

# SWAS observations of comet 9P (Tempel 1) and Deep Impact

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**Abstract.** First results of the Submillimeter Wave Astronomy Satellite (SWAS) observations of Comet 9P (Tempel 1) and the Deep Impact event are presented. The Deep Impact space mission will conduct the first macroscopic experiment intended to study the physical and chemical properties of the material at and below the surface of a comet nucleus. On July 4<sup>th</sup> 2005, an impactor with a mass of 370 kg will hit the comet's sunlit side with a velocity of 10.2 km/s, while a flyby space-craft will observe the event at visible and near-IR wavelengths. It is expected that the impactor excavates a crater on the surface of the nucleus, resulting in the evaporation of material which expands into the coma. The total amount of gas which will be produced is highly uncertain, however, as will be the duration of the event.

SWAS is equipped with a small radio telescope ( $3'3 \times 4'5$  main beam FWHM) and a heterodyne receiver and allows spectroscopic observations with a velocity resolution of  $\sim 1$  km/s. The receiver on board SWAS observes the  $1_{10} - 1_{01}$  ground-state rotational transition of ortho-water at 557 GHz simultaneously with the low-lying transitions of three other astrophysically important species ( $^{13}\text{CO}$ , CI and  $\text{O}_2$ ). Water is one of the main constituents of cometary ices, and the water molecules quickly cool as they expand into the coma. Therefore, the SWAS observations of the ortho-water ground-state transition are well suited to measure the gas evaporated by the impact. Using SWAS, we monitor the water line emission in the coma of 9P (Tempel 1) prior to the event, during impact, and for up to 8 weeks post-impact. First results from these observations and conclusions regarding the water released by the impact are presented.

**Keywords.** comets: individual (9P/Tempel 1) - radio lines: solar system - submillimeter

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