REVIEW

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My formal review will be brief in order to allow ample time for open discussion. Our main goal before leaving this workshop should be to insure that the information presented here during the past 2 days is both widely disseminated to the ISO user community and is used by the ISO management and instrument teams to further enhance the scientific return from the ISO mission.

But first, before giving my own impressions of the workshop and opening up the floor to discussion, we should express our appreciation to our hosts here at the ISO Science Operations Center for a well organized and focused 2-day meeting – in particular to the Station Director, V. Claros, for welcoming us to Vilspa, to the ISO Project Scientist, Martin Kessler, for his oversight of this conference, and to Deborah Levine, Rene Laureijs, and the other members of the organizing committee (Dietrich Lemke, Catherine Cesarsky, U. Klaas, L. Metcalf, and A. Bivianco) for the efficient planning and organization of our meeting here on the grounds of Villa Franca del Castillo.

General Impressions:

Before trying to summarize the main themes of this workshop it is worth pointing out the ground rules that have shaped this meeting. *First*, this has been a 'Camera Workshop' with no specific mention of LWS or SWS observations. However, many of the problems that have been discussed here apply equally well to all of the ISO instruments, and therefore, every attempt should be made to see that the lessons learned here are taken seriously by all of the ISO instrument teams – this is a fact that the ISO-SOC, as well as the US data center at Caltech/IPAC and the Japanese/ISAS consortium should be keenly aware of. *Second*, the participants at this workshop are a rather select group of 'insiders', mostly members of the IDTs as well as GTOs. To the extent that much of the material presented at this workshop has been new news to many of the participants, one can be certain that the much larger group of GOs who are not here are almost certainly unaware of the results that have been discussed. *Third*, the ISO mission is relatively short (2 years) and we are now just past the half-way point; thus the anxiety that has been expressed by many at this meeting is natural in light of the relatively brief time remaining in which to make important mid-course corrections.

I should also mention that my own impressions of ISO detector performance, formed mostly from what I read shortly after launch, clearly need to be updated. Until this meeting, it had been my impression that cosmic ray hits would be the major limiting factor in detector performance, and would severely limit the ability to carry out long integrations with the ISO cameras. My assessment now is that cosmic rays are proving not to be the major problem – mostly due to the ability to characterize even the long recovery time of individual detectors in the case of ISOCAM, and to the relatively short recovery time of the detectors in the case of ISOPHOT. What now appear to be the major 'limits' on 'taking ISO to the limits' are more straightforward (but possibly harder to deal with) concerns such as the ability to provide a reliable absolute calibration scale for the detectors, chronic problems with detector stability, and concern about being able to extract proper pointing and spatial information. These problems appear more severe in the case of the ISOPHOT detectors, but need to be dealt with at some level for ISOCAM as well.

Despite the variety and detail contained in the well prepared talks of this meeting, I believe you would agree that there are a few consistent themes that permeate all of the talks – my own summary of these are given below as four broad recommendations that should be addressed by the ISO managers and instrument teams as soon as possible.

Recommendations:

1. All ISO observers need to be immediately informed as to how best to modify their observing strategies in light of what has been discussed at this meeting.

For example:

(•) *Should the standard 'chop' mode be abandoned in favor of raster mapping in order to achieve the stable performance and maximum sensitivity required for faint source observations with ISOPHOT ?* The review by Wilkes presents a good summary of current problems, while the talks by Klaas, Haas, Acosta, Abraham, and Dominik suggest ways to optimize observing strategies with ISOPHOT.

2. What science that was proposed prior to launch will now be lost due to reduced detector sensitivity or stability problems.

For example:

(•) *High-z sources and cosmology* – Here the answer seems surprisingly mixed. The camera detectors are less sensitive in flight than in the lab, which clearly will limit the practical ability to carry out some high-z and cosmology work. However, a very pleasant surprise of this meeting has been the demonstration (e.g. talks by Elbaz, Oliver, Taniguchi, and Kawara) that S/N appears to be increasing as $t^{1/2}$ for integrations of 5-10 hours or longer when using specific observing strategies – microscanning in the case of ISOCAM, and raster mapping in the case of ISOPHOT.

3. The IDTs and Data Centers should strongly consider making several mid-course corrections in preparation for the final half of the ISO mission.

For example:

(•) *Provide not just frequent, but more 'relevant' updates to the PIA and CIA packages.* Those techniques and calibration characteristics that have been shown to work (or in some cases not work) should be included in the analysis packages as soon as possible. At the very least both packages should immediately be updated to reflect all of the combined wisdom and experience that has been presented at this workshop.

(•) *Encourage all PIs to consider scheduling visits to the relevant Data Centers in order to absorb the latest wisdom of the experts.* In the end this may not prove to be a practical means for planning future observations during the remaining lifetime of the spacecraft, but in light of the level of expertise at the Centers, visits should be encouraged anyway.

4. The material presented at this workshop should be disseminated to the entire ISO user community as soon as possible.

For example:

(•) *In addition to printing these proceedings (presumably as an ISO INFO bulletin) a Web version of the proceedings should be made available.*

(•) *Web updates should be provided as often as needed to answer important questions received by the IDTs and Data Centers.* It would be useful to provide samples of the most commonly asked questions and to indicate which ones are 'under study' as well as 'have been answered'.

(•) *The instrument teams should strongly consider appointing a single contact as their Web interface to the ISO community so as to speak with one clear and consistent voice.*

Finally, as a GTO who has only just recently begun to reduce ISO data, I have been genuinely impressed by the amount of detailed effort that has already gone into characterizing the ISO detectors as well as the expressed willingness by members of the Instrument Definition Teams to help the rest of us with solving problems encountered in reducing our data. At the same time however, due to the relatively short timescale of the ISO mission and the fact that we are already at the midpoint, it is imperative that the expert opinions presented here, concerning detector performance and optimized observing strategies, propagate out to the wider ISO community as soon as possible.