RevMexAA (Serie de Conferencias), **40**, 197–197 (2011)

SEARCHING FOR HEAVILY OBSCURED POST-AGB STARS AND PLANETARY NEBULAE II. NEAR-IR OBSERVATIONS OF IRAS CANDIDATES

G. Ramos-Larios,[1,2] M. A. Guerrero,[2] L. F. Miranda,[2,4] O. Suárez,[3] and J. F. Gómez[2]

This is the second paper in a series aimed to investigate the spectral properties and to determine the nature of a sample of 165 pressumably obscured *IRAS* post-AGB star and PN candidates. In Ramos-Larios et al. (2009, hereafter Paper I), 2MASS, *MSX* and *Spitzer* GLIMPSE archival data were used to search for near-IR counterparts in the 2MASS PSC, but the limited sensitivity of 2MASS observations did not allow the identification of ∼80 sources in the sample.

To overcome this problem, near-IR JHK images have been obtained using the 3.58 m TNG (Telescopio Nazionale Galileo) at the Observatorio del Roque de los Muchachos (La Palma, Spain) and the 3.6 m NTT (New Technology Telescope) at La Silla Observatory (Chile) for 164 objects in the sample of *IRAS* post-AGB star and PN candidates. The new near-IR JHK images, in conjunction with *MSX* and *Spitzer* GLIMPSE archival data, have allowed the unambiguous identification of near-IR counterparts for 154 out of the 165 sources in the sample. Accurate finding charts have been provided for the sources lacking a PSC counterpart (whose finding charts were already presented in Paper I).

The noticeable improvement in the coordinates of the sources has allowed a reliable search for optical counterparts in the DSS. The detection in optical DSS images and/or in near-IR 2MASS images has provided a rough assessment of the degree of obscuration of these sources that can be classified into three types. The most obscured sources (type m) are neither detected in near-IR 2MASS images nor in optical DSS images, intermediate sources (type n) are detected in near-IR 2MASS images, but not in optical DSS images, and the less obscured sources (type o) are detected both in near-IR 2MASS and optical DSS images.

The distribution of sources of type m and o on the *MSX* diagram indicates that the former are most likely early post-AGB stars, while the latter are late post-AGB stars. On the other hand, the narrower Galactic latitude distribution of sources of type m and n suggests that their progenitor population has initial masses larger than that of o type sources. There is a caveat as the broader Galactic latitude distribution of type o sources might also be ascribed to differential extinction along the Galactic plane.

The photometric measurements of the new JHK images have been used to derive the spectral energy distributions (SED) in the IR domain of the sources with newly identified near-IR counterparts.

Sources that have a near-IR 2MASS PSC counterpart have also been investigated for long-term variability. The JHK magnitudes of six sources have been found to have varied between the time of the 2MASS observations and that of the NTT and TNG observations.

Extended or resolved emission has been found in 18 objects and near-IR Brγ, H_2, and K continuum images have been obtained for 7 of them.

A tight relationship is found between water maser emission and bipolar morphology: all the sources in our sample that have been found to be resolved and have water maser emission are bipolar. This strenghtens the hypothesis that water maser emission is associated to axisymmetric mass loss in evolved stars.

[1]Instituto de Astronomía y Meteorología, Av. Vallarta No. 2602, Col. Arcos Vallarta, C.P. 44130 Guadalajara, Jalisco, Mexico (gerardo@astro.iam.udg.mx).
[2]Instituto de Astrofísica de Andalucía, IAA-CSIC, C/ Camino Bajo de Huétor 50, 18008 Granada, Spain (mar, lfm, jfg@iaa.es).
[3]UMR 6525 H. Fizeau, Université de Nice Sophia Antipolis, CNRS, OCA. Parc Valrose, F-06108 Nice Cedex 2, France (olga.suarez@unice.fr).
[4]Departamento de Física Aplicada, Universidade de Vigo, E36310 Vigo, Spain.