Preliminary reductions of the WFI data have been made, but a powerful computer was still missing at that time. Remember that a full frame is 300 Mb!

Here are the different reduction stages adopted:

– Bias substraction and FF division
– Cosmic-event removing
– Combine the 5 images per filter (not yet done)
– Frame recentring (Continuum as reference)
– Flux calibration
– Continuum frame substraction
– ([OIII]-Continuum) divided by (Hα-Continuum)
– Accurate astrometry using the ESO Starcat package facility (not yet done)

5. Results

These observations demonstrate that, as expected, we still can find a lot of new emission-line objects. Moreover, these observations provide, in the survey area, an unbiased and complete survey (range greater than 8 magnitudes).

As a first product this study, preliminary to further spectroscopic study, will lead to the publication of a catalogue with precise coordinates and good finding charts of more than 1000 emission objects (PNe, HII regions, SNR, Hα-emission stars, etc.) per square degree.

The performance of the WFI is very encouraging:

– Firstly, we were able to (easily) find the 6 known PNe present in our 4 fields, and moreover our photometry agreed within 10–20% with the fluxes derived spectroscopicaly.

– Secondly, with the calibration in fluxes, we confirm that we easily reach fluxes down to $F\alpha = 10^{-16}$ erg.cm^{-2} s^{-1}, and therefore that we are able to find objects 20–50 times fainter than the last deep survey (Jacoby 1980).

With a bigger area covered and better statistics, we will derive an unbiased PNe luminosity function.

In each of the two first 30′ by 30′ reduced fields we discovered more than 100 emission-line objects. In one field we found 2 new PNe, 8 compact HII regions and ~ 80 Hα-emission-line stars. In the other field, also 2 new PNe, 4 compact HII regions and ~140 Hα- emission line stars.

All 4 PNe are very faint and 2 of them are fully resolved (diameter > 1.0″). The PNe have fluxes of the order of 10 10^{-16} erg.cm^{-2}.s^{-1}, which one can compare to brigthest (3000 10^{-16} erg.cm^{-2}.s^{-1}) or the faintest (~ 200 10^{-16} erg.cm^{-2}.s^{-1}) PNe already known.

Figures 1 to 4 show the finding charts in both Hα and [OIII] filters.

5.1. Expected PNe number in the LMC

In 1978 Sanduleak et al. have estimated the total PNe number to 400 in the LMC (and 100 in the SMC accordingly to the LMC/SMC mass ratio equal to 4). In 1980 Jacoby determined these numbers to be 996 and 285, respectively.

The current number of known PNe in the Magellanic Clouds are respectively 282 and ~ 85 for the LMC and the SMC.

This study demonstrates that many PNe have been missed by the previous surveys and that probably a few hundred can be discovered with the current instrumentation.

In the studied area we double the known sample of PNe, therefore, we can extrapolate to find more than 250 new PNe in the LMC. Statistically, we can at least expect to find about 50–100 new faint and extended PNe in the Bar. These PNe are of particular interest because they are old, allowing to determine galaxy abundances at epoch up to 10 billions years.

6. Conclusion

The WFI has proved with this study that it is an excellent efficient instrument which can be used to survey large areas (like nearby galaxies) and still discover many faint interesting objects.

We hope that we will soon be able to cover several other square degree and determine an accurate PNe luminosity functions over this complete and unbiased sample.

The next step, with such faint objects, will be a follow-up with VLT telescopes (FORS) to obtain very good S/N spectra and derive accurate abundances.

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The ESO Messenger:
Editor: Marie-Hélène Demoulin
Technical editor: Kurt Kjär

Printed by
J. Gotteswinter GmbH
Buch- und Offsetdruck
Joseph-Dollinger-Bogen 22
D-80807 München
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ISSN 0722-6691

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