Midlatitude cloud shifts, their primary link to the Hadley cell, and their diverse radiative effects

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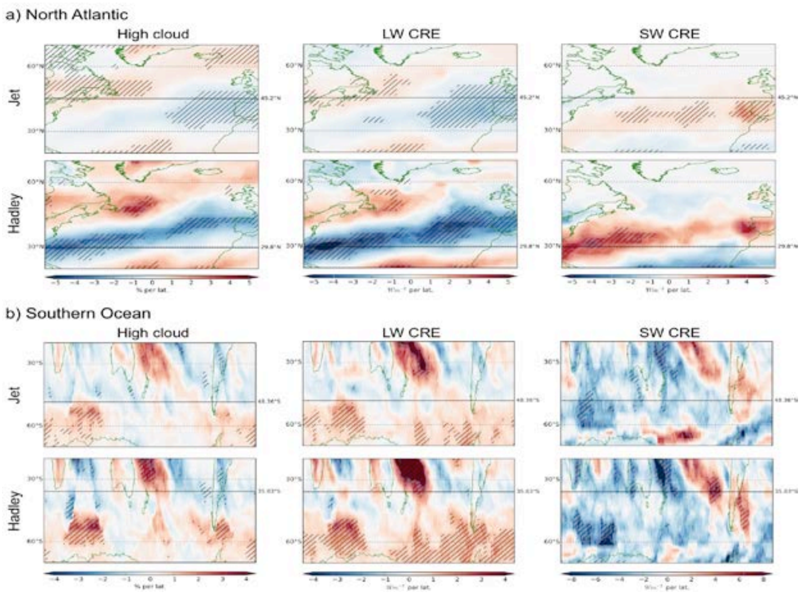
- This study uses ISCCP satellite observations to examine the effects of changes in atmospheric circulation on the midlatitude cloud field. Such effects are expected to be the source of strong cloud radiative feedbacks on climate warming.



- Analysis results show that shifts in the tropical Hadley cells affect the cloud field more strongly and consistently than shifts in the midlatitude storm track.
- High clouds shift poleward in accordance with the poleward shifts of the Hadley cell in all seasons and ocean basins.
- However, while in the winter N. Atlantic the poleward high cloud shift produces surface warming, over the Southern oceans it does not change significantly the surface radiation balance
- This happens because in the winter North Atlantic the low cloud amount is small, and the poleward 'pull' of the high curtain allows excess amounts of sunlight to reach the surface.
- Over the Southern oceans, low cloud amount is large and even increases as the high clouds are shifted poleward. As a result, the amount of sunlight that reaches the surface does not change significantly.
- In upcoming work, climate simulations are tested against the satellite analysis results, in order to examine the sign and magnitude of the feedbacks resulting from the poleward circulation shifts.