Final Technical Report on NASA Grant NAGW-3156:
"Variability Analysis and the Structure of Active Galactic Nuclei"
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This five-year Long-Term Space Astrophysics grant provided the support for several major steps in advancing our knowledge of the internal structure of active galactic nuclei.

The single largest portion of this program had to do with the development and application of techniques for "reverberation mapping", the use of spectral monitoring of several different bands related by radiation reprocessing to infer the internal geometry of sources. Major steps were taken in this regard, particularly in establishing the distribution in radius of emission line material, and in relating the apparent reprocessing of continuum bands to the underlying structure of the accretion disk.

Another major effort built directly upon these results. Once the case for continuum reprocessing was made by the monitoring, it next behooved us to understand the spectral output of AGN as a result of this reprocessing. As a result, our view of continuum production in AGN is now much better focussed on the key problems.

A third focus of effort had to do with the nature of X-ray variability in AGN, and what it can tell us about the dynamics of extremely hot material in the immediate outskirts of the supermassive black holes that form the central engines of active galactic nuclei.

In addition to these primary efforts, this grant also supported many other, smaller projects. Several of these were demonstrations of how the material spewed out of AGN in relativistic jets generate the radiation by which we observe them.

Finally, the portion of this study that had to do with continuum production by accretion disks in AGN led naturally to several papers in which new developments were presented having to do with "advection-dominated accretion disks", those disks in which accretion appears to proceed at a substantial rate, but in which radiation processes are weak.

The following publications were supported in part by this grant:

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