The warming of the Antarctic Peninsula: Is the ozone hole to blame?

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A remarkable feature of recent high latitude climate change is the surface warming of the Antarctic Peninsula with some cooling over Antarctica. Observational studies and models have suggested that this warming can be attributed to the occurrence of the ozone hole (e.g. Keeble et al., 2014). However, recent studies have also pointed out that at least part of the warming could be related to internal variability.

Here, we will use idealised model sensitivity studies to investigate the role of both effects, internal variability and the occurrence of the ozone hole, on surface climate in Antarctica. Using the newly developed ICON-ART model with interactive stratospheric ozone (Schröter et al., 2018), we perform long, multiannual integrations with and without the ozone hole. Using advanced statistical techniques, we estimate the impact of the ozone hole on surface climate and assess the internal model variability. Estimating regional changes in probability density functions of surface temperature for model integrations with and without an ozone hole, we will test the published hypotheses on the origins of the Antarctic Peninsula warming.

After establishing the range of internal variability in the model, we will diagnose the impact of the ozone hole and discuss the mechanism by which the warming of the Antarctic Peninsula could be triggered by its occurrence. ICON-ART also allows regional two-way coupled regional refinements that will be exploited to further investigate the mechanism.

Key words: ozone hole, surface climate, ICON-ART

References

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