

Near-infrared observations of the AGB-star candidate IRAS 19312+1950

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Abstract

The object IRAS 19312+1950 (Fig.1) was first recognized as a particularly interesting source during an SiO maser survey of Galactic disk objects with very red IRAS colours. The presence of SiO and H₂O maser emission was confirmed by extensive follow-up observations, which also revealed OH maser emission and multi-component molecular outflows. In the near-infrared, IRAS 19312+1950 is seen to be associated with a large-scale nebulosity of bipolar-like morphology (Fig1). The interpretation of IRAS 19312+1950 as an AGB- or post-AGB star, however, is complicated by the fact that the observed molecular content is much more typical for a molecular cloud. Also, the IRAS colours are inconsistent with those of a 'standard' AGB object (Fig.2). As part of a new multi-wavelength campaign aimed at revealing the nature of this intriguing object, we recently obtained near-infrared imaging and spectroscopy using the NTT/SOFI and the VLT/SINFONI, in order to determine the nature of IRAS 19312+1950. Preliminary analysis of our data, which is presented in this poster shows that

- the nebula emission is purely scattered light, no Br_γ emission is detected (Figure 3)
- the JHK photometry indicates an extremely red colour for IRAS 19312+1950 (Fig.4), which implies that the object is extinguished by at least $A_V \sim 15$ -20mag IF(!) only interstellar extinction is considered.
- IRAS 19312+1950 is possibly photometrically variable
- IRAS 19312+1950 shows a [1.5mic-2.4mic] spectrum typical for a late-type evolved stellar object (Figure 5)

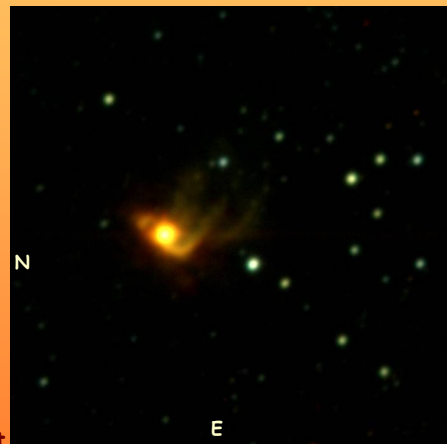


Figure 1: JHK color-composite of IRAS 19312+1950 from our NTT/SOFI observations. Size of the image is 100"x100"

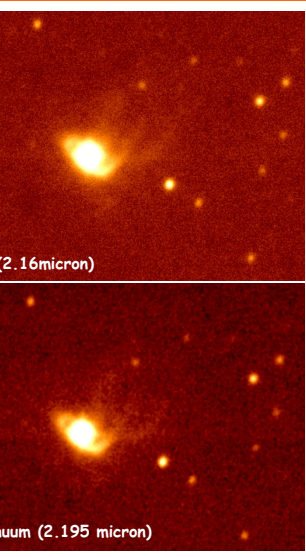


Figure 3: Narrow-band images of IRAS 19312+1950. The continuum subtracted image does not show any emission.

Near-IR photometry and source variability

We mapped the nebula around IRAS 19312+1950 in broad-band and in narrow-band filters with the SOFI instrument at ESO's 3.5m NTT in July 2006. Data were taken in J, H, K_s, Br_γ and the emission line free narrow-band continuum filter NB_2.195. The sky conditions were strongly variable resulting in seeing of 1" - 1.6" only. JHK photometry was bootstrapped from 2MASS photometry of stars present in the field. We derive J=11.33mag H=8.2mag K=6.08mag. These values are consistent with 2MASS JHK magnitudes *only* within ~0.3-0.5mag and might indicate source variability. Interestingly, the IRAS catalogue lists 19312+1950 also as possibly variable.

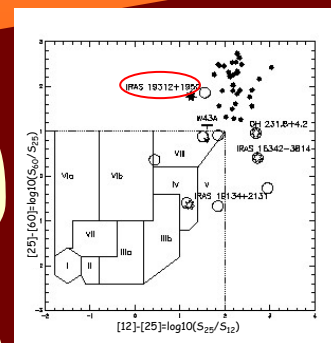


Figure 2: IRAS color-color diagram as presented by van der Veen & Habing (1988, A&A 194). The filled asterisk is IRAS 19312+1950

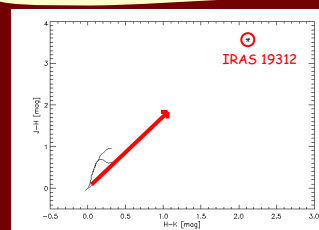


Figure 4: JHK color-color diagram. Solid lines: intrinsic colors for dwarfs and giants. Red line: direction of interstellar reddening.

Near-IR spectroscopy

H- and K-band spectra have been obtained with the integral field spectrometer SINFONI on ESO's VLT. The spectrum of IRAS 19312+1950 (black line in Fig.5) clearly shows very deep CO absorption in the 2.29-2.4mic range. The green line shows the spectrum of a M2I, red supergiant, from Lancon & Rocca-Volmerange (1992, A&AS 96), reddened with $A_K = 2.6$ mag. The red line represents the Mira star IRC20281 (M5-8III), reddened with $A_K = 1.4$ mag, which shows the prominent strong, broad H₂O absorption around 1.9mic.

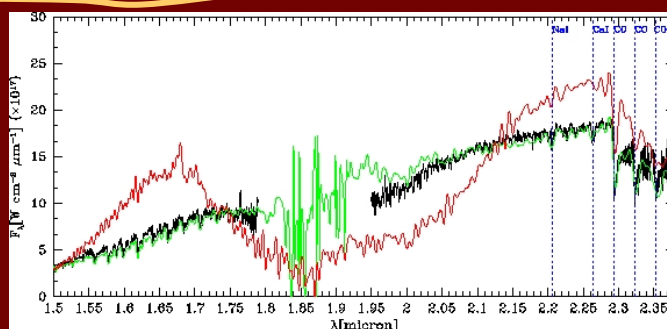


Figure 5: HK-band spectrum of IRAS 19312+1950 (black line). For comparison a M5-8III (red) and M2I (green) spectrum.