PUBLIC SURVEY STATUS REPORT
(89th OPC MEETING)

This report has to be returned to the Observing Programmes Office of the European Southern Observatory (opo@eso.org) before October 28, 2011.

PROPOSAL ESO No.: 177.A-3011
TITLE: The VST ATLAS
PRINCIPAL INVESTIGATOR: Prof. T. Shanks

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1. **Scientific Aims (brief description).** The main aim of the VST ATLAS is to make a survey of ~4500deg^2 in the Southern Hemisphere in the ugriz bands to the depth of SDSS. The ATLAS will comprise ~2000deg^2 in the North Galactic Cap between 10h<RA<15h30 and ~2500deg^2 in the South Galactic Cap between 21h30<RA<04h00. The main motivation for the survey is for cosmology. For example, there is the possibility of using the VST ATLAS UV coverage as the base for spectroscopic QSO redshift surveys out to z=2.2 in order to investigate non-Gaussianity and the power-spectrum turnover via QSO clustering. Such a QSO survey could also deliver competitive Baryon Acoustic Oscillation measurements of the Dark Energy equation of state at z~1.5. Pilot survey observations have been proposed for the AAT 2-degree Field facility. ATLAS data can also be combined with the VISTA Hemisphere Survey to produce ugrizYJHK photo-z for galaxies out to z~1. Then cross-correlation of Luminous Red Galaxies with the Cosmic Microwave Background fluctuations will test the evidence for an accelerating Universe via the Integrated Sachs Wolfe effect. Many other non-cosmological projects are clearly also feasible including the search for high redshift z~7 QSOs via optical dropout, the search for stellar streams and the search for local large scale structure including the Great Attractor. Indeed, our aim is that ATLAS becomes the equivalent of a Southern Sloan with similar scientific impact.

2. Detailed progress report with respect to initial estimate from the Survey Management Plan (including preliminary results, whether published or not).

2.1. Progress report Progress has been excellent so far. The VST Early Science Phase occurred in August and September and the first successful observations for ATLAS were completed on the night of 19th August. So far (before 27/10/11) ~500 1deg^2 fields have been observed in u, 360 in g, 300 in r, 400 in i and 300 in z. The first raw images were uploaded from ESO on 8th September and the first reduced data was supplied by CASU on 12th October. CASU are now completely up-to-date with the preliminary reductions. In terms of the observations, we have followed the plan in the SMP. The first target has been the KIDS- S ~700 deg^2 area where we have been making a pass which can be used for photometric calibration of KIDS-S data. There is also VISTA VIKING data in this area. Once this is completed we shall move to the Northern limit of the SGC survey at Dec=-10 and move S in strips from there. We also proposed to make an extra ATLAS

observation on the well-studied William Herschel Deep Field (WHDF) area at RA~00h20, Dec~0, which is also covered by SDSS and Stripe 82.

Progress report on VST activities from Cambridge Surveys Unit (CASU)
CASU have been copying the raw data from ESO based on the Archive Data Retrieval requests from the PI. As this is not a satisfactory method for long term access of survey data, CASU have been investigating alternatives based on direct scripted requests from the ESO raw data Archive for all available VST Public Survey data. For routine pipeline processing this provides a more controllable data flow and also better access to more dark sky science frames for computing, for example, fringe frames.

A prototype VST processing pipeline has been setup and used to process 59 nights of raw VST data (up to 20111005) taken for either general test purposes or for ATLAS (and VPHAS) project(s).

Processing involves the usual steps of generating master calibration files and using them to perform: bias correction, overscan correction and trimming, cross-talk correction, flatfielding to a common internal gain system, defringing for the i- and z-bands, astrometric and photometric calibration, and object morphological classification. Jitter sequence within OBs are automatically stacked and products include catalogues of detected objects, and image and confidence maps for all frames.

CASU are setting up a web-based processing progress interface modeled on the VISTA data flow system which will allow real time access to status and derived QC information. A similar PI archive access to processed data is also being constructed again modelled on the VISTA system.

There is still some fine-tuning required for the VST processing chain but all the main procedures are in place and working routinely.

2.2. Publications Our first publication is intended to be a comparison of depths of the VST ATLAS with SDSS single epoch, SDSS Stripe-82 and WHDF photometry. This is under preparation and should be submitted in the next few months.

3. Quality Control and Phase3.

The Phase3 submission plan should be described here. In addition the PI should comment on Quality Control of the acquired data.

The Phase 3 submission plan remains the one described in Section 5 of the Revised ATLAS SMP. In detail: Our team anticipate two main product releases resulting from the survey, timed at survey start plus 1.5 yr and survey start plus 2.5 yr. These will be the DR1 and DR2 catalogue releases and will, finally, incorporate globally calibrated ugriz photometry on all catalogued sources. DR1 would only be flux calibrated at the individual pointing level, whereas the aim for DR2 would be to place the entire survey on a uniform photometric scale.

In addition to the DR1 and DR2 catalogue release indicated above, the ATLAS team will ensure delivery of the following core data products to the ESO SAF:

- astrometrically and photometrically calibrated images, along with their respective weight maps, in all of the project-relevant filters will be provided on a per pointing basis.
- source catalogues based on individual bands. Associated source catalogues linking the parameters of individual objects across all of the observed filter bands will be provided on a pointing by pointing basis.
- these survey products will be supported and characterized by additional "meta" information providing a full description sufficient for their full scientific exploitation.

We will deliver full, quality controlled products to ESO as part of the Phase III process within 6 months of the end of the period in which the observations were made.

Quality control is ongoing at Durham. Generally data quality looks excellent. One problem has arisen with our original 1hr OBs where we specified large, ~1deg, offsets in RA to move from one field to another before doing a 2-tile jitter of 85 arcsec in Dec and 24arcsec in RA to cover the bigger inter-chip gaps in the CCD frame. For some reason, in a few cases, the step in RA has become smaller as the offsets proceeded. This means that at the end of strips some of the 20arcsec gaps are increasingly left in place. We are still working to understand the effects and some OBs may need to be repeated next year. However, we now use 1 (concatenated) OB per jittered tile and this problem is eliminated by this method. All the P88 OBs submitted for October-March now use the new concatenated method.

We have used the ATLAS observations on the WHDF to make a test of the depth of the ATLAS compared to SDSS single epoch. In both visual and direct quantitative comparisons we have found that we are reaching the SDSS depth in all 5 bands. Thus our minimum technical aim of reaching the Sloan depth has been achieved. But there would be significant gain for QSO surveys in terms of doubling the exposure time in the u band. We have therefore submitted a proposal (PI L. Infante) in P89 to use 7 nights of Chilean VST time to double the ATLAS u exposures with 3 further similar proposals to come in succeeding Periods if the P89 proposal is successful.

4. Are any changes proposed with respect to the Survey Management Plan in P89 (e.g., in strategy, field coordinates, exposure time and/or other settings)? If yes, please provide a clear and detailed justification.

We shall be generally continuing to follow the Revised SMP in terms of field coords, exposure times etc. The only change is that we are moving from 1hr OBs with ~1degree offsets to shorter concatenated OBs as recommended by ESO.

5. Observing Plan for Period 89.

Specify which part of the Survey Management Plan (SMP) the survey will focus on in P89 in the 1st column and provide the corresponding details in the table below. In particular please highlight any changes with respect to the SMP for P89, and provide a full justification for these changes in Section 4 above.

There are no changes with respect to the revised SMP for Period 89. Reiterating Table 4 of revised SMP:

SMP Period	Field name/ mean RA	Filter	Time (h)	Seeing	Moon	Transparency	Comments / strategy (e.g., no. of epochs)
P89 Apr-Jun	NGC RA~14h	ugr	90	<1.4	dark	clear + some phot.	As in revised SMP
P89 Apr-Jun	NGC RA~14h	iz	54	<1.4	gray/ bright	clear +some phot.	As in revised SMP
P89 Jul-Sept	NGC RA~23h	ugr	115	<1.4	dark	clear + some phot.	As in revised SMP
P89 Jul-Sept	NGC RA~23h	iz	72	<1.4	gray/ bright	clear +some phot.	As in revised SMP