



Water Vapour in the Atmospheres of Uranus and Neptune Observed with the PACS and HIFI Instrument of the Herschel Space Observatory

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As part of the guaranteed time key programme "Water and related chemistry in the Solar System" (KP-GT HssO) twenty five different rotational water vapour transitions have been observed in the atmospheres of Uranus and Neptune with the PACS instrument of the European Space Agency's Herschel Space Observatory. For both planets these data are supplemented with a spectrum of the 110-101 ground-state transition at 557 GHz observed with the Herschel/HIFI instrument at the very high resolution of 1 MHz. The initial retrieval of vertical water vapour profiles from these data using a line-by-line radiation transfer model in combination with the Optimal Estimation Method as retrieval technique showed an instable convergence of the iterative fit process and strong artificial oscillations of the profiles. These difficulties are essentially caused by a too weak regularization of the ill-posed fit problem; on the other hand a stronger regularization would confine the retrieved profiles too close to the apriori profile which leads to a significantly bad fit of the observed spectra. However, using a parameterized water vapour profile with only a few fit parameters leads to stable and physically meaningful profiles for both planets. We present details about the different retrieval approaches and the corresponding results.