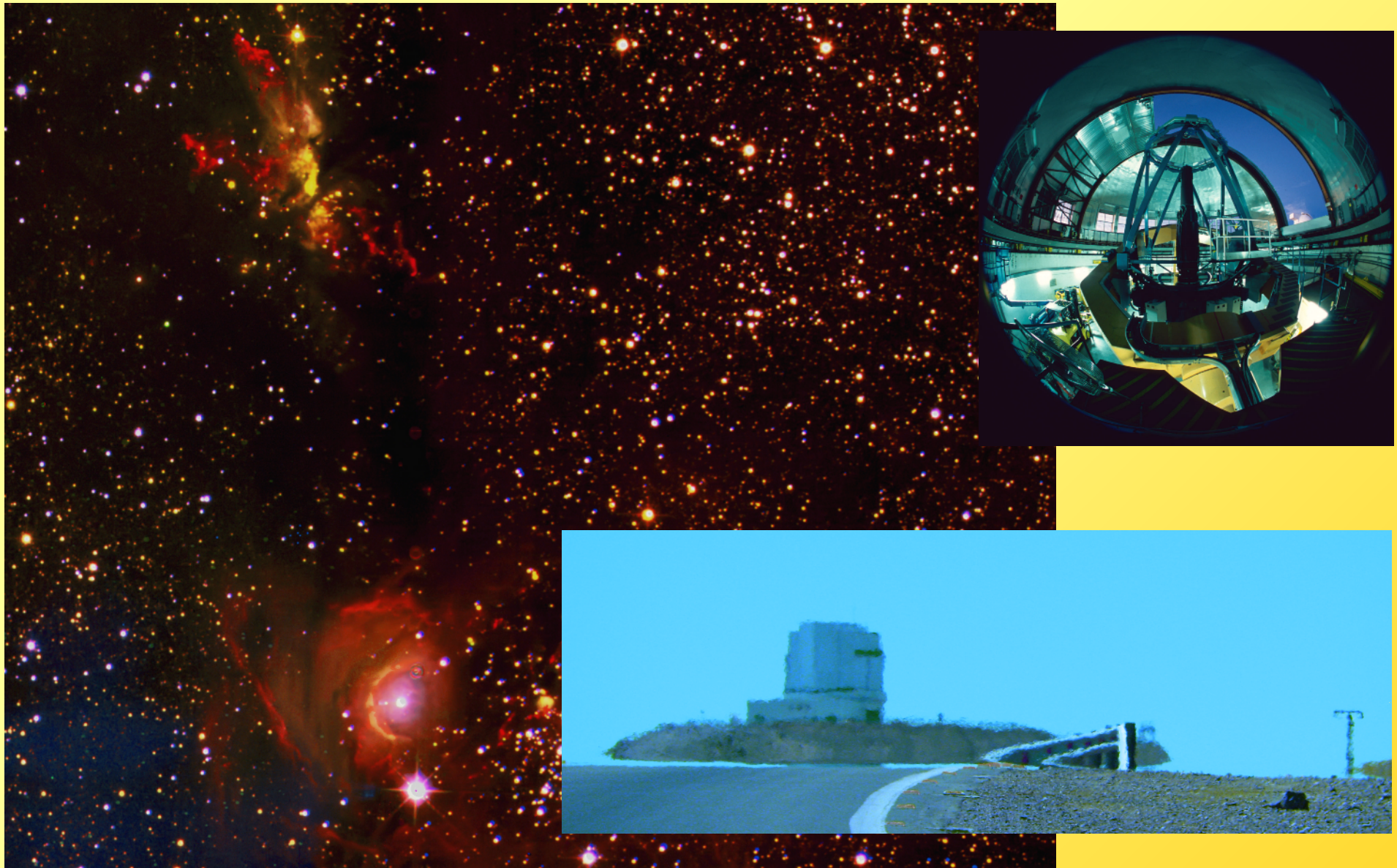


UWISH2 go(es) south (?)

B. Stecklum (TLS), D. Froebrich (CAPS), Ch. Davis (LJMU) & UWISH2 collaboration



UWISH2

TLS

UWISH2 - UKIRT Wide-field Infrared Survey

in 1-0 S(1) line of H₂ at 2.122 μ m using WFCAM

720 sec/pixel, 5 σ point source detection limit \sim 18 mag

$7^\circ < l < 65^\circ$; $|b| < 1.5^\circ$, $\sim 180^\circ$ (GLIMPSE-N), sub-arcsec

Continuum subtraction using UKIDSS K-band images

All observations finished (since 17.08.2011)

All data now public, accessible via WFCAM science archive



SCIENTIFIC OBJECTIVES – What we (could) do

Jets and outflows from Protostars and YSOs

Variability (‘substitute’ K-band epoch for GPS)

AGB stars and Planetary Nebulae

Nearby dwarf stars (via proper motions)

SNRs, HII regions, PDRs, ...

SCIENTIFIC OBJECTIVES – Star Formation

Jet structure and accretion variability
(stochastic behavior, long-term trends)

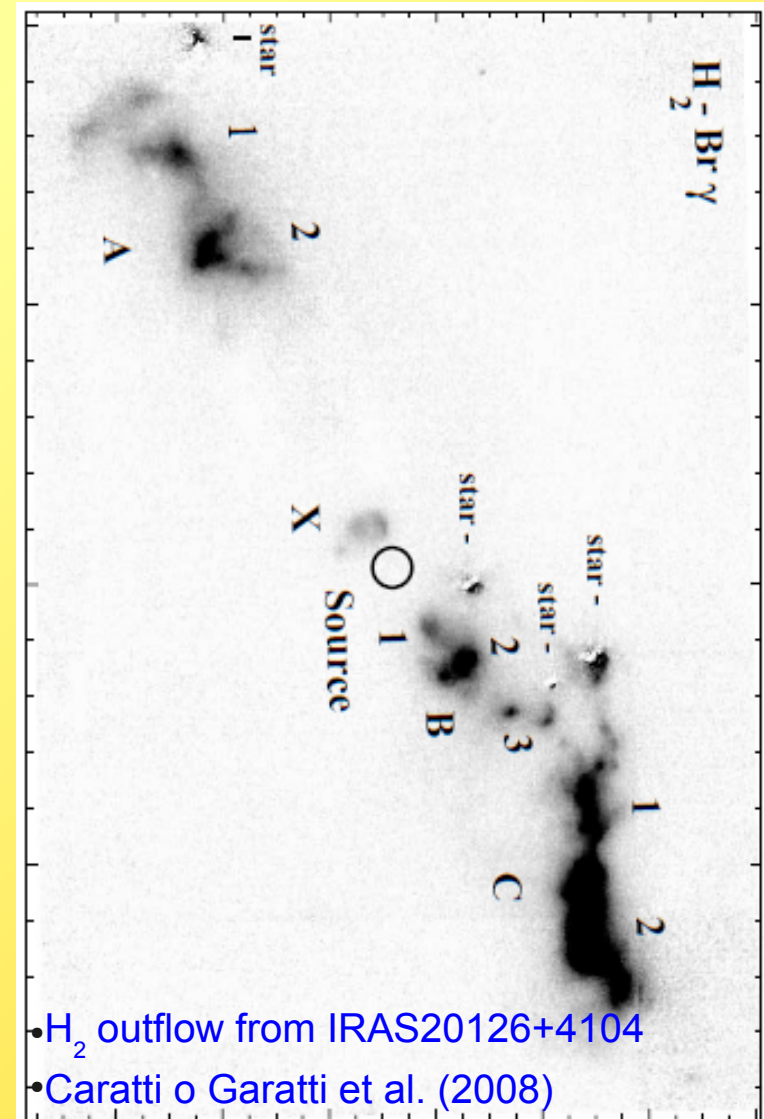
Jet collimation, mass load, and B-field

Identification of driving sources via jet
proper motion

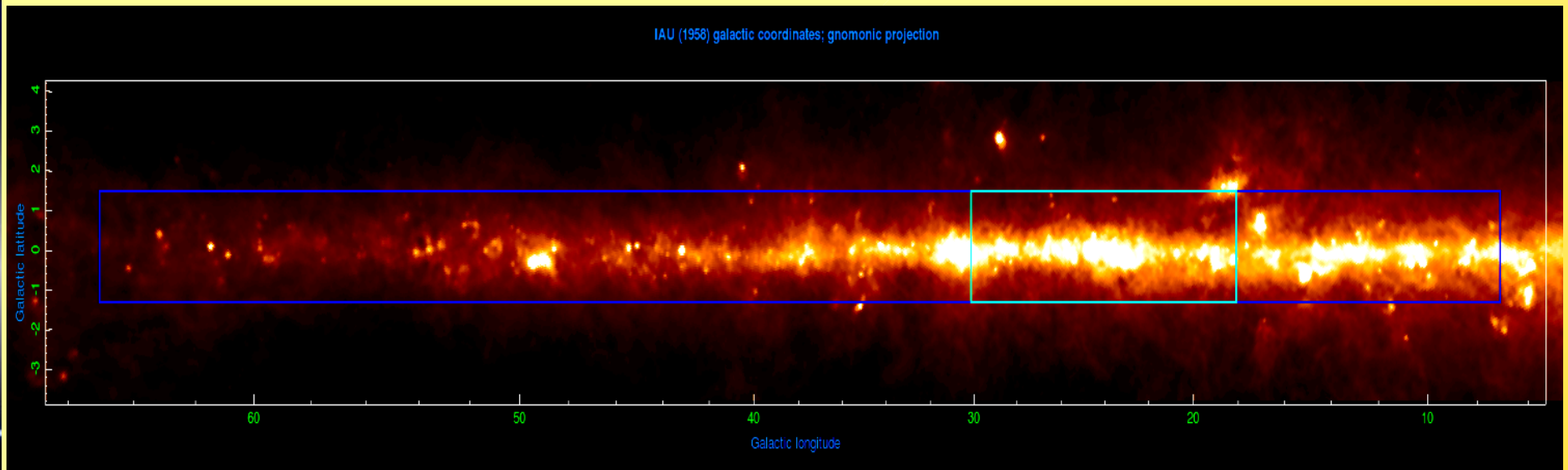
Revealing protostellar multiplicity via
outflow precession

Triggering of star formation

Energy and momentum transfer to the
ISM



AREA SEARCHED FOR OUTFLOWS



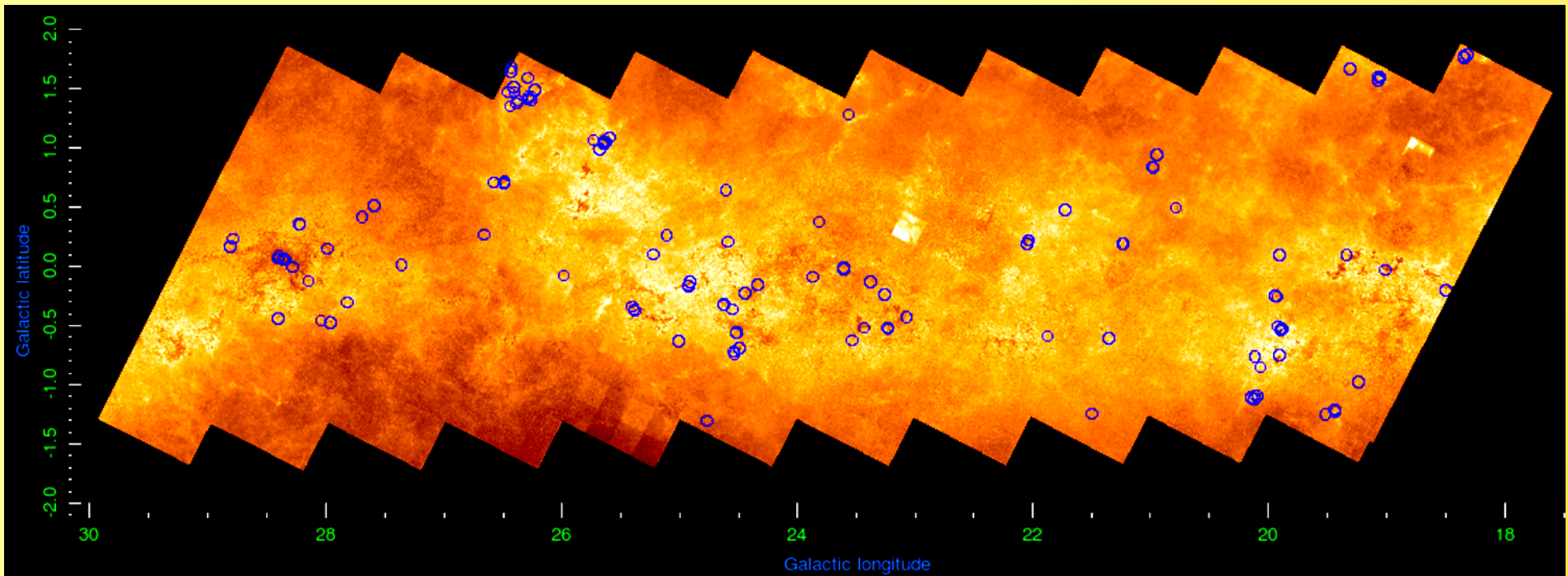
background image IRAS 100 μ m

Froebrich et al. (2011)

Ioannidis & Froebrich (2012ab)

UWISH2 ~ 180 square degrees
 searched area (so far) ~ 33 square degrees

OUTFLOWS ON UKIDSS GPS A_V MAP

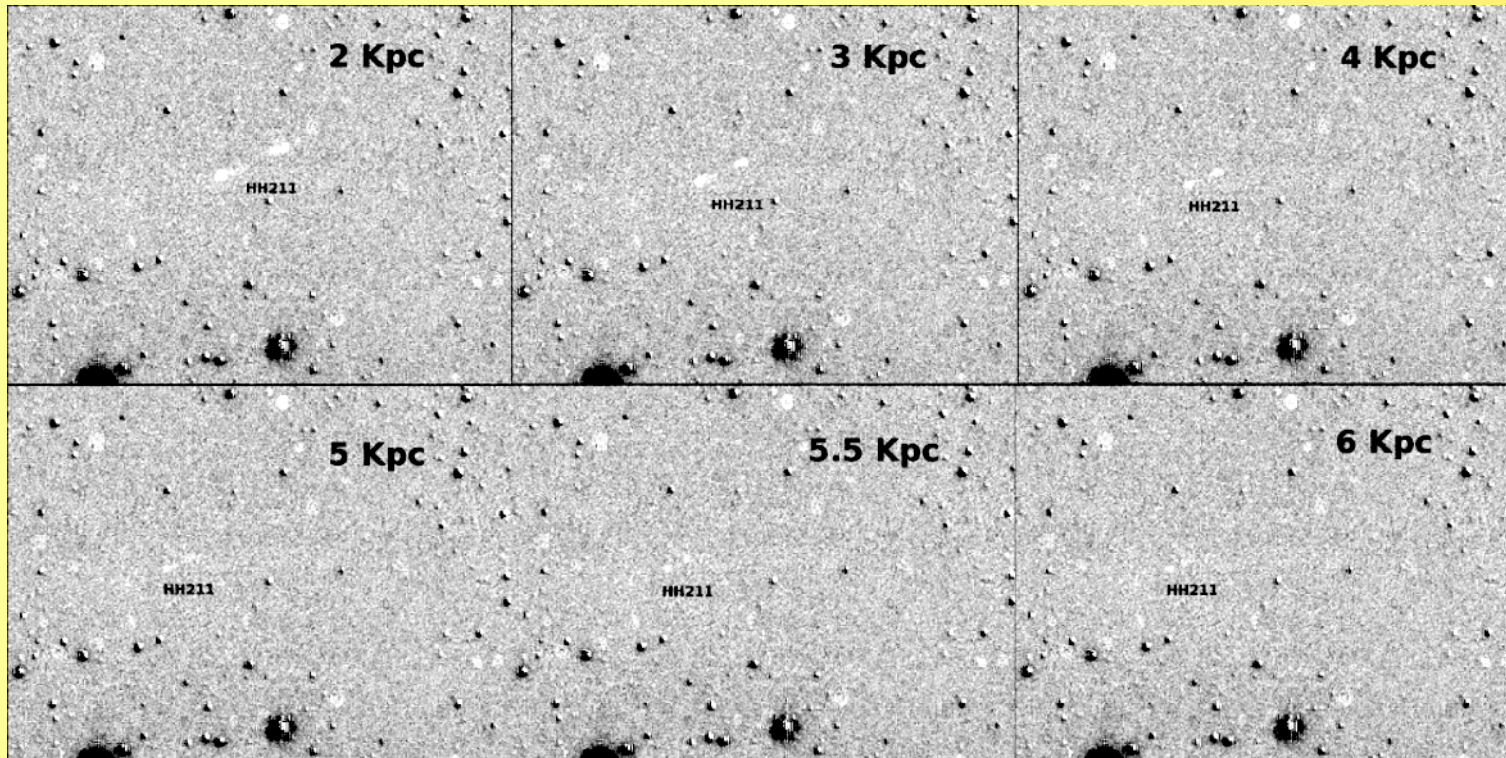
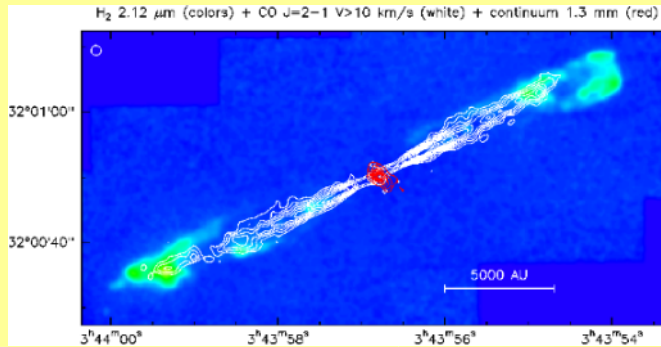


Ioannidis & Froebrich (2012ab)

15 fold increase in number of known outflows
in groups of a few (3-5) sources, with sizes of about 5pc
Scale height of the flows ~ 30 pc

UWISH2 detection limits

Moving the proto-type outflow HH211 away



HH211-like flows can be traced at galactocentric distances between 3 and 13kpc

UWISH2 Northern Galactic Plane Extension

UWISH2-E: UKIRT Widefield Infrared Survey for H₂ - Extended

Froebrich et al.

UWISH2-E: UKIRT Widefield Infrared Survey for H₂ - Extended

Team Members:

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Georgios Ioannidis, University of Kent, UK
Phillip W. Lucas, University of Hertfordshire, UK
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Alexander Scholz, Dublin Institute for Advanced Studies, Ireland
Bon-Chul Koo, Seoul National University, South Korea
Hiro Takami, Academia Sinica, Taiwan
Jochen Eislöffel, Thuringian State Observatory Tautenburg, Germany
Watson P. Varricatt, Joint Astronomy Centre, USA
+ UWISH2 survey team

Abstract:

We plan to extend our successful H₂ imaging program (UWISH2¹, U/09B/8) along the entire Galactic Plane visible from UKIRT and to selected areas in nearby star forming regions. Besides its immense legacy potential, the new dataset will be used in three main ways: a) Investigate the properties of jets and outflows as a function of Galactic environment (different densities and metallicities; clustered, isolated, triggered star forming regions). We can probe objects between 3 kpc and 13 kpc from the Galactic Centre, and will obtain a complete sample of HH 211-like outflows for 5% of the entire Galaxy. The volume of the Galaxy accessible to us will be almost 4times larger than for UWISH2. b) We will measure proper motions of all outflows in nearby star forming regions such as Taurus, Perseus and Orion. These will provide homogeneous measurements of proper motion distributions and hence jet energetics to aid our understanding of the feedback they provide to the ISM. c) Search for K-band variable eruptive young stellar objects (e.g. FU-Ori stars). Our data will be used as 3rd epoch for the GPS, and doubles the probability of detecting eruptive events in the proposed area. In total we apply for 43 nights of observing time, homogeneously spread out over the proposal period. Thus, with moderate telescope time this proposal will significantly increase the impact of our existing UKIRT data.

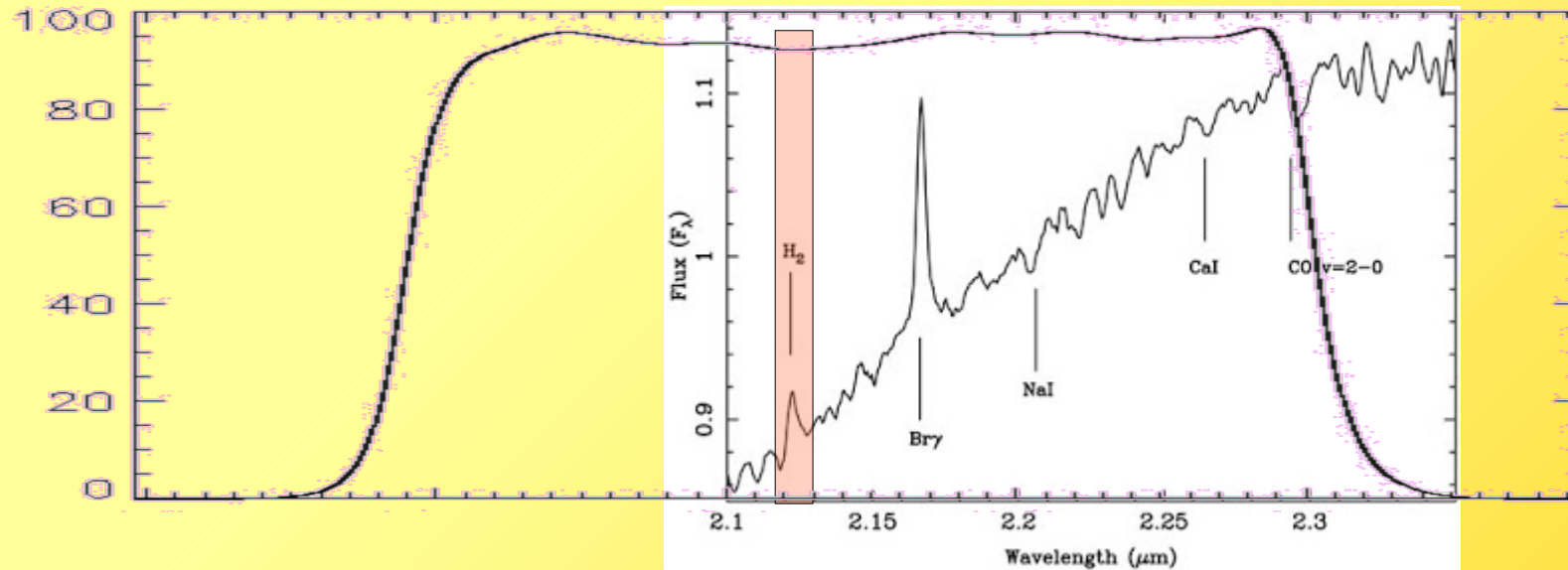
longitude ranges 358°–8°, 65°–107°, and 142°–230° at $|b| \leq 0.8^\circ$

Synergies from combining broad- and NB surveys

Better source characterization

K(s) band for continuum subtraction

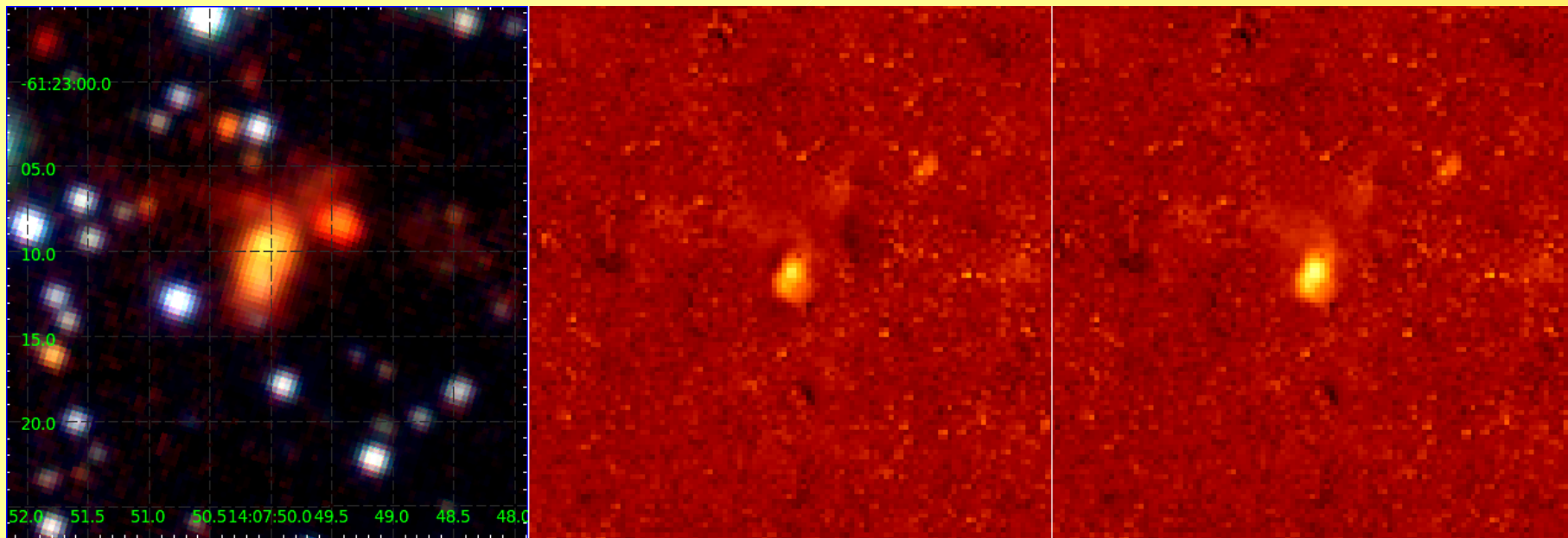
But...



2.1-2.35 μm region of the NIR spectrum of the EXOR V1647 Ori (Aspin et al. 2008) with Ks-band transmission curve

Synergies from combining JHK- and H2 surveys

Improved continuum subtraction using
chromatic correction from H-K color index



Left: VVV JHKs image of Caswell H2O 311.95+00.14

Center: straight subtraction of NTT H2 and Ks images

Right: improved subtraction

We wish to go south – Implementation of the southern H2 GPS

Utilizing VISTA hardware & data infrastructure

Match UWISH2/E data quality for a consistent sky coverage

Employing advanced data reduction (continuum, PSF subtraction)

Possible survey strategy: 2 steps

Inner GP – VVV “extension” (~20 nights)

Remaining area standalone (VISGAPS?, ~30 nights)

For less extincted regions VPHAS will be complementary. Available GPS surveys, e.g. GLIMPSE360, ATLASGAL, Hi-GAL, MMB, will allow us a firm source characterization.

A southern UKIDDS-GPS complement would be ideal...

We wish to go south – An H2 filter set for VISTA



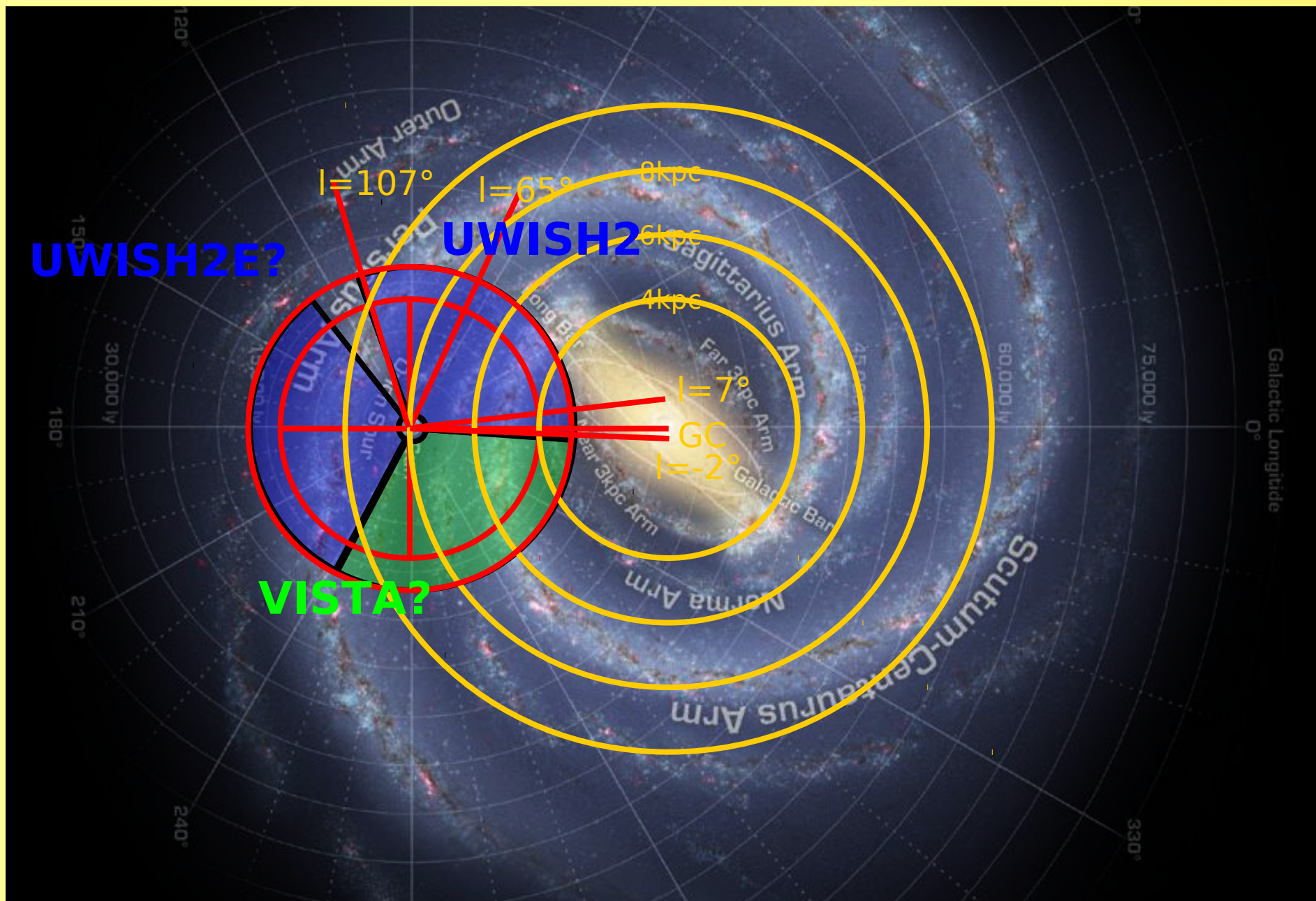
Partially funded by the project
 “The impact of protostellar outflows on the
 interstellar matter”
 within the DFG Priority Program 1573
 “Physics of the Interstellar Medium”



Partial funding from the budget of the
 Thüringer Landessternwarte

Remaining costs need to be covered by European/international consortium.

Galactic plane coverage of the combined H2 surveys



VISTA in the era of large synoptic surveys

Multi-color time-resolved photometry is required to reveal the underlying physics of variability.

Multi-epoch observations yield proper motions & parallaxes.

For red(dened) objects VISTA will be superior to LSST.



The unique wide-field NIR imaging capability of VISTA may carry a high yield for years to come.

Getting interested, want to participate ?

Send email to

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bstecklum@gmail.com

“We are in the middle of a golden age for surveys of our Galaxy”
(Binney, 2011)

