RevMexAA (Serie de Conferencias), **49**, 111–111 (2017)

NGC 6334 V REVISITED: THE COMPLEX NATURE OF THE INFRARED NEBULA

M. Tapia[1], P. Persi[2], and M. Roth[3]

XV Latin American Regional IAU Meeting (Cartagena de Indias, Colombia, 3-7 October 2016)
Editors: Mario Armando Higuera Garzón & Santiago Vargas Domínguez

A comprehensive analysis is presented of the most recent infrared observations of the small, very young and enigmatic infrared nebula associated with NGC 6334-V. We reanalized images from the Spitzer/IRAC (3.6 a 8 μm), Herschel/SPIRE/PACS (70 a 500 μm), VISTA (1.2 a 2.2 μm), VLT/VISIR (11.3 a 18.7 μm) and HST/NICMOS (2.0 μm) archives. The very high spatial resolution from the latter two sets, combined with very recent sub-millimetre maps, allow us to suggest several possible star-formation scenarios that explain the observed infrared and radio properties of the region. Evidence is provided of the presence of a small population of low and medium-mass young stars embedded in the infrared reflection nebulosity NGC 6334 V that coexist with the nearby much younger Class 0 protostars.

We retrieved and analysed unpublished archive ESO-VLT/VISIR diffraction-limited images of NGC 6334-V at 11.3, 11.9 and 18.7 μm with high resolution (0.3" to 0.5"). We also used a set of archive polarimetric 2.0 μm images (with 0.2" resolution) taken with NICMOS on HST, JHK images taken with ESO-VISTA supplemented by survey images from Herschel and Spitzer Space Telescopes archives. A recent 870 μm continuum SMA highresolution, showing the hot/warm dense dust cloud structure, is used as basic reference to understand the basic morphology. A series of seven aligned panels, shown with the same scale on the right hand edge of this poster, shows close-up near- and mid-IR images of the nebular region. Here, we address several questions regarding the nature and environment of the IR nebula: Where are and the sources of the scattered light and what is their nature? Are there other embedded (proto)stars within the nebula? What causes the nebula to appear as a green fuzzy object on the IRAC images? Are other IR emission processes acting within?

These are the preliminary results of this investigation: 1) In the mid-IR VISIR images we found the western lobe of the nebula to contain a complex set of unresolved and diffuse emission sources in the 11 to 19 μm range with a wide range of thermal dust temperatures. Their appearance suggest the presence of a group of low-luminosity embedded protostars surrounded by warm dust. Each of the brightest two appears to illuminate the eastern and western lobes of the reflection IR nebula, as suggested by the polarimetric studies. 2) We filtered the total (sum of three polarization angles) 2.0 μm HST image to obtain an unsharp mask picture that reveals only the high spatial frequency features lying behind the bright reflection nebula. We found that at least 6 faint point-like sources are embedded, most of them coincident with the 11-19 μm unresolved sources, supporting the idea that they are part of a very small recently-formed star cluster. Low energy outflows from the pre-main sequence objects interacting with their immediate surroundings may explain the complexity of the observed (e.g. IRAC) mid-IR colour structure of the nebula, the reported H2 line emission at 2.12 and 2.41 μm and possibly the high-velocity CO gas features reported and the creation of an apparent low-density cavity. 3) Active star formation occurs in the dense hot core located some 3" to the southwest, also signposted by the NH3 emission peak, but their products are still not seen at infrared wavelengths. The combined VISIR images with the position of the sub-millimetre and radio continuum and line emission sources are shown above.

This work uses Herschel (PACS/SPIRE) , Spitzer (IRAC), ESO (VISTA), HST data from their public archives. We acknowledge C. Juárez and collaborators for permission to show the 870 μm SMA observation previous to publication. MT acknowledges UNAM-PAPIIT grant No. IN-104316.

[1]Instituto de Astronomía Universidad Nacional Autónoma de México, Apartado Postal 106, Ensenada, B. C., México (mt@astrosen.unam.mx).
[2]Istituto Nazionale di Astrofisica, Roma, Italy.
[3]Giant Magellan Telescope Organization, Chile.