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The disappearance of the 1667-MHz OH maser in IRAS 17436+5003 (HD 161796)

I. Bains,[1]★ J. A. Yates,[2] T. M. Gledhill[1] and A. M. S. Richards[3]

[1]*Astronomy Group, Department of Physical Sciences, University of Hertfordshire, College Lane, Hatfield, Hertfordshire AL10 9AB*
[2]*Department of Physics and Astronomy, University College London, Gower Street, London WC1E 6BT*
[3]*Jodrell Bank Observatory, Department of Physics & Astronomy, University of Manchester, Macclesfield, Cheshire SK11 9DL*

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ABSTRACT

We report the diminution of the 1667-MHz OH maser in the post-asymptotic giant branch star IRAS 17436+5003, by a factor of $\gtrsim$17 over a period of $\lesssim$12 yr, from observations with MERLIN. This circumstellar maser was detected by Likkel in 1987, at the 13σ level of her observations with the Green Bank Telescope. We discuss a number of possible reasons for this phenomenon and conclude that it is most likely due to turbulence arising from interacting stellar winds.

Key words: masers – stars: AGB and post-AGB – circumstellar matter – stars: individual: IRAS 17436+5003 – radio lines: stars.

1 INTRODUCTION

IRAS 17436+5003 (HD 161796) has been classified as a high-latitude, evolved star of spectral type F3 Ib (Fernie & Garrison 1984) with an oxygen-rich chemistry (Justtanont et al. 1992). It has the characteristics of a post-asymptotic giant branch (post-AGB) object (or protoplanetary nebula, PPN): an infrared excess (Parthasarathy & Pottasch 1986), a bimodal spectral energy distribution (SED: Hrivnak, Kwok & Volk 1989) and a detached dust shell (Gledhill et al. 2001). It has been the subject of extensive monitoring, and has been found to show long-period, multi-modal, low-amplitude variability [$\sim$0.1–0.2 mag on time-scales that vary from tens to thousands of days (e.g. Mantegazza, Antonello & Poretti 1989; Fernie 1990a,b; Fernie & Seager 1995)], as well as periods of quiescence.

Gledhill et al. (2001) used near-infrared (NIR) imaging polarimetric observations with the United Kingdom Infrared Telescope (UKIRT) to show that IRAS 17436+5003 has an elliptical dust shell of maximum extent 5.7 arcsec (with a point spread function FWHM of $\sim$0.5–1 arcsec). Its optical reflection nebulosity was imaged by Ueta, Meixner & Bobrowsky (2000) using the Planetary Camera (PC) chip on the *Hubble Space Telescope* (*HST*); the same ellipsoidal shell is apparent and its maximum extent is given as 4.34 arcsec (with a PC resolution of $\sim$0.1 arcsec). The reflection nebulosity is of low surface brightness and is dominated by the obvious presence of the central star. No evidence for the onset of photoionization is given in the literature.

By combining their mid-infrared (MIR) observations of IRAS 17436+5003 with a radiative transfer code, Skinner et al. (1994) determine the distance to this object as 1.2 kpc. Using this distance, Gledhill & Yates (2003) model their MIR observations of the dust shell and obtain a central star luminosity of 3.44×10^3 L$_\odot$. Using the models of Vassiliadis & Wood (1994), they calculate that the stellar core has mass $M = 0.56$ M$_\odot$ and radius $R = 35$ R$_\odot$. The models of Hoogzaad et al. (2002) give $M = 0.46$ M$_\odot$ and $R = 41$ R$_\odot$. The estimates of the core temperature given in the literature vary from the 6300 K given by Fernie (1983) to the 7500 K of Gledhill & Yates (2003). In this paper we adopt the latter value.

From observations of the CO $J = 1$–0 (115 GHz) and $J = 2$–1 (230 GHz) transitions in IRAS 17436+5003, Likkel et al. (1991) measured respective systemic velocities $V_{\rm lsr} \sim -35.0$ and -35.5 km s^{-1} and expansion velocities $V_{\rm exp} \sim 14.9$ and $\sim$13.2 km s^{-1}. The authors note a probable detection of high-velocity wings on the $J = 2$–1 profile that extend to $\sim$25 km s^{-1} from the line centre. This feature is again noted by Bujarrabal, Alcolea & Planesas (1992) and Bujarrabal et al. (2001), who give the velocity extent of their ^{12}CO and ^{13}CO profiles as ranging from -53 to -13 km s^{-1}. Bujarrabal et al. (1992), Bujarrabal et al. (2001) and Zijlstra et al. (2001) suggest that such profile wings probably correspond to a high-velocity outflow with bipolar symmetry. This could be indicative of the commencement of the post-AGB fast wind predicted by the generalized interacting stellar winds (GISW) models of e.g. Kwok, Purton & Fitzgerald (1978) and Mellema & Frank (1995).

Likkel (1989) used the 43-m Green Bank Telescope (GBT) in full-polarization (Likkel, private communication), spectral-line mode, with channels of resolution $\sim$0.9 km s^{-1}, in three observing runs in 1986 September and 1987 April to search for 1612-, 1665-, 1667- and 1720-MHz circumstellar OH maser emission from IRAS 17436+5003. No emission was detected at 1612, 1665 or 1720 MHz. At 1667 MHz, a signal with a peak varying between 0.37 and 0.48 Jy, with an associated error of $\sim$15 per cent, was observed during the period that the observations spanned. Thus the

★E-mail: ib@star.herts.ac.uk

1667-MHz maser flux increased by a factor of 1.3 over a 6-month period. In 1987 April, the peak 1667-MHz flux of 0.48 Jy corresponded to the 13σ level of the GBT observations. The $V_{\rm lsr}$ of the 1667-MHz emission was ~ -26 km s^{-1}, which when compared with the systemic velocity estimates found from the CO observations (Likkel et al. 1991) gives $V_{\rm exp} \sim 10$ km s^{-1} for the OH emission.

We observed IRAS 17436+5003 at 1612 and 1667 MHz in full-polarization, spectral-line mode with the MERLIN interferometer as part of our search for polarized maser emission in PPN candidates that could be linked to the presence of stellar magnetic fields (see Bains et al. 2003). Within the noise, we did not detect any maser emission at either frequency.

Circumstellar masers are sometimes known to display variability. Some changes are attributed to Zeeman splitting owing to the presence of magnetic fields, which can result in the overlap of different Zeeman components along the line of sight (Deguchi & Watson 1986). Examples of this are the circular polarization structure in IRAS 20406+2953 (Hu et al. 1994; Bains et al., in preparation) and a number of the objects discussed by Zijlstra et al. (2001). We cannot investigate whether this is the cause of the diminution of the main-line maser in IRAS 17436+5003, because we can no longer detect maser emission with which to probe potential Zeeman effects. Other objects have shown large-scale temporal variability of their Stokes *I* spectral features, such as OH 0.9+1.3 (Shepherd et al. 1990) and IRAS 15405−4945 (Zijlstra et al. 2001). Given the characteristics of IRAS 17436+5003 described in the previous paragraphs, it seems likely that it is a post-AGB object evolving towards the planetary nebula (PN) stage. Indeed, the recent presence of the 1667-MHz maser and the fact that this maser alone has been observed in IRAS 17436+5003 are in accordance with the behaviour of a post-AGB object in the chronological sequence proposed by Lewis (1989). In this evolutionary scheme, all the maser species expire as the star ascends the AGB and the circumstellar envelope (CSE) becomes opaque at optical and infrared wavelengths. When the post-AGB phase begins and the mass loss dramatically decreases, the consequent decrease in dust opacity $\tau_{\rm d}$ means that, for a short time, an ideal density and temperature are maintained in which the mainlines are again supported. Eventually, the evolutionary changes in the OH shell (e.g. the decrease in dust temperature $T_{\rm d}$ and the further decrease in $\tau_{\rm d}$, or the variation in the velocity field due to the onset of the post-AGB fast wind, or the effect of a growing ionization front) mean that the maser can no longer be sustained, whereupon it disappears for good.

The non-detection of the once-present 1667-MHz maser emission in IRAS 17436+5003 suggests that significant physical changes are occurring in the circumstellar environment of this object. In this paper, we examine the possible physical causes of the diminution of this maser flux and, where relevant, we consider the effect of the expected changes that occur in the CSE of an evolving, post-AGB star.

2 OBSERVATIONS AND DATA REDUCTION

IRAS 17436+5003 was observed at 1612 and 1667 MHz in full-polarization, spectral-line mode by six telescopes of the MERLIN array on 1999 May 17 and 18. In this waveband, the maximum MERLIN baseline of 217 km provided a spatial resolution of $\sim$0.15 arcsec. After Hanning smoothing, the 0.5-MHz bandwidth and 256 correlator channels provided an effective velocity resolution of 0.36 km s^{-1} (1612 MHz) and 0.35 km s^{-1} (1667 MHz). The total useable velocity bandwidth of the observations was $\sim$80 km s^{-1}, ranging from $\sim$−66 to 14 km s^{-1} and covering the full extent of the velocities over which the CO was observed by Bujarrabal et al. (1992). The pointing centre of the observations of IRAS 17436+5003 was $\alpha_{\rm B1950} = 17^{\rm h}43^{\rm m}40\overset{\rm s}{.}7$, $\delta_{\rm B1950} = 50°03'47''$, the same as the coordinates used by Likkel (1989).

The observations were made in frequency-switching mode, with $\sim$7.5 h per frequency spent on target. All observations were in narrow-band mode. The observations of the PPN were interleaved with scans on 1739 + 522A, the phase reference source. 3C 286 was observed as primary flux calibrator. 3C 84 was observed in order to perform the amplitude and bandpass calibration. The flux density of 3C 84 was determined by comparing the visibility amplitudes on the shortest baselines with those of 3C 286. Using 3C 286 flux densities of 13.8 Jy (1612 MHz) and 13.6 Jy (1667 MHz) (Baars et al. 1977), the flux densities of 3C 84 were found to be 29.5 ± 0.8 Jy (1612 MHz) and 28.0 ± 2.9 Jy (1667 MHz). The error on the absolute flux scale is 5 per cent. The data were reduced as detailed in Bains et al. (2003).

3 RESULTS

The MERLIN observations at both frequencies show a non-detection of OH masers down to a 1σ rms (Stokes *I*) noise level of 8 mJy at both 1612 and 1667 MHz. The shortest baseline determines the largest angular size of $\sim$3 arcsec detectable by MERLIN at this observing band. Using the typical maser cloud sizes found in Bains et al. (2003), at the 1.2-kpc distance to IRAS 17436+5003 the clouds are likely to be $\lesssim$1.5 arcsec, meaning that MERLIN should be detecting all the available flux and not resolving out any emission.

There is a possibility that the narrower channels used in these observations, compared with those of Likkel (1989), could result in any maser signal detected by Likkel (1989) being spread over two or three consecutive MERLIN channels, hence decreasing the likelihood of its detection. In order to investigate this, we averaged together every three channels of the MERLIN data to make data cubes with channels of comparable width to those of Likkel (1989). The resulting widths were 1.08 km s^{-1} (1612 MHz) and 1.05 km s^{-1} (1667 MHz). In the event that the emission would be apparent in the averaged data but might also straddle two consecutive averaged channels, we performed the averaging three times, each time staggering by one the first channel from the data set to be averaged. No maser emission was apparent in any of the averaged data cubes, at either observing frequency.

The MERLIN observations of IRAS 17436+5003, whilst taking place at the same coordinates as those used by Likkel (1989) in discovering the maser emission, are offset by 5.6 arcsec in RA and 2.1 arcsec in Dec. from the coordinates of the PPN given in the *Hipparcos* Catalogue (Perryman et al. 1997). In order to verify that the non-detection was not due to the offset in pointing, the AIPS task POSSM was used to plot the spectra with a shift to the *Hipparcos* coordinates applied. The resulting spectra were still found to be noise-like.

We measured a 1σ rms (Stokes *I*) noise level of 5 mJy in all of the velocity-averaged data cubes. In order to compare the noise levels of the new observations with those of Likkel (1989), we scaled these measurements by the ratio of the MERLIN to GBT channel widths to obtain 5σ upper limits to the flux density of OH maser emission of 30 mJy (1612 MHz) and 29 mJy (1667 MHz). As 1612-MHz OH maser emission has never been detected in this object, we will give no more consideration to its non-detection in the new observations. By comparing the observations of Likkel (1989) with the new observations, at some time between 1987 April and 1999

May, the flux of the 1667-MHz masers has decreased by a factor of $\gtrsim$17.

4 DISCUSSION

In this section we examine the possible physical causes of the diminution of the 1667-MHz maser flux in IRAS 17436+5003.

4.1 Dust temperature and density

Radiative transfer models show that the population inversion of the 1667-MHz transition disappears at $T_{\mathrm{d}} \leqslant 80$ K (Elitzur 1992), because there are not enough photons to populate the infrared pumping transitions sufficiently at temperatures below this. τ_{d} is proportional to the number density of the dust and describes how much material is available to provide a source of infrared pumping photons for the maser. Both of these quantities are reduced by the expansion of the maser-emitting region, because of spatial dilution effects.

To examine the temperature and density conditions within the molecular OH region of IRAS 17436+5003, we need to determine where the OH is in relation to the star. Gledhill & Yates (2003) find that the equatorial belt of dust, visible as the two peaks in their fig. 1, is at a radial distance of $\sim 10^{16}$ cm from the central star and at $T_{\mathrm{d}} \sim 120$ K. This is within the temperature range typically required for supporting OH masers (e.g. Cohen 1989; Elitzur 1992), which suggests that they have not diminished because of heating or cooling.

Gledhill & Yates (2003) find that the mass-loss episode in IRAS 17436+5003 ceased 285 yr prior to their 2001 observations. Assuming that the CSE has expanded with a constant velocity since then, the fractional drop in column density between the observations of Likkel (1989) (271 yr after mass-loss ceased) and the MERLIN observations (283 yr after mass-loss ceased) is 8 per cent. Alternatively, using the model of Hoogzaad et al. (2002) in which the mass-loss period ended 430 yr prior to their 1996–97 observations, the fractional drop in column density over the 12 yr between the maser observations is 5 per cent. As the number of pumping events is linearly related to the number of maser photons emitted per unit time (Elitzur 1992), in both the aforementioned cases, it is unlikely that the small fractional change in dust column density would cause a dramatic change in pumping efficiency.

The fractional change in column density of OH should also be considered; Huggins & Glassgold (1982) have shown that, for a given expansion velocity, the radial column density of OH falls off with decreasing $\dot{M}$ but only very slowly. The time-scale of decline of just $\lesssim$12 yr is then a likely pointer to another mechanism being the cause of the decrease in the maser output.

4.2 Fluctuations in the radiative pumping rate

As the number of pumping photons equals the number of maser photons (Elitzur 1992), the variability of the central star can directly affect the maser output. Fernie & Seager (1995) show that the amplitude of the stellar variability light curve of IRAS 17436+5003 is at most $\sim$0.2 mag. Therefore the variability of the central star can only explain maser variability of 20 per cent (assuming an unsaturated maser, hence an exponential relation), which is comparable to that detected by Likkel (1989) over the 6-month period of her observations.

It is possible for a velocity gradient in the OH shell to shift the frequency of a pump photon such that it then overlaps another transition ('line overlap'). In this way, a pump photon emitted from one part of the shell can be absorbed by another transition in a different part (e.g. Bujarrabal et al. 1980; Elitzur 1992). For this have to occurred in IRAS 17436+5003 and for it to have destroyed the maser, the velocity structure in the OH shell needs to have changed between the GBT and MERLIN observations. Such changes are discussed further in Section 4.7.

Finally, using the dust model of Gledhill & Yates (2003) with a visual equatorial extinction of $A_{\mathrm{v}} = 1.2$, we find that IRAS 17436+5003 has an extinction of 0.08 mag at 35 μm, the wavelength of the far-infrared mainline pump. This means that in the region in which we think the OH exists (Section 4.1), the dust is optically thin and so simple pump photon self-absorption is not a factor that requires consideration.

4.3 An ionized region

Unsaturated masers are sensitive to background, continuum flux of the required wavelength (18 cm in this case), which they will amplify exponentially. Assuming that the continuum source and the maser share the same line of sight, a change in the background continuum will then affect the output of the maser. For this scenario to be the cause of the maser flux decrease in IRAS 17436+5003, the continuum source needs to have decreased in output over the last 12 yr. The two likely sources of continuum 18-cm photons are a growing central ionized region due to stellar wind interactions/pulsation shocks around the star, and ionization arising from shocks in high-velocity, jet-like outflows that are sometimes seen in post-AGB objects. Examples of the latter case are seen in IRAS 16342−3814, in which the masers are grouped against the centre of a reflection lobe (Zijlstra et al. 2001), and Hen 3–1475 (Bobrowsky et al. 1995) which has also been modelled in this way.

As the OH emission detected by Likkel (1989) was redshifted, these situations could not have acted to amplify it. However, a growing ionized region that is intermediate in our line of sight to the maser could have the effect of gradually absorbing the redshifted emission from the maser located behind it, so causing an apparent decrease in its output. As $T_{\mathrm{eff}} \sim 7500$ K in IRAS 17436+5003 (Gledhill & Yates 2003), we can rule out the existence of a growing central H II region caused by ionizing stellar ultraviolet (UV) photons (see Section 4.6). Furthermore, no evidence of photoionization (induced by a jet-like interaction or otherwise) has been found in this object. The other effects of outflow interactions are discussed further in Section 4.7.

4.4 Line narrowing, beaming and directional competition

Very faint or fully saturated masers have a linewidth similar to the thermal linewidth of OH, which is 0.57 km s^{-1} at 120 K (Section 4.1). The maser linewidth can be smaller than the thermal width when it is in a state intermediate to the aforementioned cases, but our unsmoothed channel width of 0.35 km s^{-1} was probably quite adequate for detection purposes as it is one-third of the resolution used by Likkel (1989). However, the maser beaming angle does become smaller as the maser intensifies. Therefore the maser can become fainter because we are no longer within its beam.

A particular case of spatial beaming is directional competition. One direction of maser amplification may become dominant because of the amplification of a background source, or simply because of an aspherical cloud. The former is unlikely (Section 4.3). The latter could arise if a cloud is compressed or ablated by shocks, producing a more favourable maser propagation path in one direction and suppressing masing in other directions. We discuss the possibility of turbulent shocks in Section 4.7.

The 1667-MHz emission that Likkel (1989) detected was from the redshifted part of the spectrum only. This suggests that either the distribution of masers was inhomogeneous, or it was homogeneous but the emission was anisotropic. It could be argued that the latter case implies that the anisotropy in the maser output, e.g. because of directional competition, has now affected the redshifted maser. As the distribution of masers in circumstellar shells is known to be sometimes clumpy (e.g. Zijlstra et al. 2001; Bains et al. 2003), it is likely that the lack of blueshifted emission is in fact due to the former scenario. Furthermore, the dust structure visible in the MIR image of IRAS 17436+5003 (Gledhill & Yates 2003) is inhomogeneously distributed, suggesting a general anisotropic distribution of matter throughout the CSE. Other objects also display predominantly redshifted emission in their mainline spectra, e.g. IRAS 17404−2713, IRAS 17385−3332 (Hu et al. 1994) and IRAS 18276−1431 (Bains et al. 2003).

4.5 Competitive gain

The four possible ground-state OH maser transitions each share an upper and lower hyperfine energy level with the other transitions. In the particular case of a saturated maser, each level can only support one inversion and therefore one maser. If the masers are unsaturated then two transitions can co-exist, but small intensity changes in the stronger maser will dramatically affect the output of the weaker one. Direct observational evidence of competitive gain is rare; one example is OH 0.9+1.3 (Zijlstra et al. 1989). In the case of IRAS 17436+5003, competitive gain can be disregarded as being the cause of the diminution of the 1667-MHz maser, as no other OH maser species has ever been detected in this object.

4.6 Photodissociation

Once the mass loss drops dramatically, as happens in the post-AGB phase, the decrease in dust density due to the expansion of the CSE means that the OH has less shielding and is more susceptible to photodissociation via UV photons from the central star (which is increasing in temperature) or from external, interstellar (IS) UV. This lack of shielding then leads to lower column lengths of OH to support the maser.

We note that, in the case of IRAS 17436+5003, $T_{\rm eff}$ ~7500 K (Gledhill & Yates 2003). Significant ionization of H II regions only begins when the central star is of $T_{\rm eff} \sim 18\,000$ K. The main contributors to the photodestruction of OH are photons of $\lambda \sim 950$ Å (compared with Lyman photons of $\lambda = 912$ Å). We can therefore disregard photodissociation via UV from the central star as being the cause of the decrease in the maser output.

OH could be dissociated by IS UV photons if the dust density in the outer parts of the OH region has fallen to such a level that the OH is unshielded. The photodestruction rate P is only known approximately, lying in the range 7.2×10^{-12} to 2.5×10^{-10} s^{-1} (Huggins & Glassgold 1982, and references therein). Assuming an average $P \sim 10^{-11}$ s^{-1} and an OH expansion velocity $V \sim 10$ km s^{-1}, the dissociation radius as determined by IS UV photons is given by $\sim V/P \approx 10^{17}$ cm, which is still outside the radius at which we think the OH exists (Section 4.1). In addition, Gledhill & Yates (2003) find a visual extinction $A_{\rm v} = 1.2$ in the equatorial belt of dust, the region in which we expect the masers would have originated (Section 4.1). If the dust shell is optically thick at visible wavelengths, then it will be even more optically thick to UV. Therefore photodissociation of OH is unlikely to have led to the diminution of the maser.

4.7 Turbulence

We now consider the effect of adding turbulence to the OH region. We define this as the injection of extra bulk velocity, heat and microturbulence into the perturbed region. Such an injection could be due to the onset of the GISW-predicted, fast, post-AGB wind. This would increase the inner radius of the OH shell and decrease the available velocity coherence length for maser amplification.

According to the GISW models, the post-AGB fast wind is thought to begin once the CSE has detached from the star and the exposed stellar core rises in temperature. Using the derived stellar parameters of Gledhill & Yates (2003) (Section 1), we can show that the escape velocity $V_{\rm esc}$ of the system is 78 km s^{-1}, so the wind from the star has to be at least this fast. As the stellar temperature increases, the wind speed exceeds $V_{\rm esc}$ because of radiative acceleration, but for $T_{\rm eff} \sim 7500$ K the models of Vassiliadis & Wood (1994) suggest that $V_{\rm esc}$ and the wind speed are about equal. Adopting 78 km s^{-1} as an average velocity for the fast wind, we find that to reach a radius of $\sim 10^{16}$ cm (Section 4.1) takes 40 yr. Alternatively, using the model of Hoogzaad et al. (2002) (Section 1), $V_{\rm esc}$ becomes 65 km s^{-1} and the time to reach $\sim 10^{16}$ cm is 49 yr.

It is likely that the fast wind has been blowing for longer than this, and that the velocity with which this wind leaves the star is gradually increasing as the star evolves and becomes hotter. It could have started blowing soon after detachment when the star started to contract [~285 yr ago (Gledhill & Yates 2003); ~430 yr ago (Hoogzaad et al. 2002)]. However, this simple calculation shows that the time-scale since detachment of the CSE is sufficient for the gradual evolution of the post-AGB fast wind and its subsequent interaction with the slow, AGB, molecular wind. The consequent turbulence suffered by the OH region upon the mutual wind–wind interaction and the disruption to the velocity coherence of the maser is then a plausible reason for the observed decrease in the 1667-MHz maser flux.

The interaction of the post-AGB fast wind with the molecular OH region would produce the swept-up shell described by Zijlstra et al. (2001). This shell would travel at a constant, intermediate, post-shock velocity for which 25 km s^{-1} is consistent with the models of Zijlstra et al. (2001). Indeed, the high-velocity wings of the CO emission from IRAS 17436+5003 observed by Likkel (1989) and Bujarrabal et al. (1992) are found at this velocity. Further evidence for the onset of the fast wind is found in the prolate dust shell seen in the NIR images of Gledhill et al. (2001), the MIR image of Gledhill & Yates (2003) and the optical image of Ueta et al. (2000). This morphology is interpreted by Gledhill & Yates (2003) as being evidence of a GISW interaction with an equatorial torus, which acts as a constraint on the outflow and causes elongation at the poles. However, the CO profiles indicate that only 16 per cent of the gas travels at the higher speeds (Bujarrabal et al. 2001). Therefore most of the OH shell may in fact lie outside the interaction region, but the effect of the fast wind on the inner part of the OH shell would act to decrease the velocity coherence through the shell, hence reducing the maser column length and intensity. In addition, we know that the majority of observed PN are bipolar or ellipsoidal (e.g. Manchado et al. 2000), and that the GISW models predict that these morphologies arise because of an axisymmetry in the slow AGB wind or the fast post-AGB wind. It is therefore possible that the predicted fast wind in IRAS 17436+5003 could break through the AGB shell more quickly in some directions than in others, which would add to the loss of large-scale velocity coherence in the OH region. As well as the disruption to the maser amplification length, turbulence can have the effect of ablating the OH clouds, resulting in directional competition (Section 4.4), and can also cause the loss of the required velocity structure of the infrared pump ('line overlap'; Section 4.2).

The presence of the fast wind could be further verified with CO spectral line interferometry observations. In addition, we suggest monitoring of IRAS 17436+5003 at 1667 MHz to eliminate recurrent transient variability as a possible cause of the decrease in maser flux.

5 SUMMARY

New observations have shown that the 1667-MHz OH maser in IRAS 17436+5003 has dropped below the MERLIN 5σ rms detection threshold of 29 mJy, a factor of $\gtrsim$17 decrease in flux over a period of $\lesssim$12 yr. We make a number of suggestions to explain its diminution, and favour turbulent disruption of the OH-containing region. We postulate that the OH exists in the belt of warm, equatorial dust that is visible in the MIR maps of Gledhill & Yates (2003), and that this region is now being perturbed by the GISW-predicted, fast(er) post-AGB wind that is emanating from the stellar surface. Given that IRAS 17436+5003 displays so many characteristics of a post-AGB object, it is likely that the apparent disappearance of the 1667-MHz maser is permanent, rather than due to recurrent transient variability, and that it signifies a further step in the evolution of this object towards the PN stage.

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