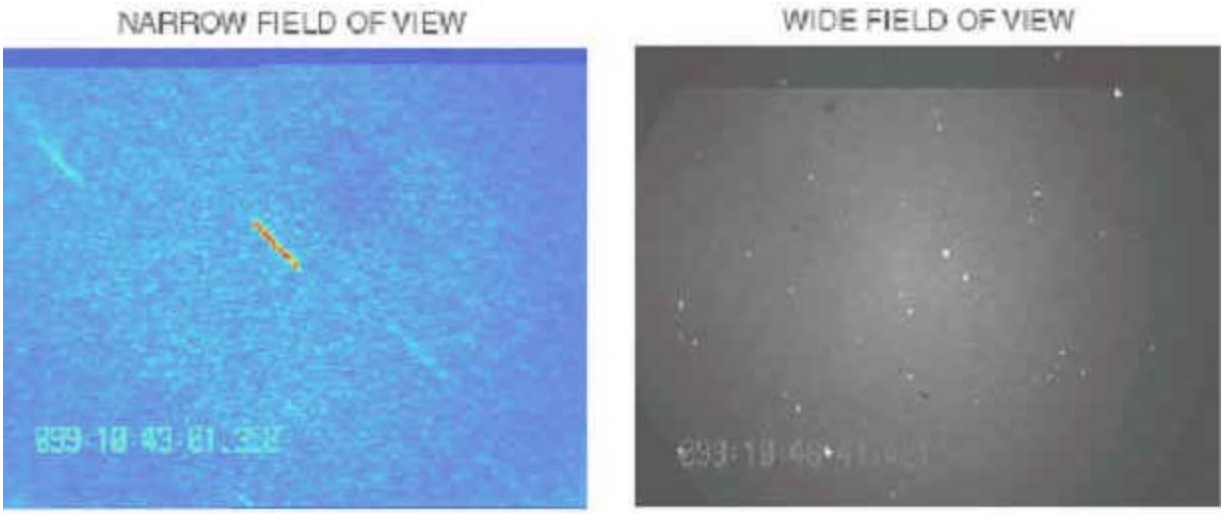


Figure 4: Example data from the April 2000 HAARP campaign.

Telescopic Imagery of HF-Induced Airglow

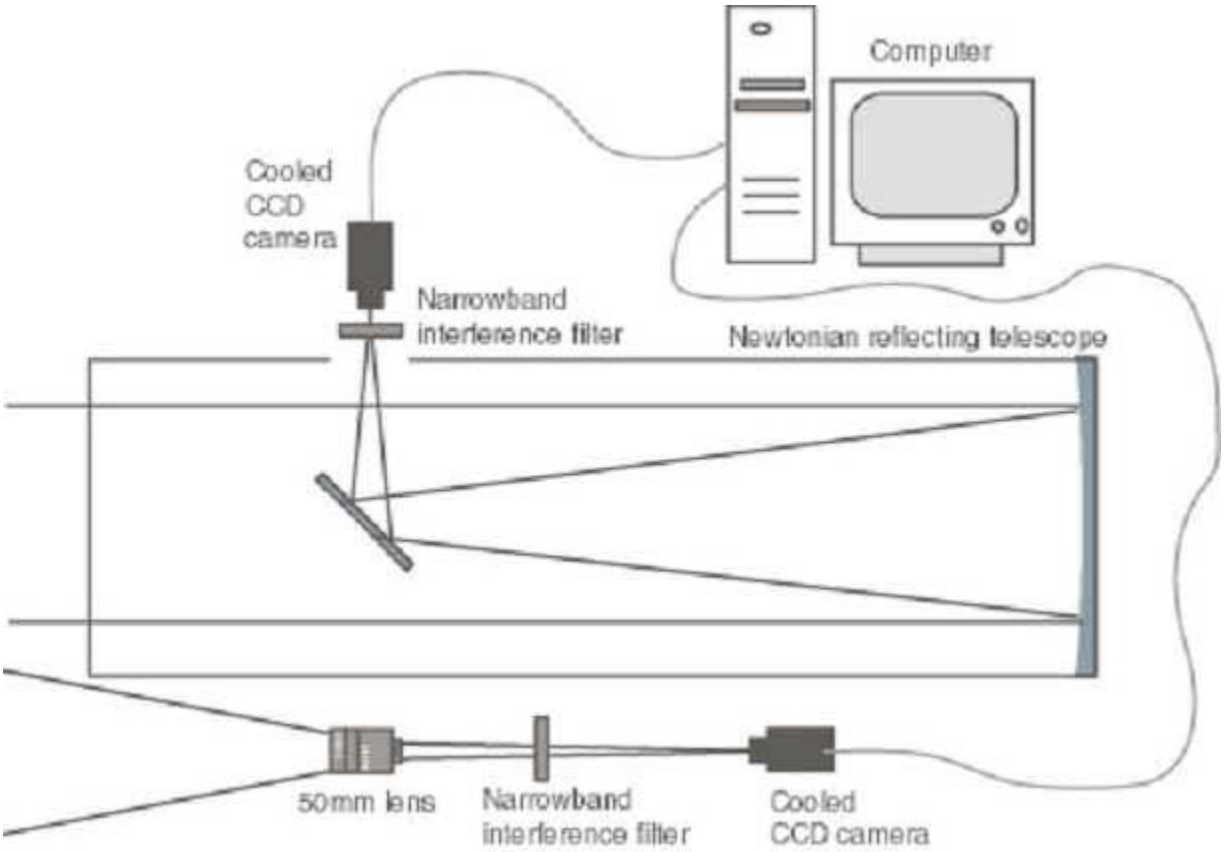
E. A. Gerken / *Umran S. Inan*

The goal of this experiment is to make telescopic measurements of the optical emissions created by HAARP HF heating of the ionosphere. With the narrow field of view (.72° x .9°) of a telescopic system we will be able to determine whether there is fine structure in the optical airglow emissions. We are able to view an object 100 km away with a resolution of ~3m. Since the lateral extent of the ionospheric region heated by the HAARP HF transmitter is ~30 km, our narrow field of view is completely within the heated region.

Although airglow observations of heaters have been conducted in the past, our observations constitute the first attempt to look for fine structure within the heated regions. Observing

either the absence or presence of structure would be an important scientific contribution and would give additional insight into the atmospheric makeup of these heated regions. Although the main lobe of the HAARP HF heater is quite broad, one might expect fine structure due to ambient electron density variations. It is also possible that small variations the radiation pattern within the main lobe may be detectable.

Our system consists of a telescope with a cooled scientific bare CCD camera mounted at the image plane of the telescope. The system uses a Meade Starfinder telescope which is a 16" aperture, f/4.5 Dobsonian-mounted, Newtonian reflecting telescope. The cameras is narrowband-filtered to allow either the near infrared N2 first-positive lines, the 630nm oxygen line, or the hydroxyl lines to be selected for viewing. The camera is a Princeton Instruments VersArray 512B digital CCD system with thermoelectric Peltier cooling, 512X512 pixel format, and binning and subregion readout modes. Frames from the camera are sent directly to a computer interface with accompanying software for real-time acquisition, display, and data processing. The interface has a 16 bit A/D converter with dual speeds of 100kHz and 1MHz. The camera is integrated for several seconds (up to 30sec) in order to be able to view the relatively dim airglow levels of 20-100 R.



Last Updated: June 2001.