Combined surface solar brightening and increasing greenhouse effect favour recent intensification of the hydrological cycle

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The surface net radiation (surface radiation balance) is the key driver behind the global hydrological cycle. A first order estimate of the changes in its individual radiative components suggests that surface net radiation has recently been substantially increasing, on the order of 0.2 Wm-2y-1 over the 15-years period 1986-2000, after several decades with no such indications. Increases in both downward solar radiation with more transparent atmospheres, and downward thermal radiation with enhanced atmospheric greenhouse-gas concentration have similarly contributed to this recent increase. The additional surface radiative energy may have favored an intensification of the hydrological cycle and is consistent with the rapid increase in land precipitation observed over the same period. The concurrent changes in surface net radiation and the hydrological cycle were particularly pronounced in the recovery phase from the Mount Pinatubo volcanic eruption, but remain evident since the mid-1980s also after discarding the Pinatubo effects.

References:

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