



## **Analysis of the polarized scattering signatures observed by the TRMM Microwave Instrument in relation with the electrical processes in cloud systems**

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The polarized scattering signatures observed in convective cloud systems with the Tropical Rainfall Measuring Mission (TRMM) Microwave Instrument are analyzed. In particular, and in contrast to the positive polarization difference ( $TbV - TbH > 0$ ) observed when scattering by large ice particles is important, we also find a negative polarization difference. Radiative transfer simulations show that such a polarization difference can be explained by relatively large, mostly vertically oriented, non-spherical particles but not by horizontally or randomly oriented non-spherical particles. A relationship is established between the occurrence of the negative polarization difference signature and electrical activity in the cloud using coincident observations by the Lightning Imaging Sensor also on board TRMM. The negative polarization difference is thus related to non-spherical particles that are mostly vertically oriented as revealed by the lightning activity. This result confirms that a careful analysis of passive microwave observations over clouds provides valuable information about the cloud ice phase.