

Odin[†] observation of water in the IRAS 16293-2422 low-mass star forming region

I.Ristorcelli¹, E.Falgarone², F.Shoier³, S.Cabrit⁴, M.Gerin²,
Ph.Baron⁵, U.Frisk⁶, J.Harju⁷, A.Hjalmarson⁸, A.Klotz¹, B.Larsson³,
R.Liseau³, and L.Pagani⁴

¹Centre d'Etude Spatiale des rayonnements, CNRS-UPS, 31028 Toulouse, France
email:Isabelle.Ristorcelli@cesr.fr

²Laboratoire de Radioastronomie - LERMA, ENS, 24 rue Lhomond, 75231 Paris, France

³Stockholm Observatory, AlbaNova University center, SE-106 91 Stockholm, Sweden

⁴LERMA, Observatoire de Paris, 61 av. de l'Observatoire, 75140 Paris, France

⁵Noveltis, Toulouse, France

⁶Swedish Space Corporation, PO Box 4207, 171 04 Solna, Sweden

⁷ Observatory, PO Box 14, University of Helsinki, Finland

⁸Onsala Space Observatory (OSO), 439 92 Onsala, Sweden

Abstract. We present the Odin satellite submillimeter measurement of the ground state transition of ortho-water at 557 GHz around the low-mass protostar IRAS16293-2422. The three following regions have been probed: the on-source position, and the two regions of interaction between the molecular outflows and the dense ambient cloud, *i.e.* on the SiO peak E1, and near the deuterated peak (cf Lis et al.(2002)). The three spectra reveal broad emission, with a narrow and deep absorption feature at the velocity of the quiescent gas. The water line profiles and intensities have been compared and combined with the $CO(3-2)$ and HCO^+ lines from Lis et al.(2002) after convolution over the Odin beam. The contribution from the central envelope on the water line emission has been estimated with the infall model of Shoier et al. 2002. We show that the water emission is dominated by the outflows, particularly in the red wing of the lines. Using a c-shock modelling (Cabrit et al. 2005), we derive an abundance of $X(H_2O) 1 - 3.10^{-5}$ of H₂, and shock velocities of 12 – 15 km/s. We also show that the absorption feature is due to the cold outer halo and corresponds to a lower limit of a few 10^{-9} on the H_2O abundance.

Keywords. ISM: molecules, stars: formation, ISM: individual (IRAS16293), ISM: jets and outflows, ISM: abundances

[†] Odin is a Swedish-led satellite project funded jointly by the Swedish National space board (SNSB), the Centre National d'Etudes Spatiales (CNES), the Canadian Space Agency (CSA), and the National Technology Agency of Finland (Tekes). The Swedish Space Corporation was the prime contractor and also is responsible for the satellite operation.

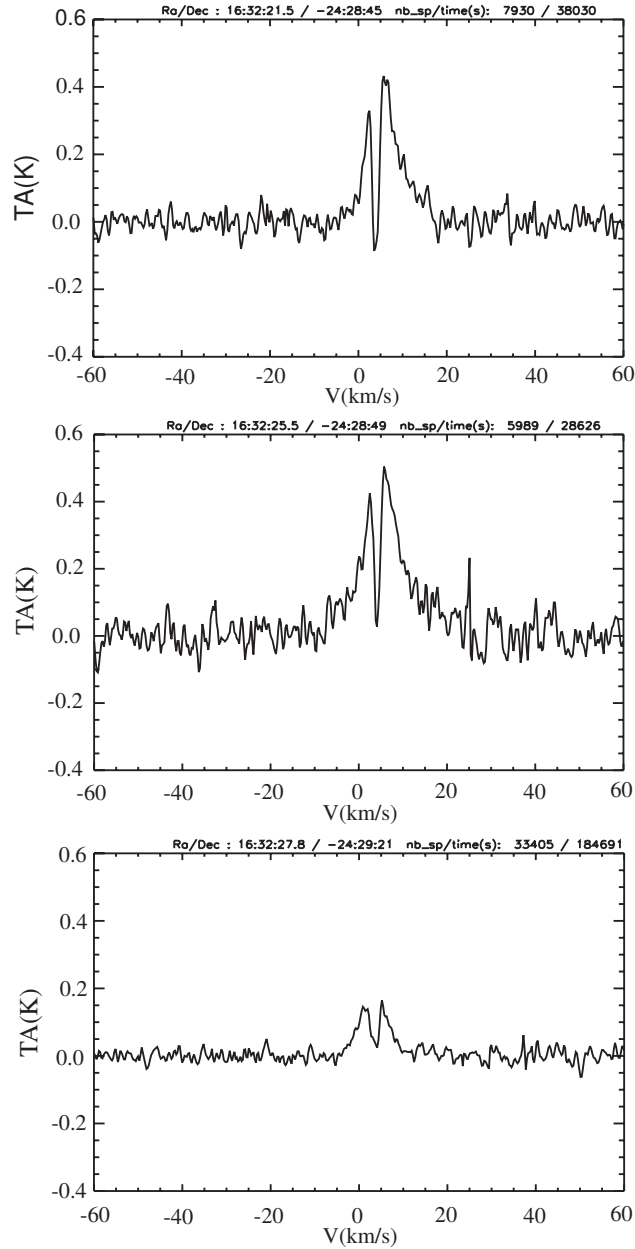


Figure 1. The 557GHz Ortho- H_2O line profiles observed with Odin toward IRAS16293-2422. The spectra correspond to beams centered on the source position (upper panel), the SiO-peak (middle panel), and near the Deuterated-peak (bottom panel).

References

- Cabrit S. et al. 2005, *in preparation*
 Lis D.C., Gerin M., Phillips T.G., F.Motte 2002, *ApJ* 569, 322-333
 Shoier F., Jorgensen J.K., van Dishoeck E.F. and Blake G.A. 2002, *A&A* 390, 1001-1021