINED

TEXT: DANIELA DOMEISEN

An ozone hole was observed over the Arctic this spring – an exceptional phenomenon in the Northern Hemisphere. Stratospheric ozone is key for the protection against harmful ultraviolet radiation from the sun that causes skin cancer. High northern regions were particularly affected this spring. While in the Southern Hemisphere above Antarctica, an ozone hole forms every spring in the cold conditions of the stratosphere due to human-made chemicals, the atmosphere over the Arctic is warmer and more disturbed, allowing for ozone to be replenished from lower latitudes. But the opposite was the case in the Arctic this winter due to the exceptional strength of the 2020 stratospheric vortex. These are winds rotating eastward around the North Pole at altitudes of 15 to 30 kilometres, which effectively shielded the Arctic from the influx of ozone. The strong vortex was also part of the reason for the warm and stormy weather over Europe in February. While this winter was certainly extreme, it remains an open scientific question if ozone depletion events over the Arctic will become more frequent in the future, as models currently do not agree on the future of the Arctic stratosphere. ■

MORE INFORMATION
ozonewatch.gsfc.nasa.gov

PAPERS: WHY IS SOUTHERN EUROPE A CLIMATE CHANGE HOT SPOT?

TEXT: ROMAN BROGLI

If climate change continues at the current rate, scientists expect that Southern Europe will experience excessive warming during summer and a year-round rainfall decline. This makes the region especially vulnerable to climate-related risks such as water shortages or heat-related fatalities. In two recent publications, researchers from ETH Zurich explored the reasons behind these regional climate change anomalies using specifically designed climate simulations. The simulations show that the excessive summer warming is mainly related to the vertical distribution of warming within the atmosphere in Southern Europe. Much of the warming in Southern Europe occurs close to the surface. In other regions, most of the warming is re-distributed to higher levels in the atmosphere. Against expectations, changes in the atmospheric circulation are not decisive for the excessive summer warming nor the rainfall decline in summer. The situation in winter is different, where changes in the atmospheric circulation are the primary cause of the rainfall decrease in Southern Europe. ■

REFERENCES

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Brogli R, Sørland SL, Kröner N, Schär C (2019) **Causes of future Mediterranean precipitation decline depend on the season.** Environmental Research Letters 14: 114017. 10.1088/1748-9326/ab4438

MORE INFORMATION
c2sm.ethz.ch

CONTACT
info.c2sm@env.ethz.ch

ABOUT C2SM

C2SM aims to improve the understanding of the climate system and strengthen the predictive skill of climate and weather models. It is a joint initiative of ETHZ, MeteoSwiss, Empa, WSL, and Agroscope.

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