that most of the sources have values 2×MEAN_AB18 which fall within a narrow range of radii $0.625 < \log(\theta/\mathrm{arcsec}) < 1.125$. The large majority of these are larger than the FWHM of the PSF. Where we now view the distribution of sources with respect to the vertical axis –that is, with respect to values of diameter taken from radio and optical observations– it becomes apparent that half of sources are smaller than the PSF, and that the distribution is very much broader than that of the AKARI results. This latter trend is also apparent in the lower panel of Figure 2, where we show normalized histograms of the AKARI and radio/optical results. Whilst the AKARI dimensions are sharply peaked close to $\theta = 7.5$ arcsec, the radio/optical data extend over a regime which is ∼60 times larger.

It is therefore clear that whilst the mean infrared sizes of the sources are similar to those in other wavelength regimes –the AKARI dimensions are ∼0.86 times as large as those determined through optical and radio observations– the level of agreement for individual sources is much less impressive. It is found that the infrared dimensions are mostly very much larger, or significantly less.

It is no surprise that there is a paucity of AKARI sources with dimensions less than the PSF – sources which are smaller than this limit would be unresolved. What is more surprising is that so many optically compact sources have substantially larger IR diameters, and that these are close to the size of the 18 μm PSF. One explanation for this may be that many smaller radio/optical sources correspond to younger PNe, in which the neutral envelopes are larger than the ionized regimes. Where a large fraction of the IR emission derives from these HI shells, then the dimensions of the sources will be correspondingly enhanced. On the other hand, it is possible that sources which are compact are prone to larger errors in their derived diameters, and that many of the MIR dimensions are significantly too large.

Similarly, it is possible that [OIV] λ25.87 μm and [NeV] λ24.316 μm are dominant in evolved PNe, leading to centralized emission, and smaller mean dimensions. A similar trend has been noted in MIPSGAL 24 μm mapping of PNe (Phillips & Márquez-Lugo 2011; Chu et al. 2009; Ueta 2006; Su et al. 2004, 2007), and this may explain the paucity of sources having larger angular diameters. Here again however, it is possible that weaker, more extended emission falls below the AKARI detection limits, and that this causes a significant reduction in the sizes of the PNe.

It is therefore clear that instrumental errors, and variations in the structures of the PNe are capable of explaining the disparities illustrated in Figure 2. Further analysis is required before these differences can be understood. Given the uncertainties in the veracity of the AKARI results, however, we shall be using radio/optical estimates of diameter in our investigation of evolutionary trends.

2.4. *Comparison of the AKARI and IRAS Photometric results*

We have finally undertaken a comparison between the AKARI photometry and corresponding IRAS results. The flux comparisons are provided in Figure 3, where all of the results have quality factors of 3. For this case, the IRAS PSC was interrogated using a search radius of 18 arcsec, comparable to the positional uncertainty for sources in this catalogue. This resulted in the detection of 573 nebulae with flux quality FQUAL = 3 in at least one of the photometric channels.

The IRAS photometry was undertaken at 12, 25, 60 and 100 μm; wavelengths which are slightly different from those quoted for the present results. It is not therefore possible to undertake a direct one-to-one comparison with the AKARI fluxes, although we are able to compare the closely adjacent channels at 9 and 12 μm, 18 and 25 μm, 65 and 60 μm, and 90 and 100 μm (Figure 3).

It is clear that whilst the fluxes are similar at 90 and 100 μm, the other comparisons show systematic differences in emission. For the most part, the IRAS fluxes are larger than those determined by the AKARI all-sky survey.

One possible explanation for these trends is that there is a calibration problem with the AKARI data, although this seems extremely improbable, and can almost certainly be discounted. The AKARI team has used a broad range of standard stars for the IRC calibration, for instance, including sources in the ecliptic polar regions and Large Magellanic Cloud. They have also used sources employed in calibrating the *Infrared Space Observatory* (*ISO*). There is a non-linear relation between input source fluxes and the AKARI signal; a function which is fitted using a second degree polynomial fit. When this correction is employed, it is clear that residual errors are small; there is certainly little evidence for the biases which are detected in the present work. Similar calibrations are used for the FIS results, where the AKARI team has used stellar, asteroidal, and planetary flux calibrators. Again, non-linear relations are detected between the source fluxes and measured signals, and