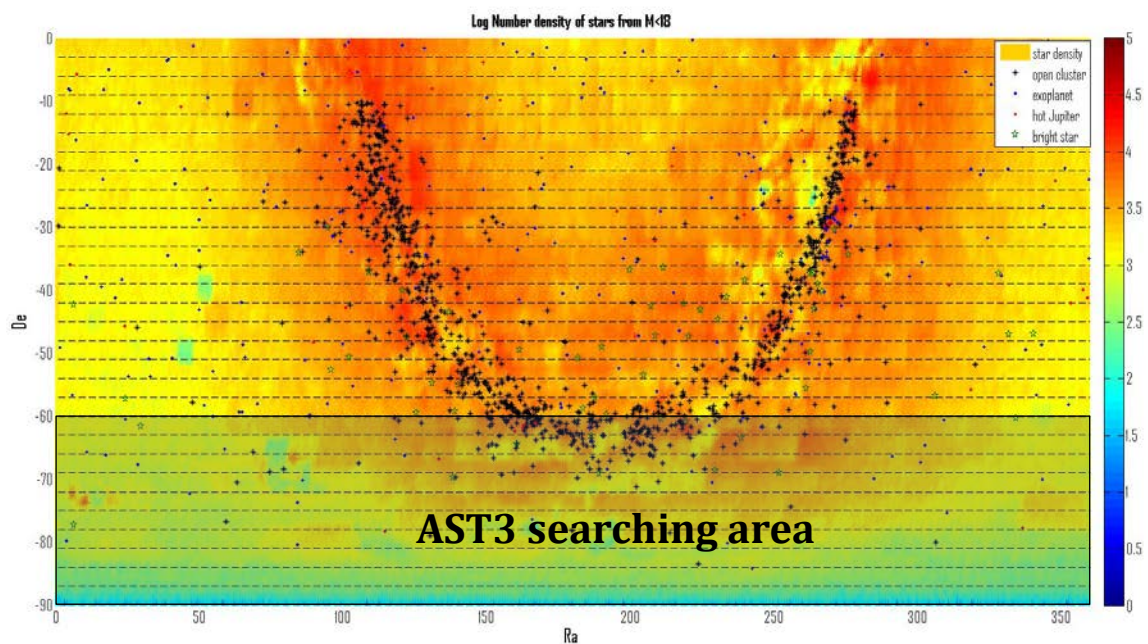


This material is a short summary on the observation scheme and candidates estimation of the AST3 exoplanet searching program. Please contact me (huizhang@nju.edu.cn) without any hesitation if you got any suggestion or correction.

- Overview of the south sky



Known open clusters on the south sky : 1051

Known exoplanets on the south sky : 394

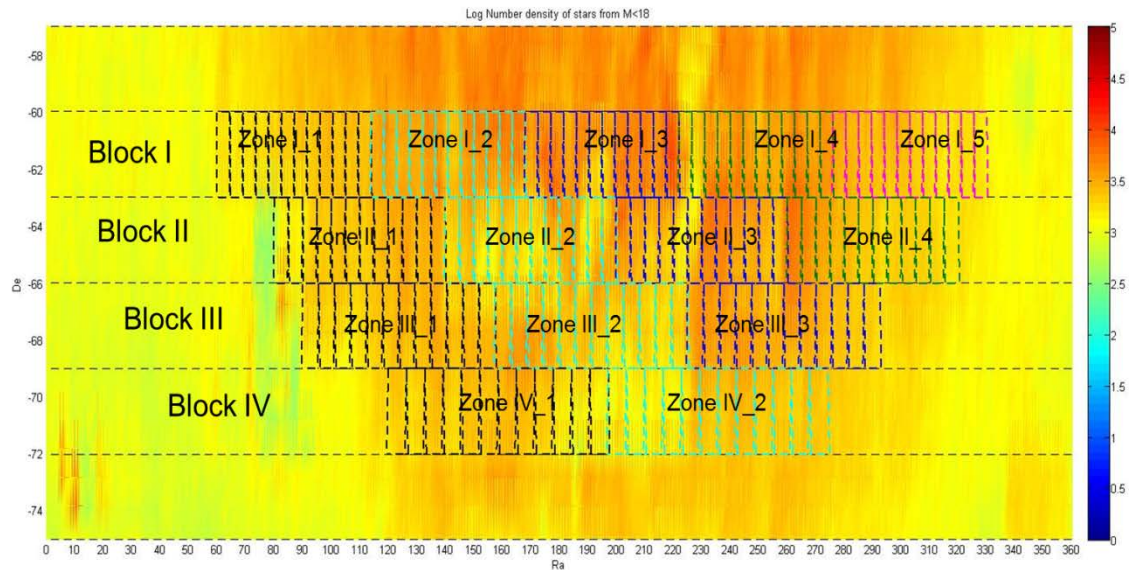
Within the AST3 searching area, $\text{Dec} \leq -60$ degree:

Open clusters: 211

Exoplanets : 64

Hot Jupiters with their period < 10days : 11

- AST3 observation zones (a preliminary design)



To find exoplanet candidates as many as possible in the first 3 years, we focus on the galaxy plane area where the star density is about $10^4/\text{degree}^2$. The area is divided into 4 blocks and each of them is composed of several observation zones. Each zone consists of 12 FOVs (about $1.5 \times 3 \text{ degree}^2$). The 4 blocks cover about 900,000 known objects with magnitude from $m_v=8$ to $m_v=14.5$ (according to the PPMX catalog).

- AST3 observation strategy (a preliminary design)

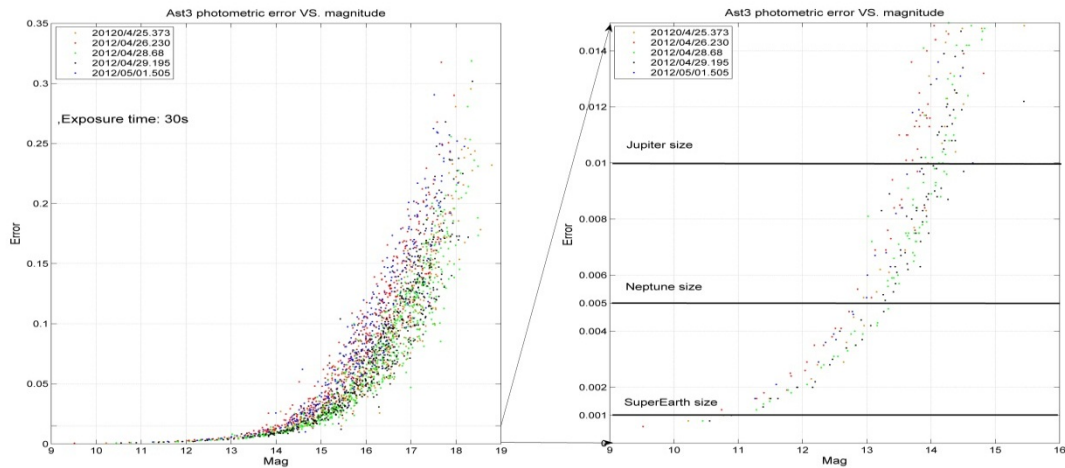
The exoplanet search lasts 42 continuous days every observation season (the polar winter at dome A, Antarctic). To cover both short period ($< 3\text{days}$, typical transit duration $\sim 1\text{-}3\text{hours}$) and moderate period ($3\sim 30\text{days}$, typical transit duration $\sim 3\text{-}6\text{hours}$) transiting planets, the observation contains two cadences:

- Short cadence:
 - exposure time: 30s
 - pointing, readout and redundancy: 15s
 - scan 12 FOVs continuously among 1 zone
 - cadence: $45\text{s} \times 12 = 540\text{s} = 9\text{m}$
- Long cadence:
 - exposure time: 30s
 - pointing, readout and redundancy: 15s
 - scan 24 FOVs continuously among 2 zones
 - cadence: $45\text{s} \times 24 = 1080\text{s} = 18\text{m}$

Observation time schedule:

- Day 1- 3: scan zone No.1, Short cadence, 5760 images
- Day 4 - 6: scan zone No.2, Short cadence, 5760 images
- Day 7 - 42: scan zone No.1 and No.2, Long cadence, 67200 images

• AST3 demonstration test



Photometric accuracy of AST3 with 30s exposure time:

0.1% at $m_v \leq 11$;

0.5% at $m_v \leq 13.5$;

1% at $m_v \leq 14.5$.

• Total candidates expected to be found by AST3

According to Kepler's results:

Photometric accuracy	Frequency of Exoplanet
1%	0.047%
0.5%	0.085%
0.1%	0.28%

Total candidates expected:

42days/year, 3 years, 1 or 2 AST3 units

Planet size	Expected number
>Jupiter	> 400
Neptune - Jupiter	~ 250
SuperEarth - Neptune	~ 150
Total	> 750