

WATER VAPOUR : OBSERVATIONS AND MODELS

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The observation of many rotational and vibrational lines of water vapour is one of the main contributions of ISO to our understanding of the far-infrared spectroscopy of the interstellar and circumstellar media. I will present the main ISO observational results and their implications in deriving the physical conditions of the regions where H₂O is present. In particular the water emission (rotational and vibrational lines) towards Orion and SgrB2 will be discussed in detail. In addition I will discuss the implications of the observation of many lines of H₂O towards O-rich evolved stars and present the analysis of one C-rich object (CRL618) with significant amounts of O-bearing species including H₂O.

The interpretation of water vapour lines in the ISM and the CSM has required an important effort in the modelling of the radiative transfer problem for a molecule having rotational levels and ro-vibrational transitions covering a large range of energies, frequencies and line intensities. I will discuss how important this modelling is in order to get significant physical information on the emitting regions and reliable estimates of the water vapour abundance. The comparison of these models with the ISO observations and the rôle that radiative pumping (due to emission from dust grains or from a central object), has on the water emission/absorption will be one of the main topics of this talk.

Finally, I will discuss briefly the capacities that the FIRST satellite will have in observing rotational water vapour lines, and how the instruments onboard this satellite will contribute to our understanding of the water vapour emission/absorption in molecular and circumstellar clouds.