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The Ion Tail of Comet Machholz observed by OSIRIS as a Tracer of the Solar Wind Velocity

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During commissioning of OSIRIS, the scientific imaging system onboard Rosetta, the comet C/2004 Q2 (Machholz) was observed on 20th January 2005, close to its perihelion passage at a distance from the Earth of 0.405 AU. The Wide Angle Camera (WAC) detected the ion plasma tail of the comet through the Red and Green filters (630 and 537 nm, respectively). By an analysis of ground-based plasma tail observations taken almost during the OSIRIS observation and of the WAC data, we determine the appearance, morphology and orientation of the ion tail. Following this analysis, we estimate the solar wind velocity 3D vector, the first remote determinations of non-radial wind solar velocity components. Furthermore, we compare our observations with the simulations of solar wind condition and relevant coronal observations. Our results attempt to provide a more thorough understanding of the behavior of cometary ion tails and the solar wind flow.