

Diurnal Martian Ice Cloud and Ozone Maps from HST WFPC2 Multi-Band Images

Principal Investigator: Dr. Tracy L. Smith

Institution: Space Science Institute

Electronic Mail: tsmith@delos.mps.ohio-state.edu

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Abstract

Mars atmospheric aerosols such as dust, ice and ozone play important roles in the meteorology of the planet. Much controversy still exists among observers and modelers over what represents the average Mars atmosphere, and how it changes diurnally, seasonally and interannually. Ozone is an important tracer of the photochemical processes responsible for the stability of Mars' carbon dioxide atmosphere. Water vapor is also an important trace element in atmospheric models, and contributes to the formation of water ice clouds. Seasonal global temperature fluctuations affect the water vapor saturation altitude (hygropause), which in turn determines water ice cloud formation altitude at low- to mid-latitudes. Models predict large diurnal ozone fluctuations as a result of the seasonal changes in the hygropause. The mapping of global, diurnal water ice clouds and ozone column densities can only be performed by using Hubble Space Telescope (HST) WFPC2 multi-band images of Mars. No other spacecraft, including Mars Global Surveyor and Mars Express, can achieve this. Diurnal water ice cloud and ozone column density maps derived from a long baseline of HST measurements (1993-2004), would serve as useful reference data for workers using current mission data, such as Mars Orbital Camera (MOC), providing context and connection to their temporally limited data. A water ice map and an ozone column density map have already been produced by the PI from the January 2001 HST cycle9 Mars multi-band WFPC2 images.

Investigators:

	Investigator	Institution	Country
PI	Dr. Tracy L. Smith	Space Science Institute	USA/CO

Number of investigators: 1

Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
WFPC2	13	DISK	The archival data, both HST WFPC2 and TES, are on local hard disks, ready to use, through the collaboration with Wolff et al. (1999).