UWISH2

UWISH2 – Overview and Results

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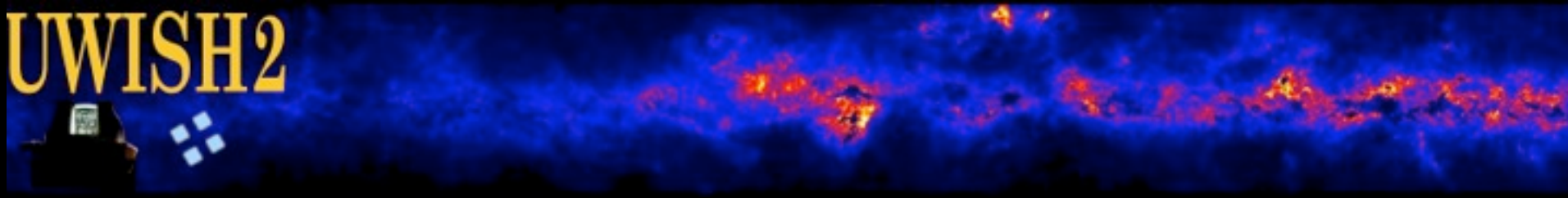


UKIRT Widefield Infrared Survey

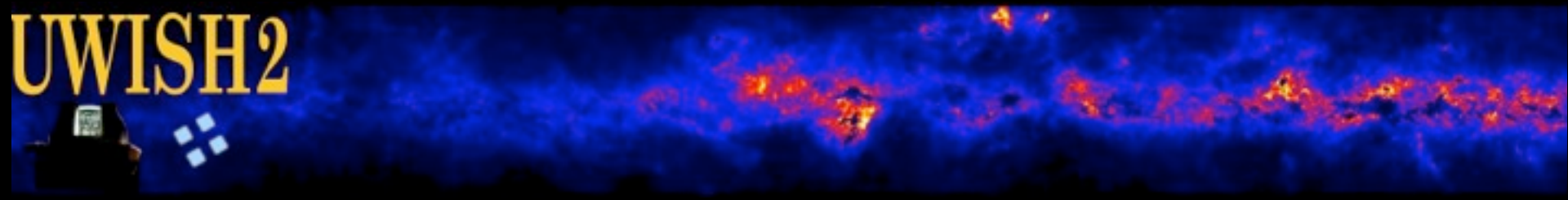
in 1-0 S(1) line of H2 at 2.122μm

7° < l < 65° ; -1.5° < b < +1.5°

~180 square degrees

All observations finished (since 17.8.2011)

All data now public, GPS K-band quality



SCIENTIFIC OBJECTIVES – What we (could) do

Jets and outflows from Protostars and YSOs

Variability ('substitute' K-band epoch for GPS)

Planetary Nebulae

Nearby dwarfs (via proper motions)

SNRs, HII regions, ...

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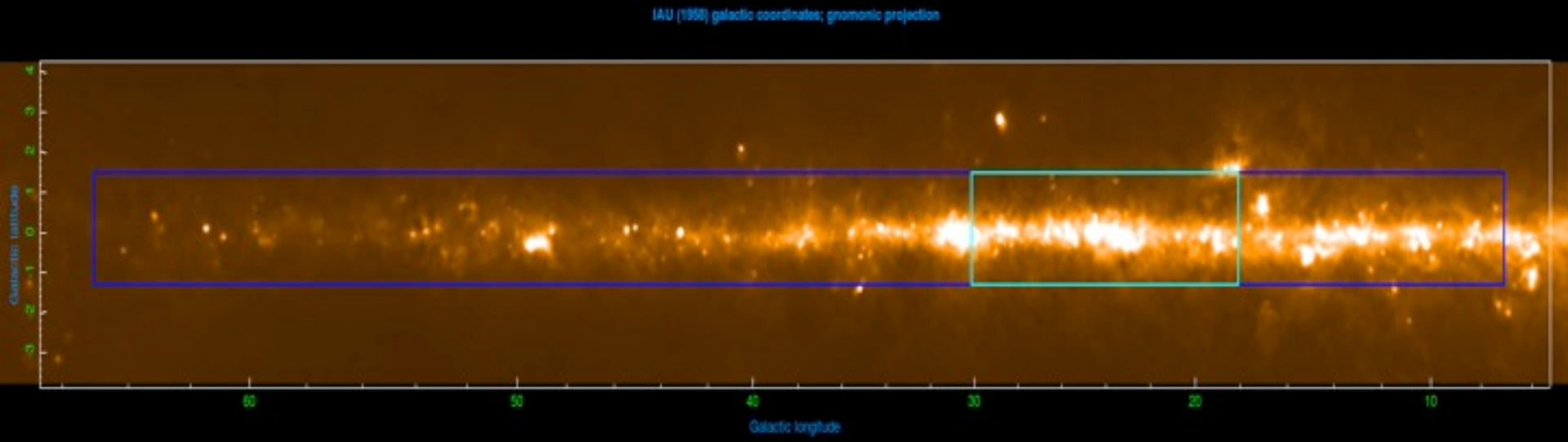
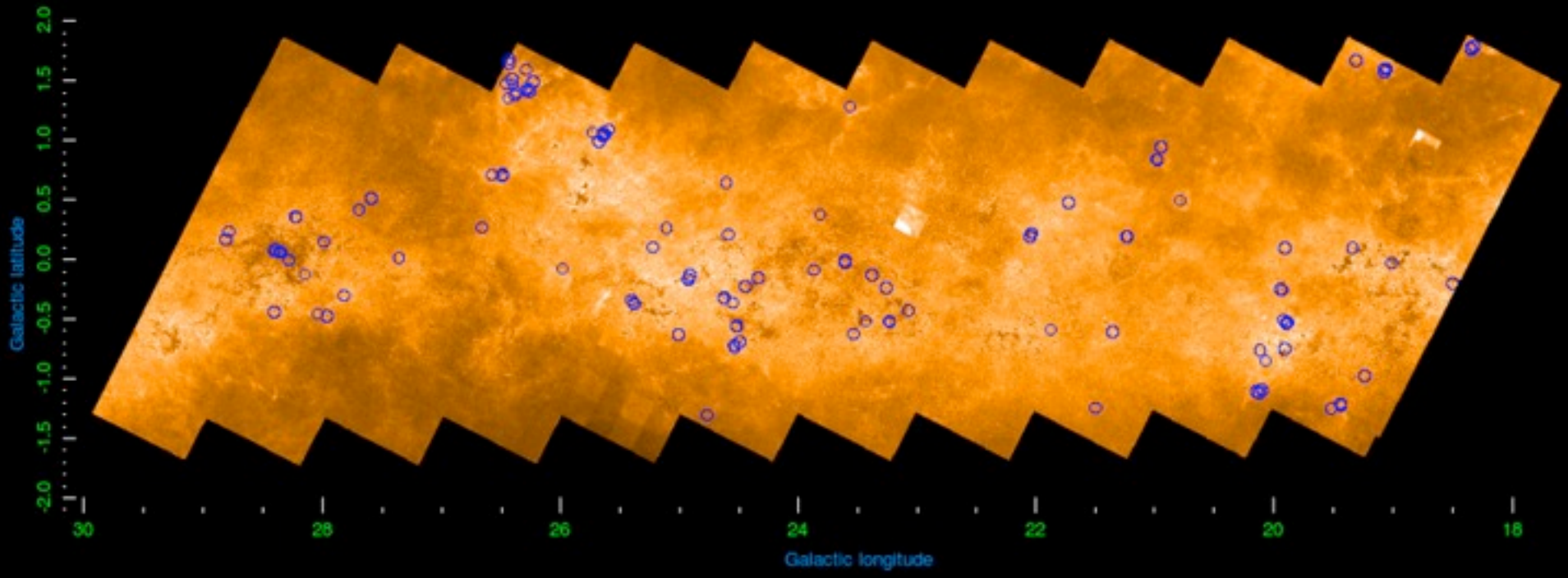
AREA SEARCHED FOR OUTFLOWS



Froebrich et al. (2011)
Ioannidis & Froebrich (2012)

UWISH2 ~ 180 square degrees
SEARCHED AREA ~ 33 square degrees

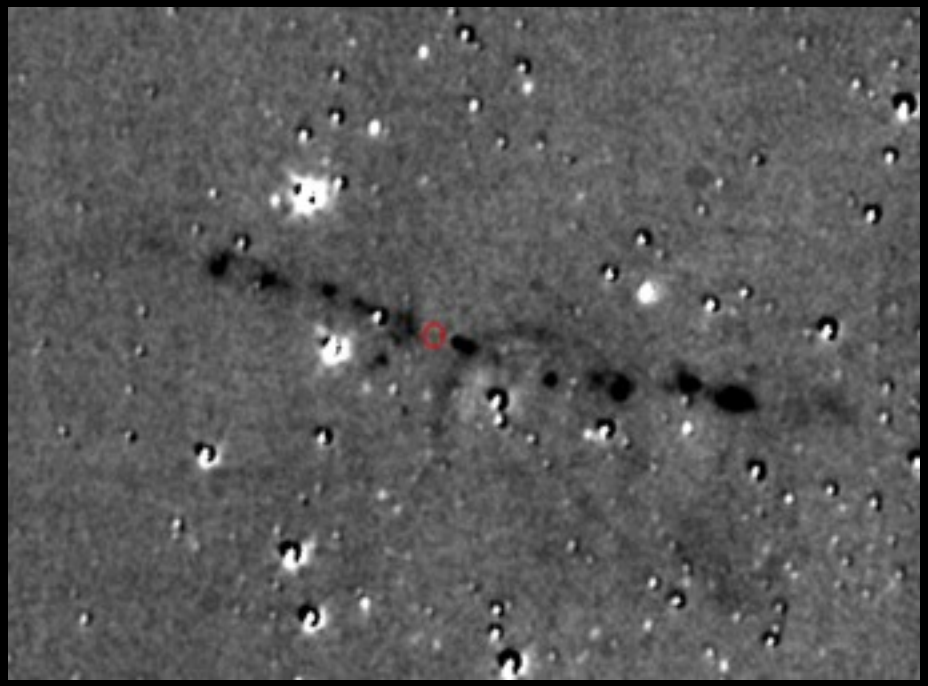
OUTFLOWS ON GPS A_V MAP



15 fold increase in number of known outflows
in Groups of a few (3-5) sources, with sizes of about 5pc

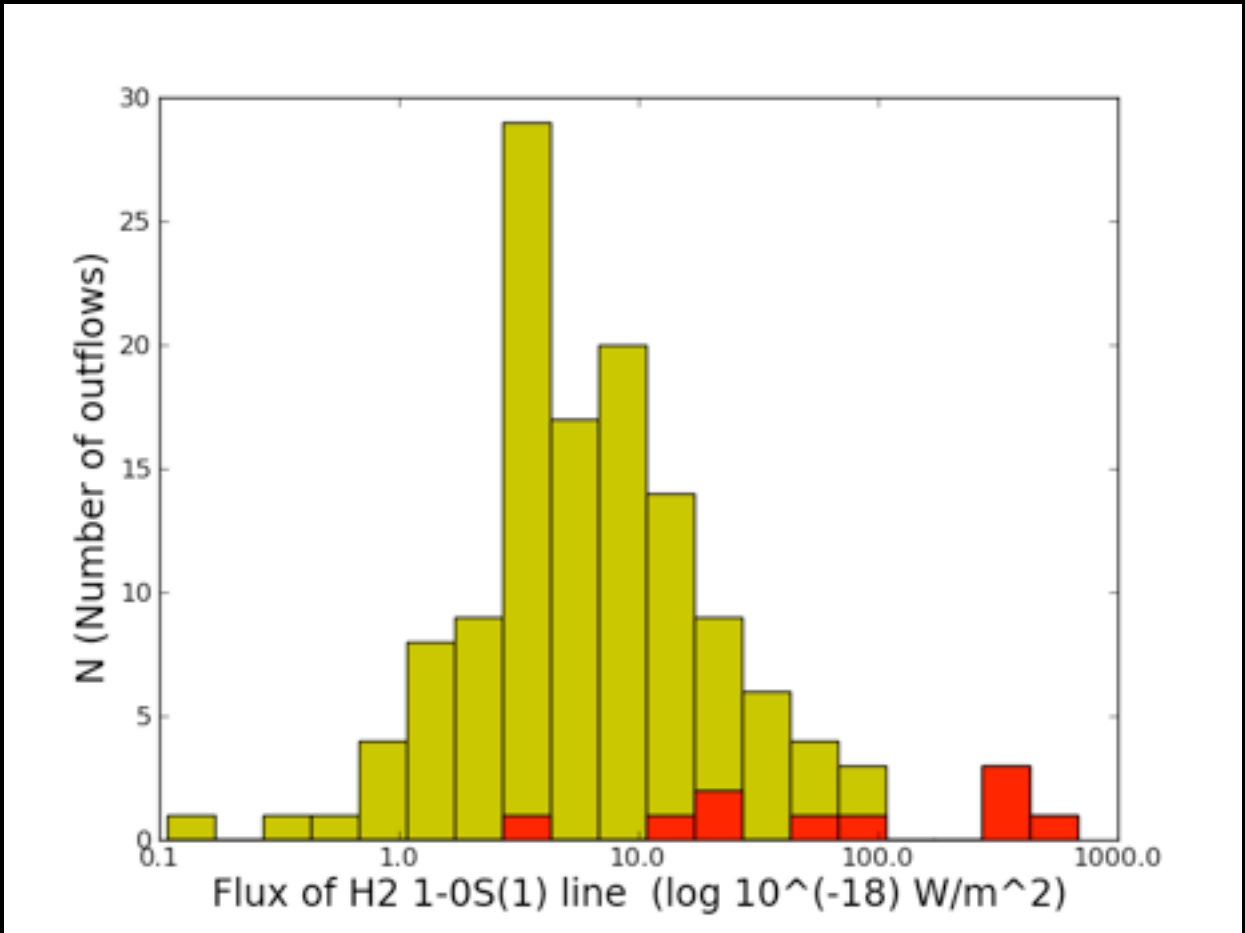
Ioannidis & Froebrich (2012)

SOURCES OF OUTFLOWS



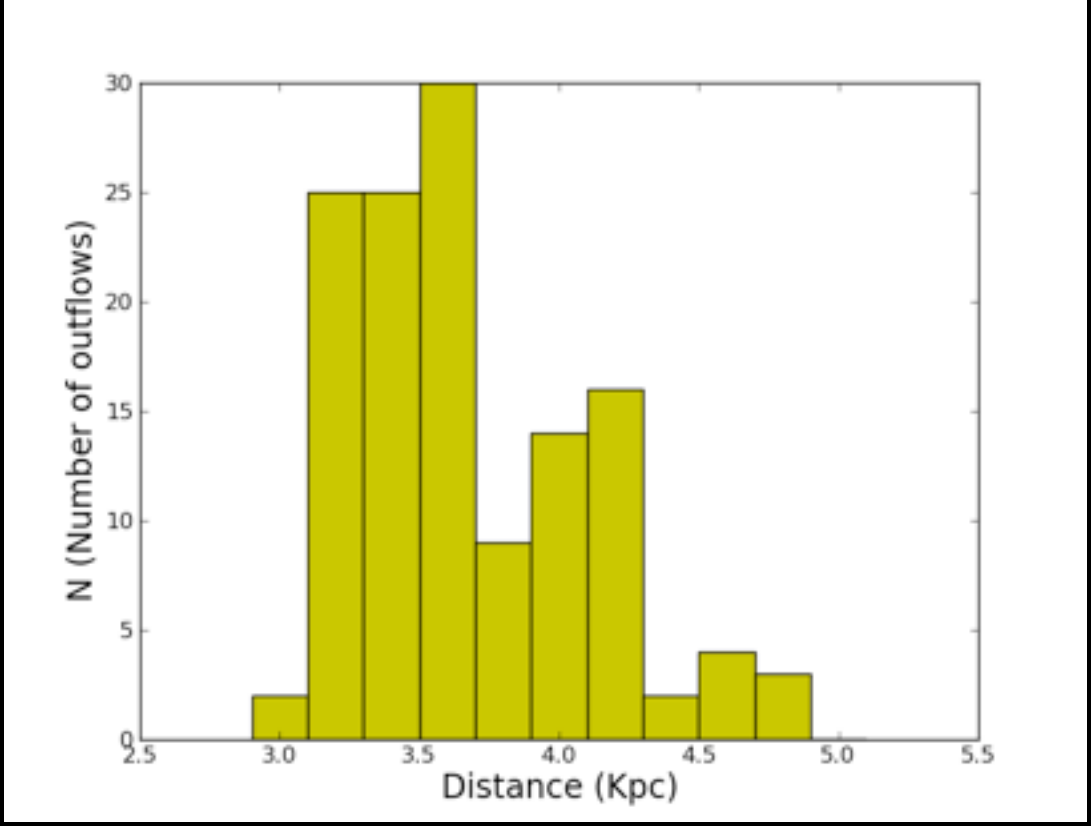
Glimpse, AKARI, K-band excess, K-band variability, literature,...
half of objects have a source candidate

Flux distribution



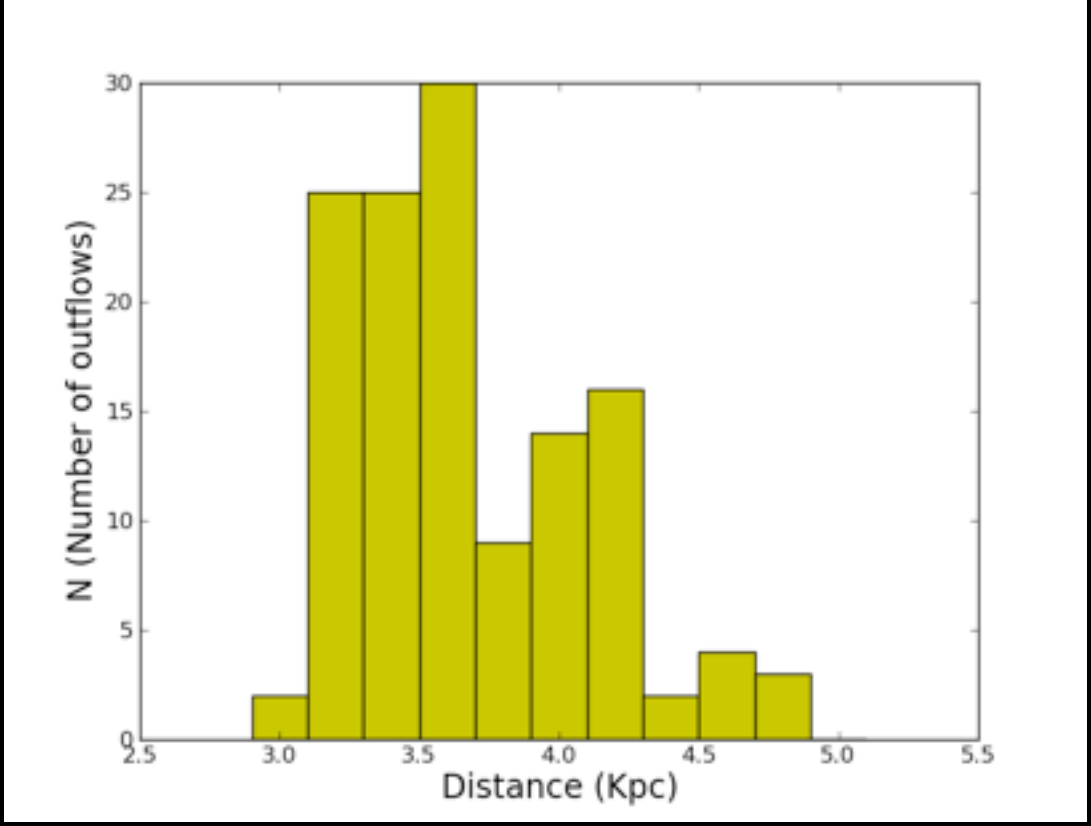
Completeness limit $3*10^{-18}Wm^{-2}$

DISTANCE CALCULATION (σ=25%)



Measure density of foreground stars
Compare to Besancon Galaxy model (Robin at al. 2003)
Calibration with RMS sources (Urquhart et al. 2008)

DISTANCE CALCULATION (σ=25%)



Completeness limit is 10^{-3} Lu at 5Kpc
That is HH211 behind A_K=1mag

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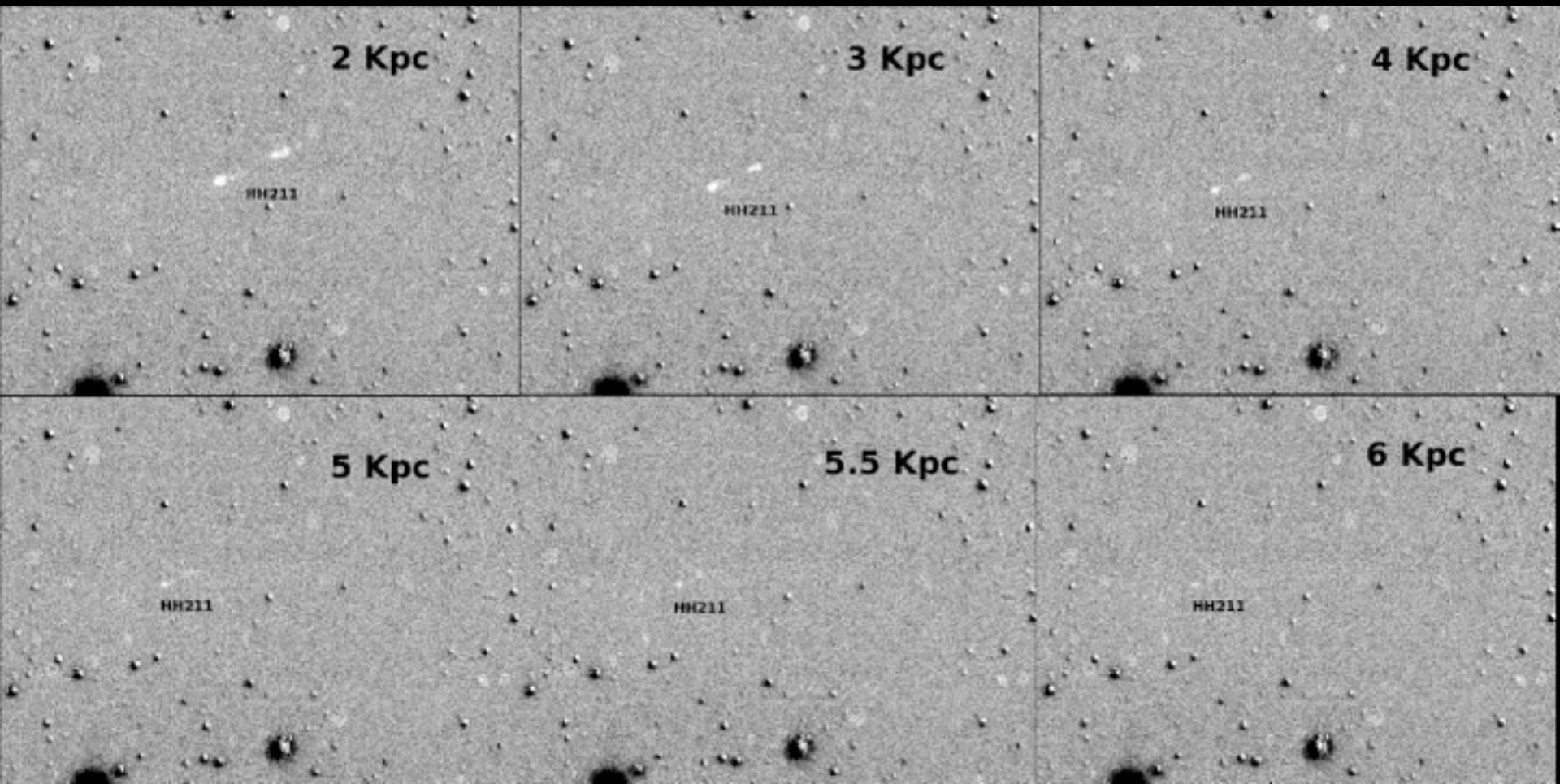
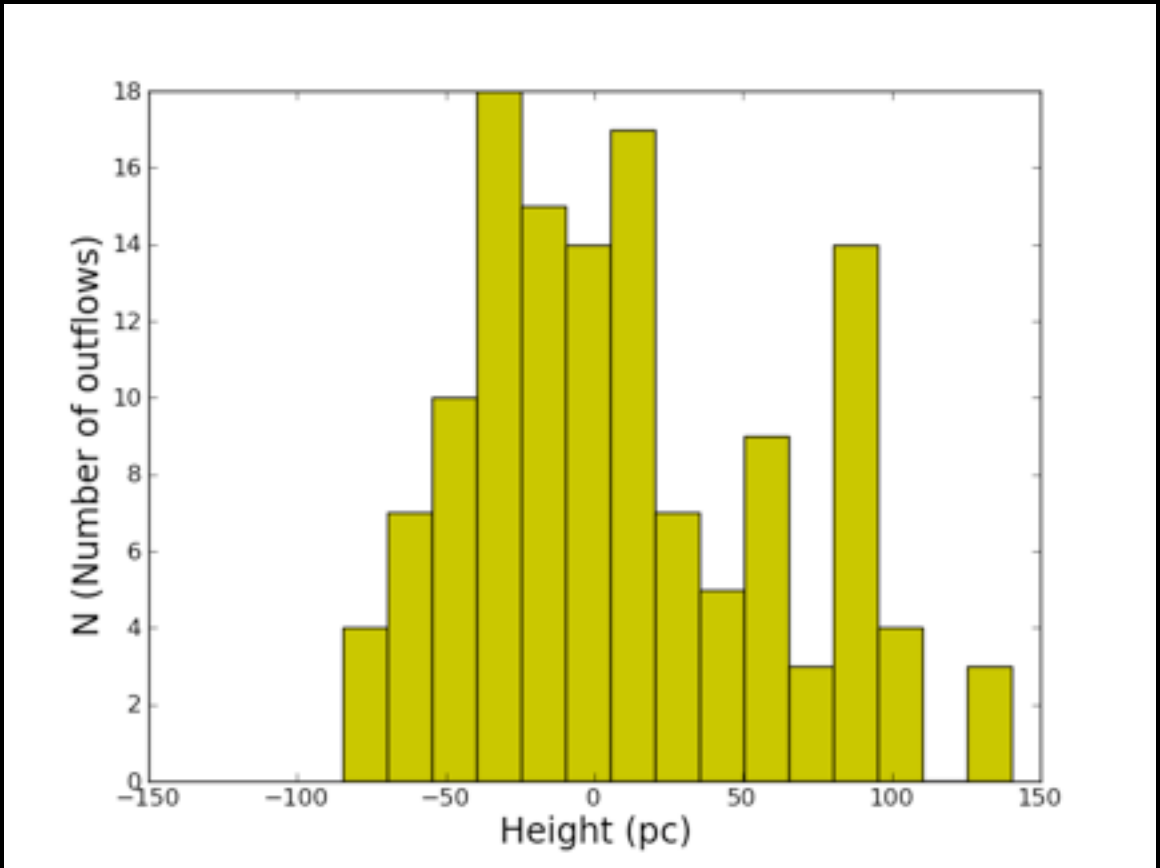
HH211 in our data

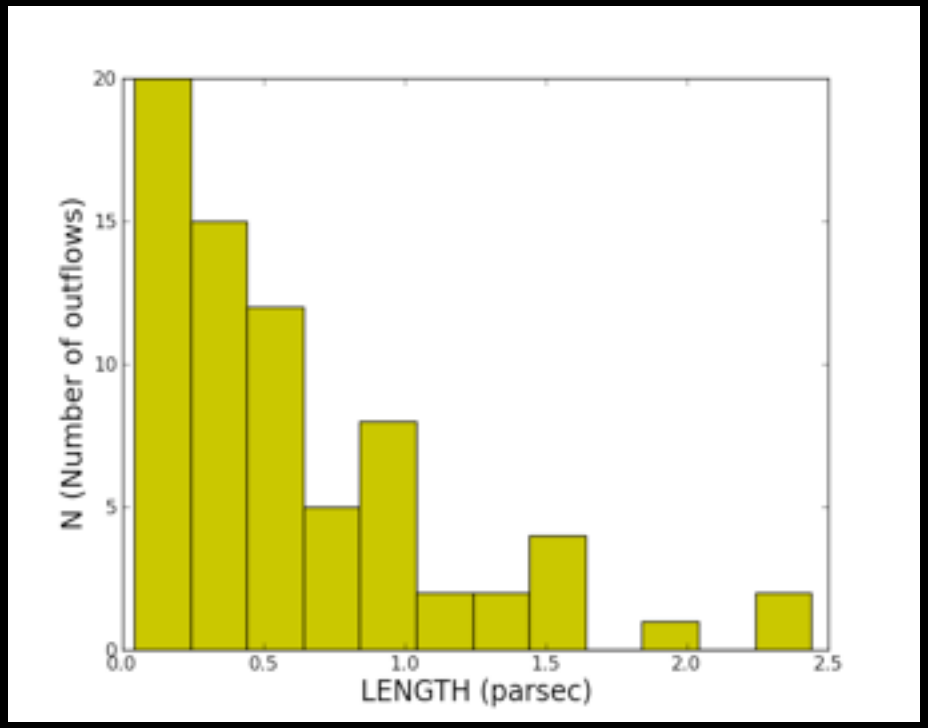


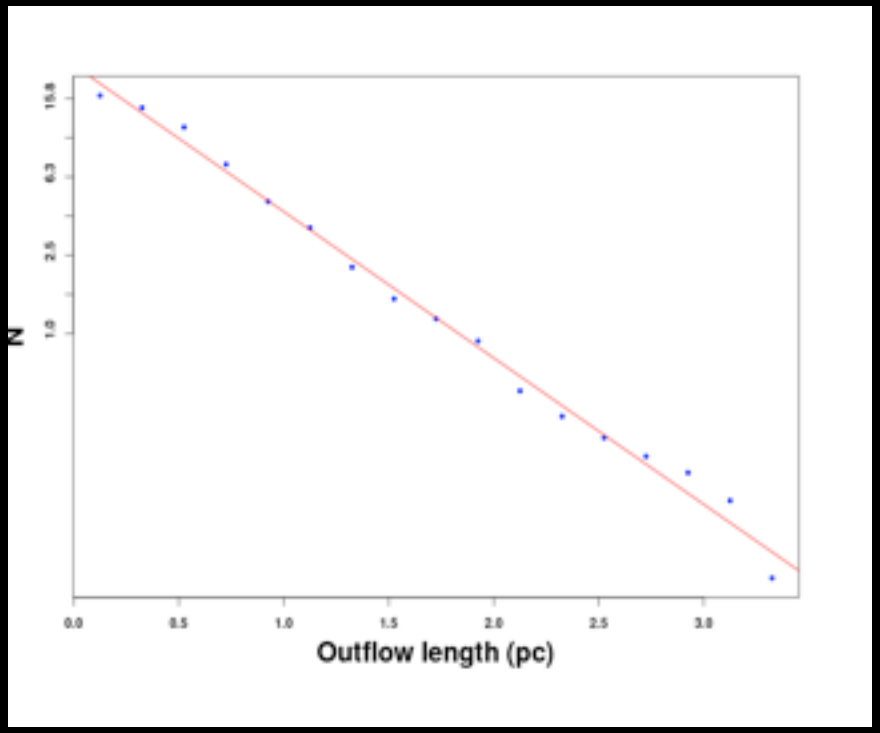
DISTANCE TO THE GALACTIC PLANE



Scale height 30 pc, like massive stars

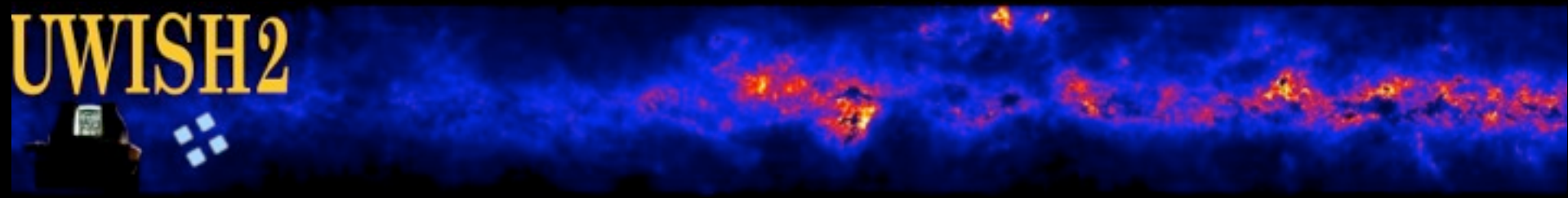
LENGTHS





Exponential relation between N and length: $N \propto 10^{-0.75\ l\ [pc]}$

¼ of objects are parsec scale



LENGTH DISTRIBUTION MODELLING

Variables:

- Velocity (0 – 150 km/s)
- Age (1000 – 30000 yrs)
- Inclination

Best fitting models:

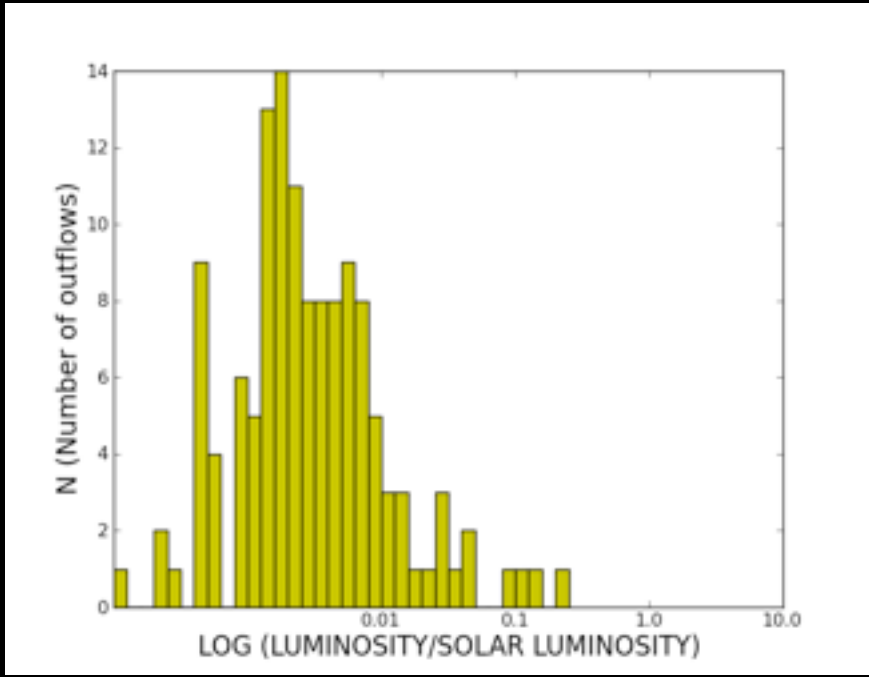
40 km/s – 130 km/s

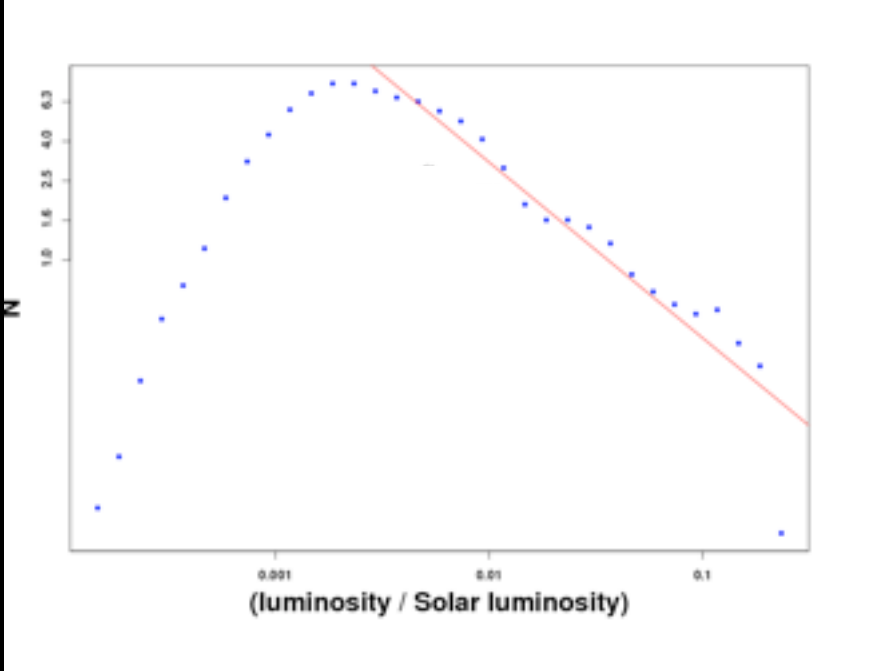
4000 yrs – 20000 yrs

20 degrees – 90 degrees

Young/old and very slow objects are not common in our sample.

LUMINOSITY





$N \propto L^{-1.9\pm0.2}$ $\dot{M} \propto M^{-1.3\pm0.2}$ MW SFR ~ 2Mu yr^{-1}

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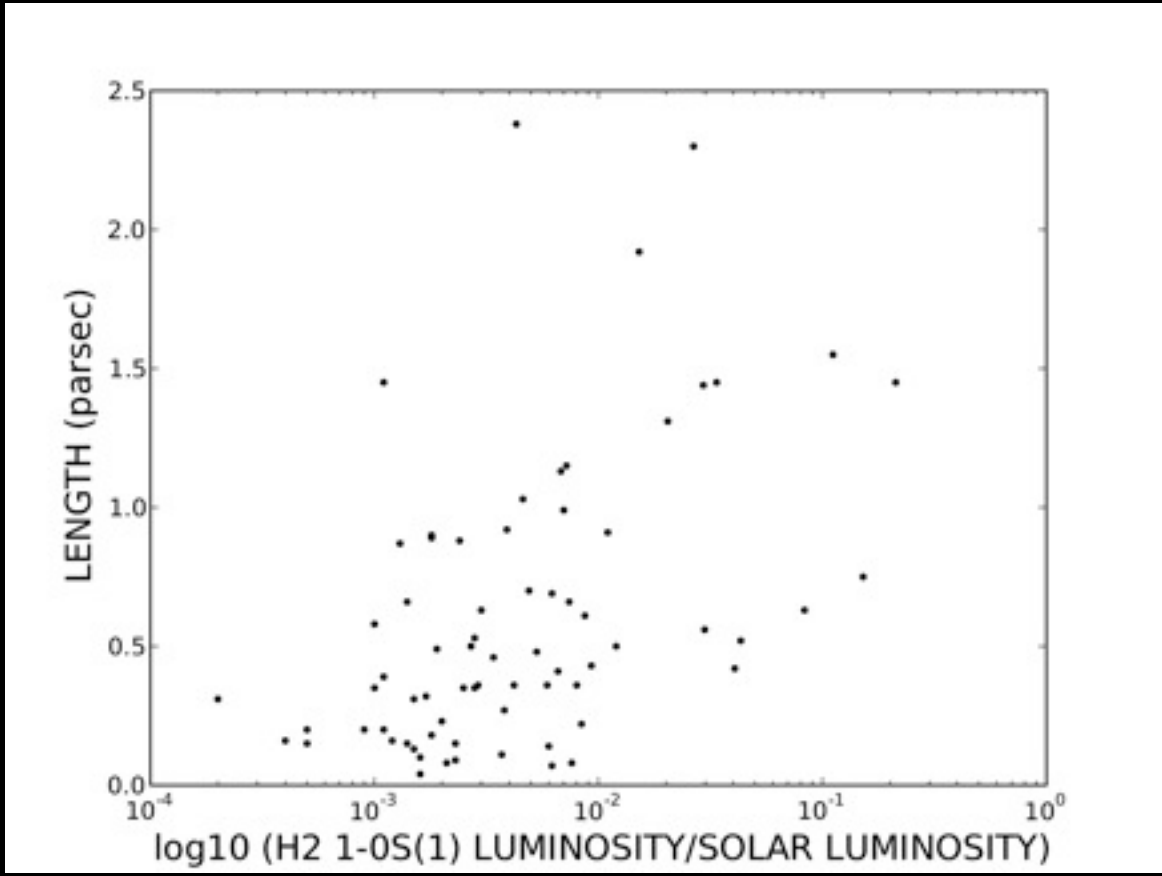
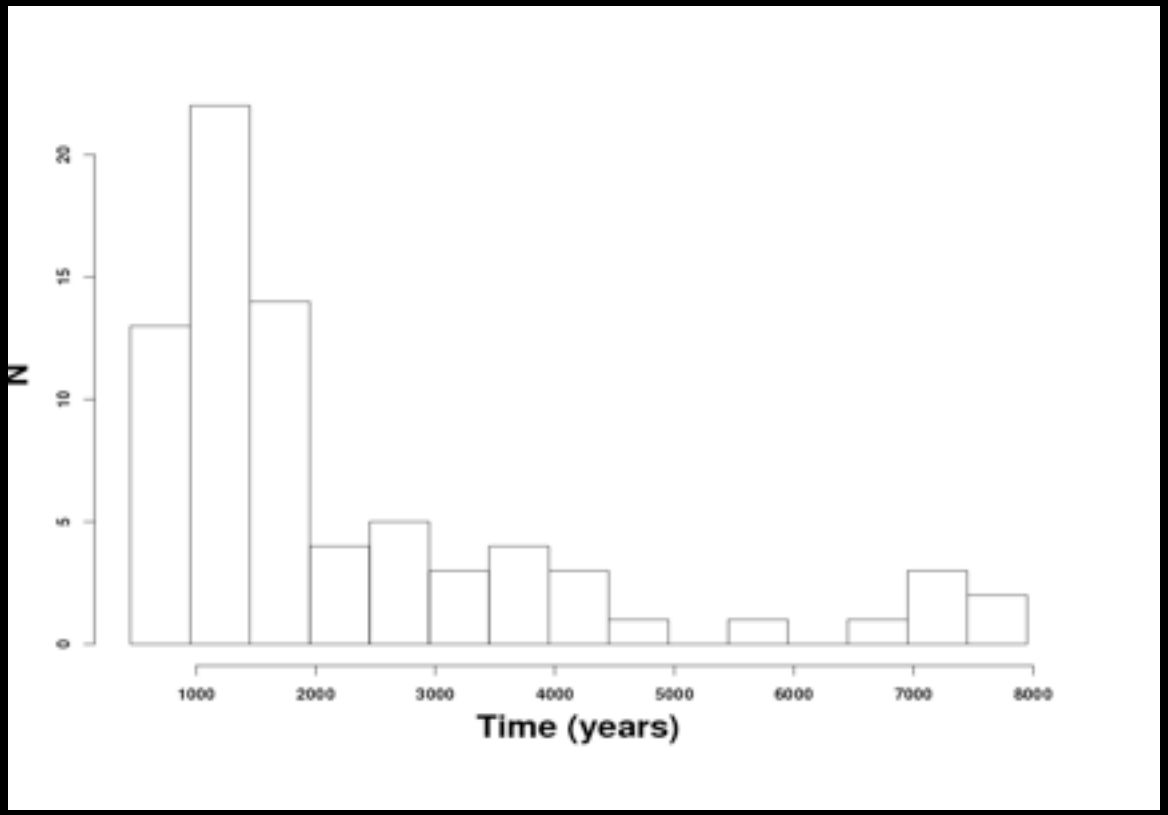
Luminosity vs Lengths

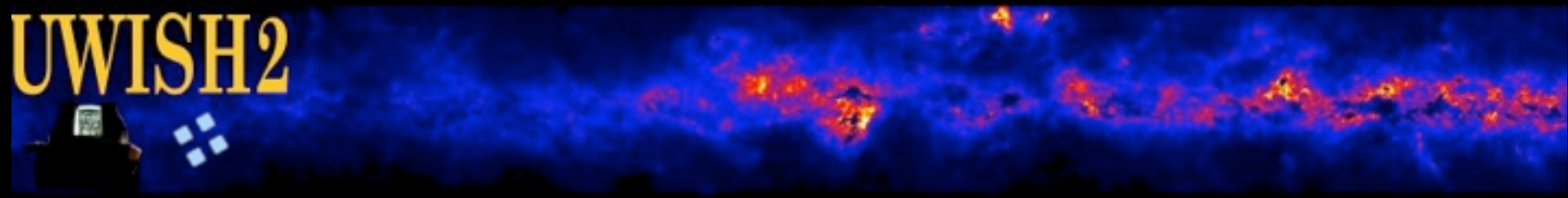


Brighter Outflows are Longer, environment not dominant

Time Gap between mass ejections

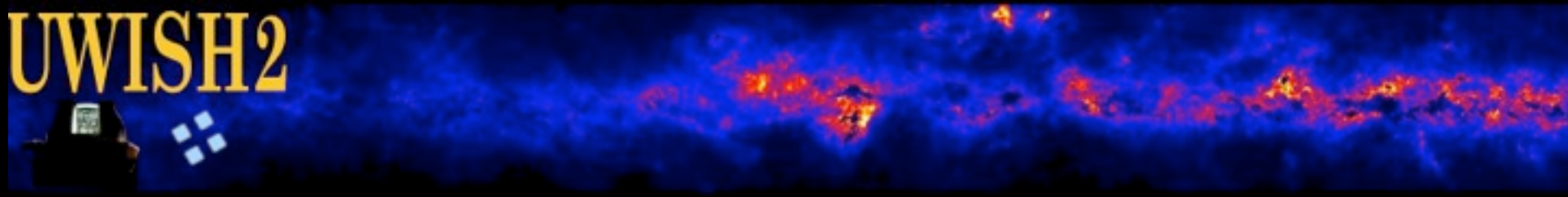


typically 1000yrs, ~10% fraction of jet lifetime
<< than FU-Ori duty cycle?



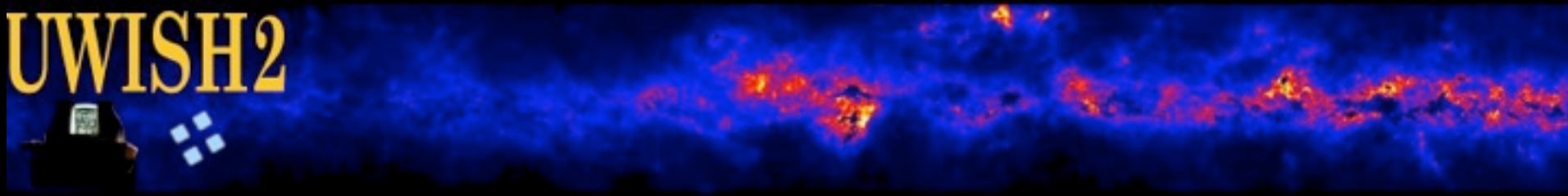
WORK IN PROGRESS

- Fraction of sources with jets/outflows - duration of the jet/outflow phase in YSO evolution 21/245 in Robitaille list
- Source properties (mass, luminosity, age, accretion rates) younger, higher mass accretion rates
- How do jet properties relate to source properties? no L_{bol} vs L_{H2} correlation
- Simulate simultaneously length, luminosities and gaps to constrain mass ejection scenarios.



FUTURE WORK

- Cloud properties (mass, structure)
- Associate outflows with cloud cores – what percentage of clouds show active forming areas
- Is the star formation (with jets) isolated or clustered?
- How is YSO variability (outbursts) linked to jets/outflows?



FUTURE WORK

EXTEND THIS WORK TO

THE ENTIRE UWISH2 SURVEY

and UWIFE?