

Open Cluster @Solar Neighborhood (OCSN)

Speaker: Songmei Qin (秦松梅)

Collaborators: Jing Zhong (钟靖), Li Chen (陈力), Tong Tang (唐通)

Shanghai Astronomical Observatory, CAS

Open Cluster in the Gaia era



@Machine learning:
UPMASK, DBSCAN,
HDBSCAN, FOF,
GMMs...

- Accuracy
 - Membership determination
 - Cluster properties
- Efficiency
 - Clustering algorithm

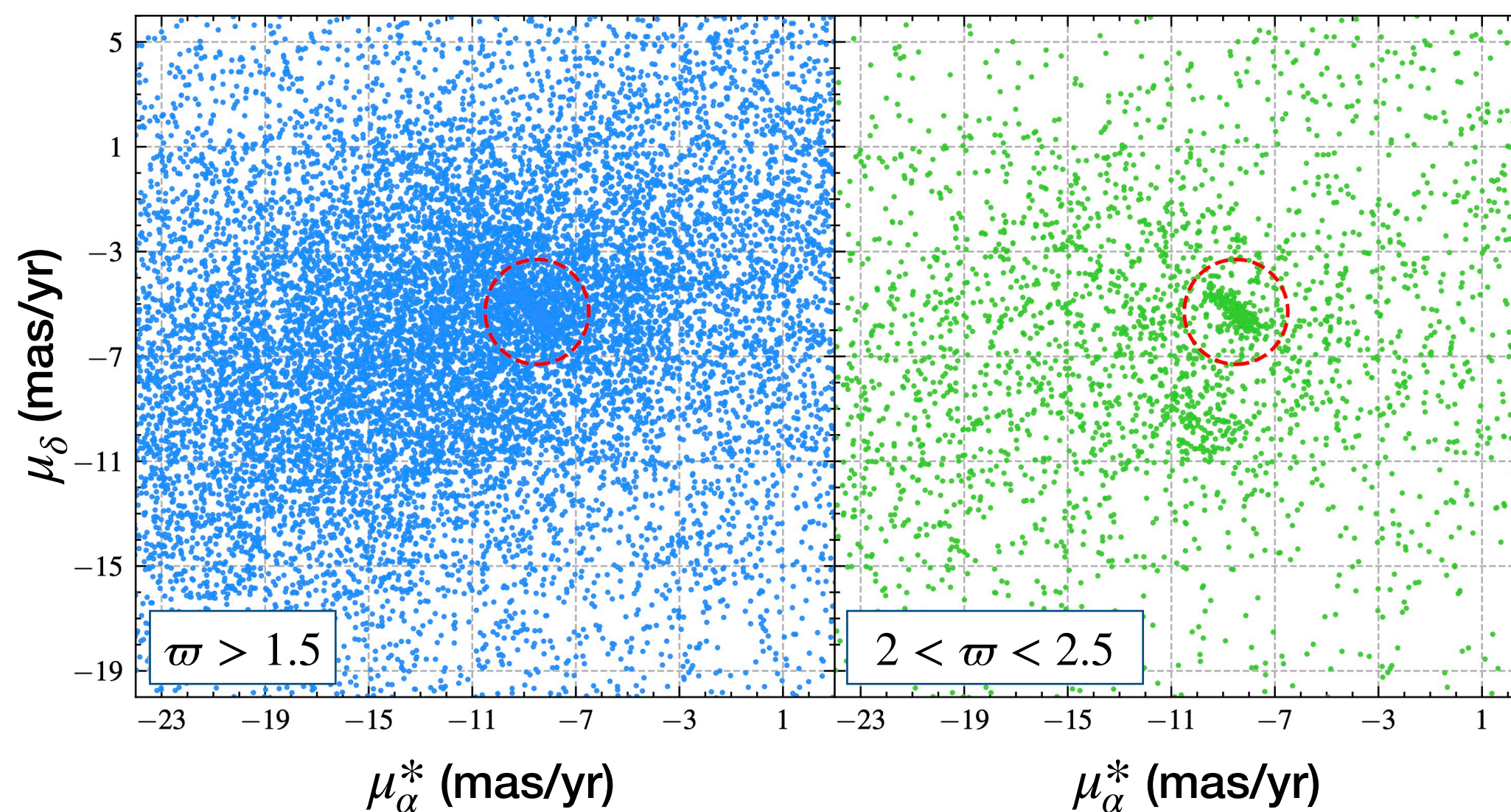
OCSN Searching Process

Hunting for clusters within 500pc
based on Gaia DR3

Data Slicing

Typical physical size: 50pc

6-30deg



dist (pc)	<100	100-200	200-300	300-400	400-500
w (mas)	>10	5-10	3.33-5	2.5-3.33	2-2.5
size (deg)	30	20	12	10	6

Initial Screening
with pyUPMASK

Separating Clusters
with HDBSCAN

Visual Inspection

Results

Open Cluster @Solar Neighborhood (OCSN)

Results: 324 clusters

223 reported clusters, 101 new clusters, increased by about 45%!

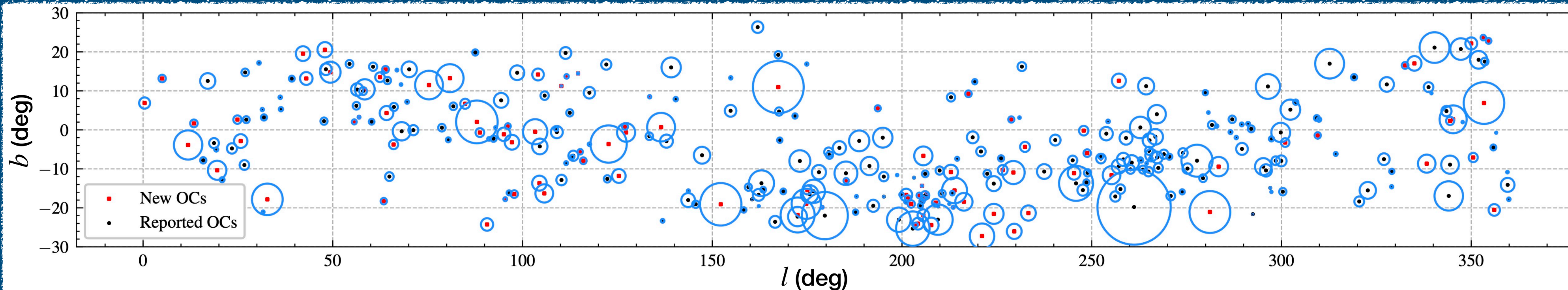
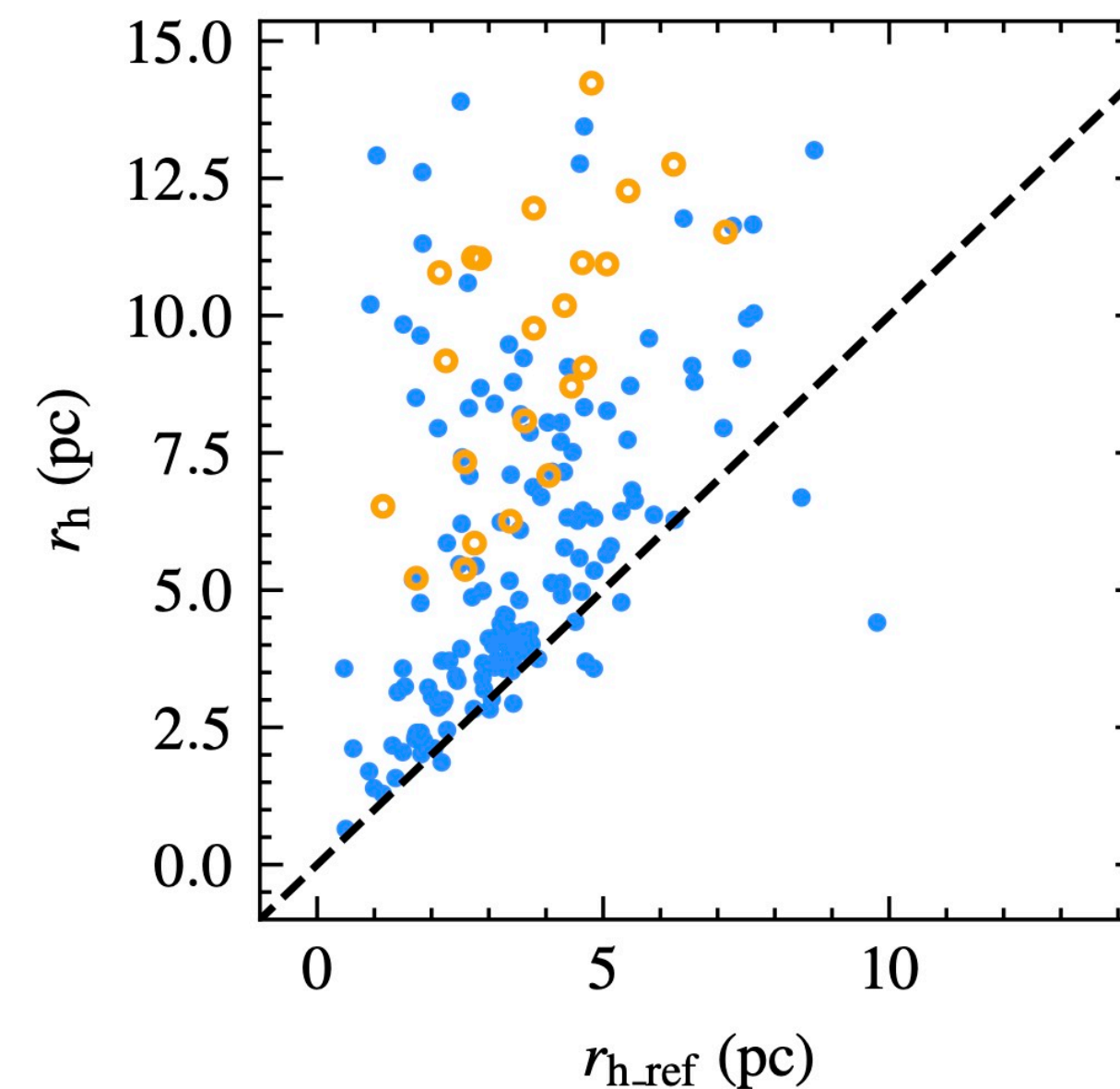
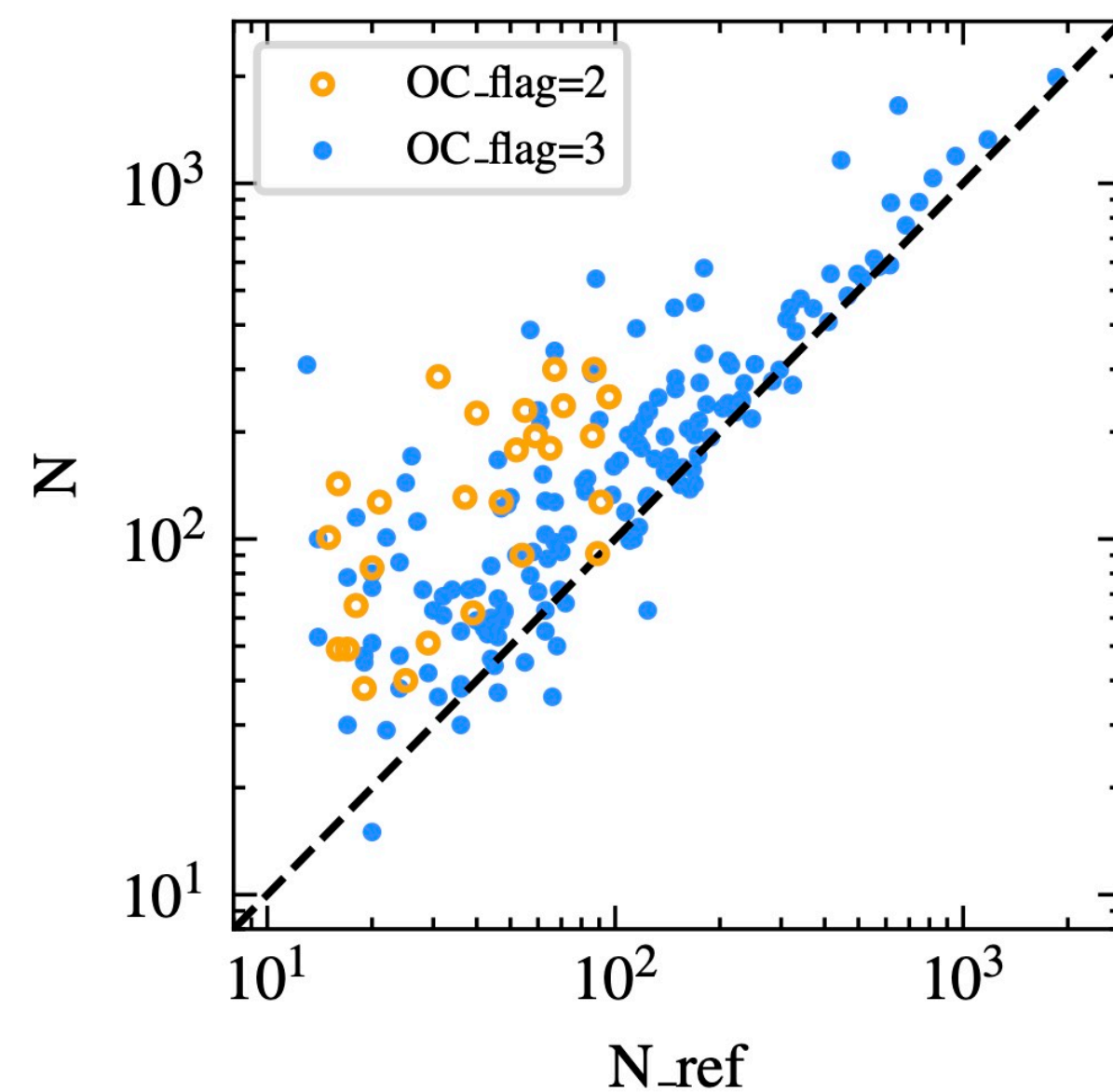
Larger spatial extents and more members!

1. Comparison with reported clusters, associations, moving groups.

2. Cluster and member catalog within 500 pc:

- Mean $l, b, \varpi, \mu_{\alpha}^*, \mu_{\delta}, rV$;
- Age, ebv , $m-M$ \longrightarrow isochrone fitting;
- Structural parameters \longrightarrow two-component model fitting.

3. Binary clusters: 19 pairs and 3 triple systems.



2023, ApJS, 265, 12



qinsongmei@shao.ac.cn