Several current satellites use solar occultations to derive profiles of ozone and other species. The Halogen Occultation Experiment (HALOE) on the Upper Atmosphere Research Satellite (UARS) and the Stratospheric Aerosol and Gas Experiment (SAGE) II on the Earth Radiation Budget Satellite (ERBS) are currently operational in orbits which allow only seasonal coverage of the polar regions. The Polar Ozone and Aerosol Monitor (POAM) II instrument, which provided excellent coverage of high-latitude ozone, is no longer operational as the French Satellite pour l'Observation de la Terre (SPOT)-3 platform which hosts POAM II recently began to tumble. An Improved Limb Atmospheric Spectrometer (ILAS) in a polar orbit on ADEOS has begun to acquire ozone profiles.

The Microwave Limb Sounder on UARS is currently providing ozone profiles with 6 km vertical resolution, and experiments operating on similar principles at microwave (AMAS) and IR (MIPAS) wavelengths are planned.

The ESA Global Ozone Monitoring by Occultation of Stars (GOMOS) instrument on the ENVISAT platform has been in preparation for over five years, and is scheduled for launch in late 1998. GOMOS will measure ozone and numerous other minor constituents using a stellar occultation technique, as does NiteOwl. The large number of target species necessitates much higher spectral resolution and coverage than are proposed for NiteOwl, and increases the cost and complexity of the instrument. As well, observations are restricted to the relatively few first-magnitude stars, thus hindering both spatial resolution and the possibility of tomographic analysis. A smaller instrument (Calibration for Ozone by Atmospheric Limb Acquisitions - COALA) using stellar occultation has been proposed as a payload complement to an ozone sensor operating on other principles.

This submission proposes a conceptually simple and elegant experiment to measure ozone at night by using visible-wavelength stellar occultation. Measuring column ozone concentrations along multiple lines of sight through the observed volume allows a tomographic reconstruction of the volume ozone distribution, with the spatial resolution required by current predictive ozone models. The moderate spectral resolution proposed for the NiteOwl experiment is sufficient to measure ozone absorption in the Chappuis band, and increases the instrumental sensitivity, thus expanding the range of useful stars and improving the resolution of the derived ozone distribution.

It should be noted that an opportunity exists to fly the NiteOwl experiment as part of a microsatellite mission. The Niteowl submission team has learned that payloads will be solicited for the ESA PROBA technology demonstration microsatellite, to be launched in early 1999. ESA plans to bear payload integration costs for all selected payloads, so CSA costs for the NiteOwl payload, if it is selected by ESA, would be limited to those for instrument development. It is believed that the NiteOwl instrument could be ready to take advantage of this opportunity.

4 Required Theoretical and Modelling Support

During the Phase A study, simulations of the spectral inversion technique and the tomographic inversion technique will provide important support to the mission and have the potential to

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