Passive optics workshop
Quo Vadis?
(a Latin phrase meaning, Where do you go?)

• There is a great potential for a new direction for passive optics provided we were to work together.

• GBOA deja vu?

• Several ideas that come to mind:
  - networking of imagers and FPI instruments, local and global ($$$)
  - a portable state-of-the-art spectrograph ($$$)
  - others?

• Thus, part of the reason why we are here is to fashion goals and strategies for future development of passive optics in aeronomy utilizing the new technology available to us.

• There is also the question of how to organize imager and FPI networks should we go in that direction.

One of the first examples of satellite and ground-based FPI collaboration was the ground-based support provided for DE-FPI by the network of FPI observatories in the early 80s.

This figure illustrates the observations of averaged thermospheric neutral winds at mid-latitude ground-based FPI locations combined with the average neutral winds observed along the DE orbital track.
The results were compared with the TGCM model of the day with clear indication of areas of disagreement.

- Unfortunately, Killeen’s vision of the continuing contributions that could be realized from such a network has not been realized, in spite of the progress that has been achieved with the Internet and the introduction of the PC for data acquisition.

- FPI data submitted to CEDAR database by most PIs but generally, no effort to coordinate results for particular events.

- Campaign mode generally successful but applied only to small scale studies.

- The science potential for coordinated studies of mesosphere and thermospheric dynamics specifically noted in NAS decadal report recently released.

- If we can formulate a clear statement of science issues and goals, with a strategy for the future, we can anticipate the realization of this vision.
There is strong justification for an imager - FPI network.

GAIM calculations carried out by Schunk and colleagues show that changes in the meridional and zonal winds relative to the HWM predictions can have significant effect upon the peak height and peak plasma densities of the F layer.

**Conclusion:** SW cannot rely upon the HWM model.
Network needs for SW and support of spacecraft operations - TIMED, LWS, others

- More imager & FPI observatories needed to improve sampling of the global circulation pattern of thermospheric and mesospheric dynamics.
- Upgrade of existing imager & FPI observatories essential to improve sensitivity and wavelength selection to get observations of mesospheric and thermospheric dynamics with good temporal resolution.
- Internet connectivity crucial to enable real-time feedback of data to central archival storage for data assimilation into global SW model such as Schunk’s GAIM.
- Extension of FPI network into daytime sector highly desirable for improved sampling of global thermospheric wind pattern.
- 24/7 coverage highly desirable and feasible for mountain sites in arid locations.

We should appreciate that the imager & FPI network focus should not be limited to that of global scale structure. There is also great science potential for studying small scale effects.

ASC and FPI observations of aurora, Poker Flat at 630 nm
(Conde et al., 2002)
Mesospheric dynamics studies would benefit from simultaneous observations of mesospheric winds and temperatures as well as ASC images.

557.7 images observed at Clemson during passage of cold front.

Where are we today regarding optical network status?
Global distribution of all-sky imagers

Global distribution, imagers + FPI
Global distribution, imagers+FPI+MI

Future expansion of network?

Optical astronomical observatories possible potential for future expansion.