

Cassini UVIS Project PDS Data/Software Product Review

J. Clarke comments 16 June 2004

I have time only for some general comments at this point, I hope the following will prove helpful.

First, I commend the UVIS team for providing IDL .pro's for the reduction and I/O of the data. While IDL is a commercial product, i.e. we all have to pay for it, I have found it to be the most widespread software among researchers in our field, and by far the most flexible and adaptable package. Most people working in spectroscopy of planetary atmospheres have been using IDL for years, and its adaptation for UVIS will greatly advance the utility of outsiders to use the UVIS data.

Secondly, the draft write-up of the spec.'s has been very helpful. This is clearly a project that is in far better shape than previous instruments for planetary missions, in terms of the planning for making the data accessible to the outside community. However, in many cases this is not saying much, previous instrument data sets have in some cases been so poorly documented that they were not useable by their own science teams. I expect the main by-product of the present effort for UVIS will be in fact to make the data much more useful to the UVIS science team, who will be the main users of the data set. The structure of the PDS requirements will help the UVIS team to make their own science program a success.

Calibration:

There are several interesting issues of the calibration to explore. Overall, the UVIS team has listed the important general areas in which calibration data will be required, and stated that the needed files will be provided. This is all good. It is, however, a long way from a "cookbook" activity by outside workers to having the ability to truly model and interpret UVIS spectral and imaging data. For the former, it is important for people to have clear documentation about exactly what has been done to the raw data, and to have access to all of the calibration data files that have been used. It should be possible for a user to download the documentation and calibration files, and reproduce the reduction of the raw data. For the

second area, there are a lot of calibration measurements that one would need to have to fully understand the properties of the instrument. Examples of these include line spread functions, point spread functions, scattered light profiles, changes in sensitivity with time (calibration star exposures), etc. Not all of these things are normally included in databases for the observers, and are needed to fully understand the data and to make comparisons with models.

Geometry and Pointing:

The use of NAIF and SPICELIB programs is again the right choice. These are the tools that nearly everyone in the field use for their existing data. This also adds flexibility for users to adapt their own existing programs to UVIS applications. The needed information about instrument pointing, however, is generally more complicated than having a NAIF output for the expected conditions at the time of the observation. Most of the complications arise from real-world considerations. Even with HST, the header record often does not correctly describe the true pointing or observing conditions. Will the UVIS header record include predicted or modeled pointing information, or will some after-the-fact analysis be performed to determine where the instrument field of view was actually located? Will there be flags inserted into the header record to indicate observations with possible problems? The minimum needed will be some sort of flag to indicate to the observer to exercise caution, and some method that the observer can use to try to determine the actual pointing and timing (one of the most common pointing uncertainties is the actual time of the observation, a difference in time of execution corresponds to a difference from the expected pointing).

Another challenge for the user of the UVIS data will be to produce figures or projections of the distributions of emissions on Saturn, Titan, the rings, etc. Programs exist for people to overlay an aperture on the Saturn system, but projections of data from an oblate spheroid generally do not exist in any commercial package. If a user needed to model the geometry of an observation near the limb of Saturn, for example to assign latitude and longitude values to specific pixels within the field of view or to "map" the observed area to a different point of view, this would not generally be

possible without a *lot* of software development. The default approach would be to leave this up to the observer, and it is probably not within the responsibility of the UVIS science team, but this is a limitation.

General Comments:

Overall, this is a very good approach and start to the UVIS data and software documentation. The problems that I foresee with the system arise from the difference between what happens in the real world, and what has been programmed in advance into observation planning. The issue here is to what extent anyone will go over the downloaded data, and at least flag observations sets where the true pointing, integration time, etc. may have differed substantially from what was planned. I understand that this would be a time consuming and expensive task. I offer the suggestion that this would primarily aid the UVIS science team, and also assist the outside users.