Selection of Pre Main Sequence Targets for the COROT Mission

Gustavo Rojas, Jane Gregorio-Hetem and Jacques Lépine (IAG/USP)

We describe the selection procedure of possible candidates to be observed with COROT Additional Program, for which we have projects focused on the variability of Pre-Main Sequence (PMS) objects.

Our final list consists of nearly one hundred targets, which can be observed with the Exoplanetary CCDs of COROT. We are already performing ground-based observations of the targets with the 60-cm telescope at the Observatorio do Pico dos Dias (Brasopolis, MG)

IAG 30 anos PÓS-GRADUAÇÃO

FAPESP

Scientific Motivations

Variability in Pre-Main Sequence Objects

Many **PMS** objects (such as **Classical T Tauri** and **Herbig Ae/Be** stars) display **photometric variabilities** of up to around 1 magnitude on time scales of a few days. Possible causes of the variations are:

- **interaction of the star with the circumstellar structure;**
- **rotational modulation induced by starspots (both hot and cold);**
- **eclipses by circumstellar material;** and
- **variations in the accretion process.**

The COROT mission presents an unique opportunity to obtain high precision photometric observations of PMS objects over very long periods.
Together with ground-based observations, it will provide a large set of data which will increase our understanding of the final stages of PMS evolution.

Target Selection Criteria

We have selected Young Stellar objects (YSOs) with the following characteristics:

- Visual magnitude in the range **11,5 < V < 15,5**
- located less than 3^{o} from prime targets (long run targets), **OR**
- less than 8^{o} from field centre (short run targets)

Candidates were drawn off compilations of
- YSOs Catalogues (PDS, HBC)
- Young Open Clusters
- X-Ray Sources with emission typical of YSOs

Target Selection

YSOs Catalogues

Pico dos Dias Survey *(PDS)* (Gregorio-Hetem et al. 1992, Torres et al. 1995, Torres 1998)

596 total objects - 13 selected

Herbig-Bell Catalogue *(HBC)* (Herbig & Bell 1988)

735 total objects - 69 selected

Young Open Clusters

New Catalog of Optically Visible Open Clusters and Candidates

(Dias et al. 2002)

1690 total clusters - 119 selected

X-Ray Sources

ROSAT sources with hardness ratios HR1, HR2 >0

Optical counterparts selected in the **GSC,Tycho** and **UCAC** catalogues

83 sources selected

Long Run Candidates

Prime target	Number of candidates	Distance from prime target	Comments
HD49933	16	0.7° - 1.9°	NGC2301,Bochum 2, Dolidze 25, PDS229N
HD170580	1	2.6°	NGC6633
HD171834	7	0.9° - 1.9°	IC4756, PDS530E
HD177552	10	0.2° - 1.0°	Berkeley 81, five X-ray sources
HD181555	7	1.9° - 3.0°	NGC6775, three X-ray sources
HD 55265	24	0.5° - 2.7°	HBC547, PDS229N, PDS234, PDS241, NGC2302, Bochum 3, Haffner 3, NGC 2338
HD 43587	13	1.6° - 3.0°	Collinder 91, Dolidze 22

78 objects selected

- 6 Young Stellar Objects
- 63 Young Cluster Members
- 9 X-Ray Sources

Short Run Candidates

Object	Number of candidates	Distance from the center field	Comments
Cluster 1	3	3.9^{o} - 5.0^{o}	HBC665N, PDS520, HBC285
Cluster 2	5	4.4^{o} - 6.8^{o}	HBC684N, four X-ray sources
Cluster 3	17	4.5^{o} - 6.8^{o}	PDS518, HBC284N, Trumpler 35, seven X-ray sources
Cluster 4	5	8.0^{o}	NGC2219 (anti-center)
Other	12	3.0^{o} - 7.0^{o}	Several stars (HBC, PDS, Tycho) distributed in both center and anti-center directions).

48 objects selected

{

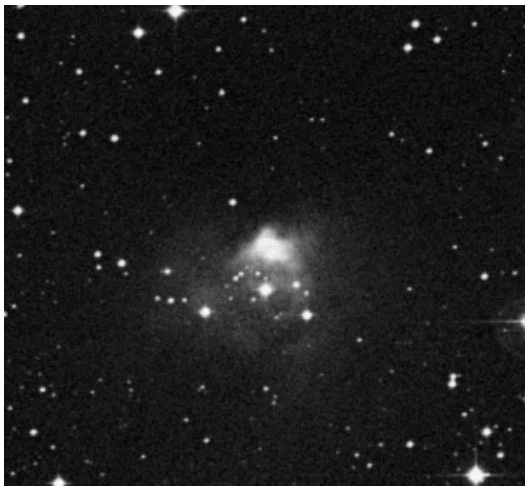
17 Young Stellar Objects
13 Young Cluster Members
18 X-Ray Sources

Some Interesting Objects

Images from the DSS2 survey (I band)
Field Size : 12.9' x 12.9'

PDS 241 - Herbig Ae/Be star

PDS 530 - Herbig Ae/Be star



NGC 2316 + HBC 547
Young Embedded Cluster + B2 star

HBC 284 - Herbig Ae/Be star

NGC 6633 - Young Open Cluster

Ongoing Work

Ground-Based observations of selected targets

Our group intends to follow-up the targets using the 60 cm. telescope at the Observatorio do Pico dos Dias (Brasopolis, MG, Brazil).

So far we have performed four observation runs in the centre direction in June and July/2004.

Preliminary results show that at least one target (PDS 91) presents photometric variations of ~ 1 mag (See the poster by Vieira et al.).

REFERENCES

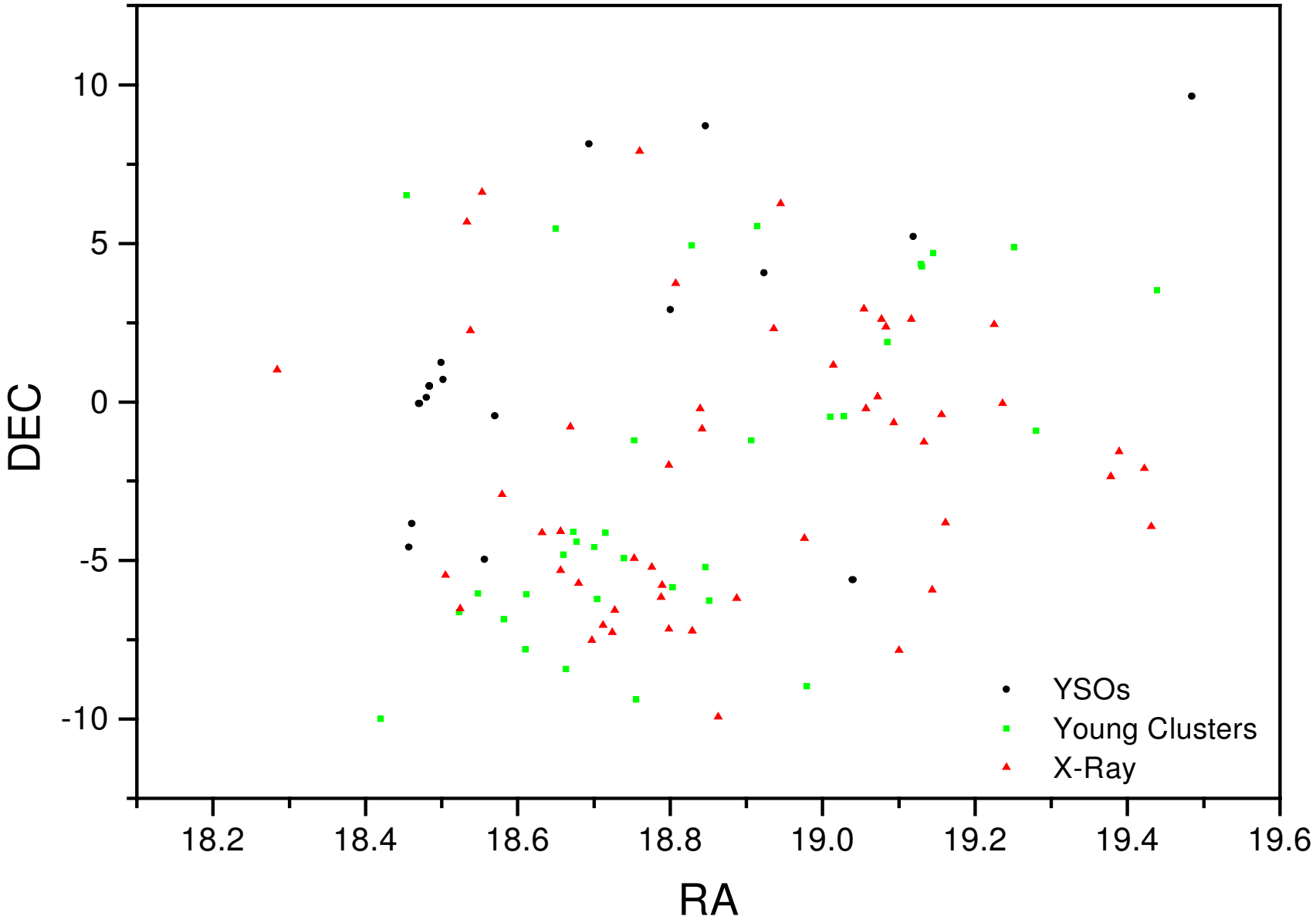
Dias W.S., Alessi B.S., Moitinho A., Lepine J.R.D. 2002, A&A 389, 871

Gregorio-Hetem, J., Lépine, J., Quast, G., Torres, C.A., de la Reza, R. 1992, AJ 103, 549

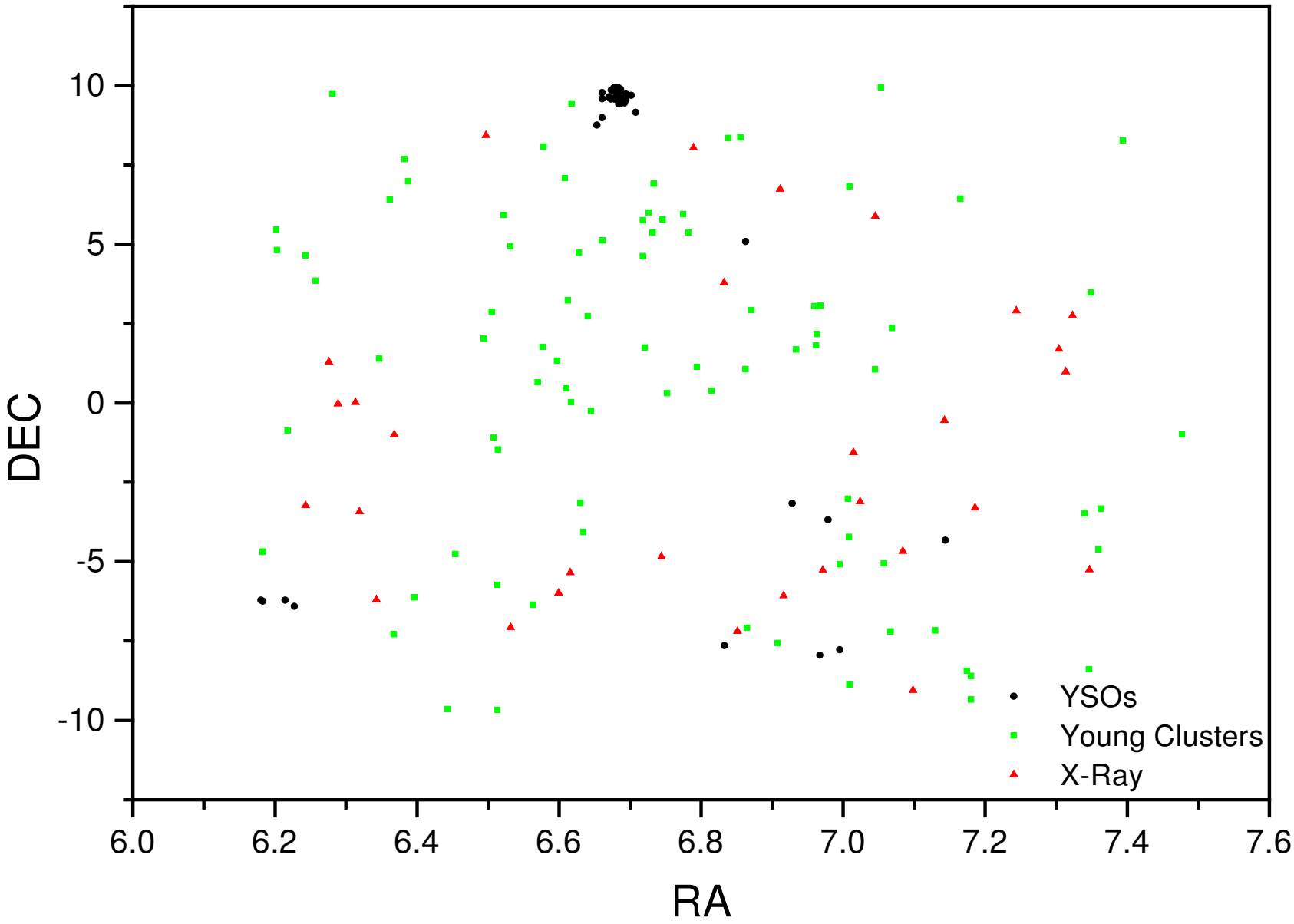
Herbig, G. H., Bell, K. R. 1988 Lick Obs. Bull. 1111

Torres, C. A. 1998, PhD. Thesis, ON/CNPq

Torres, C.A., Quast, G., de la Reza, R., Lépine, J., Gregorio-Hetem, J. 1995, AJ 109, 2146



Distribution of Candidates in the Centre Direction.



Distribution of Candidates in the Anticentre Direction.

Object	Additional Info	Number of Observations / Mission			
		9-13/June	22-26/June	14-18/July	22-26/July
PDS090	Weak T Tauri		4	10	2
PDS498	Weak T Tauri		4	10	3
NGC6633	Tyc 0445-01522	8	12	7	3
IC4756a	Tyc 0455-00776		11	7	2
IC4756b	Tyc 0455-00863		11	7	1
PDS530	Classical T Tauri	4	11	4	1
Berkeley 81	Ucac 31736376	12	11	7	1
J190418.9+000	X-Ray source		11	7	1
J190534.6-003	X-Ray source		11	7	1
HBC684	Classical T Tauri		4	7	1
J191329.9+022	X-Ray source		3	7	1
IC4756c	Tyc 0455-00791		1		1
NGC6775	Ucac 31567537				
HBC665	Classical T Tauri				
PDS520	Classical T Tauri				
PDS518	Herbig Ae/Be				
HBC284	Herbig Ae/Be	4			

Observation log for the June/July OPD Campaign.