The Outflow from IRAS17233-3606

Pamela Klaassen
Katherine Johnston
Luis Zapata
Silvia Leurini

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The overall concept

• We’re used to the paradigm in which each outflow can *and should* be traced back to each powering source.

• But what if massive stars are conspiring against us?

• what if they’re coming together (because of their common potential well), and creating one large scale structure between them?
IRAS 17233-3606

Zapata et al. 2008

Region of Interest

- $10^{4.2} \text{ L}_\text{sun}$
- 1 kpc
- Multiple HII regions

$1" = 1000 \text{ au}$
IRAS 17233-3606

Leurini et al. 2011

- $10^{4.2} \text{ L}_\odot$
- 1 kpc
- Multiple HII regions
- Multiple Outflows?
JVLA Observations

- CnD configuration
- 43/48 GHz
- 2.8x1.7” beam
- part of larger sample
- still working on them!

averaged uv plane spectra
The single outflow

- We’re used to the paradigm in which each outflow can *and* should be traced back to each powering source.

- I’m going to step through the data to show you why I think there’s only one outflow, despite the presence of multiple HII regions

- SiO
  - With help from previously published CO

- CS
SiO - outflow shocks

- Blue in the north, red in the south
- Appears to be two distinct velocity components in each region
SiO - outflow shocks

- decomposing the spectra into two components
  - high v, high $\Delta v$
  - low v, low $\Delta v$
- Which component dominates depends on area chosen
SiO - outflow shocks

- Blue in the north, red in the south
- Appears to be two distinct velocity components in each region

SiO first moment map with 48 GHz contin. contours

15GHz contin. contours
The entrained outflow

Leurini+ 2011  Colour scales: high velocity CS emission
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Starting Simple: Blue

- HV SiO ‘jet’ in the centre
- CS & CO fill the cavity
- LV SiO lines edge of wall
- EHV CO has made it out of the envelope
  - Where A$_v$ drops, and H$_2$ is detectable
Accepting that, what’s the red lobe doing?

- It’s doing the same thing, but has been able to escape the envelope ‘earlier’
- Shortening the ‘right’ side

grey contours -> =  <- red contours
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Comparing to Models

- multiple stars forming from a single accretion flow
- coupled outflow & radiative feedback
- outflows tend to preferentially align themselves
Conclusions

• clusters of HM stars likely influence each other

• their outflows may align

• causing only 1 large structure to be seen

• the individual contributions can’t even be distinguished in models
The ‘Third’ Outflow

• ~perpendicular to primary outflow direction

• due to a combination of outflow & rotating core motions
Larger Scale Structure

- $\text{N}_2\text{H}^+$
- MOPRA observations
- outflow indicated near bottom of IRDC

Leurini et al. 2011