o Ceti (a.k.a Mira A) is known as the prototype of Miras and Mira-type long-period variable stars. o Ceti has a typical optical period of 332 days; nevertheless, it is quite a remarkable Mira. It belongs to a detached binary system (Mira AB) in which mass transfer by wind interaction is taking place. The hot companion of o Ceti, Mira B (either a main-sequence star or a white dwarf), is orbiting at a radius of ∼55 AU (∼60") (Dufour & Guérard 1999). Whereas OH masers - originating in the outer part of the circumstellar envelope (CSE) - are commonly found towards isolated Miras, they are fairly unusual around binary systems close enough to be in interaction as is the case for the Mira AB system. Flares in OH are a rather rare event. They have been detected only towards Miras (i.e., not seen so far in any OH/IR objects). All 6 previous detected only towards Miras (i.e., not seen so far in any OH/IR objects). All 6 previous OH maser flaring events were deduced from studies of several stars by Etoka & Le Squerre (1996 & 1997). It belongs to a detached binary system (Mira AB) in which mass transfer by wind interaction is taking place. The hot companion of o Ceti, Mira B (either a main-sequence star or a white dwarf), is orbiting at a radius of ∼55 AU (∼60") (Dufour & Guérard 1999). Whereas OH masers - originating in the outer part of the circumstellar envelope (CSE) - are commonly found towards isolated Miras, they are fairly unusual around binary systems close enough to be in interaction as is the case for the Mira AB system. Flares in OH are a rather rare event. They have been detected only towards Miras (i.e., not seen so far in any OH/IR objects). All 6 previous OH maser flaring events were deduced from studies of several stars by Etoka & Le Squerre (1996 & 1997).

### Abstract

The new flaring emission, is composed of 2 strongly polarised main spectral components

- the profile and velocity spread are similar to which was observed in the 1990’s outburst
- but it is now centred at V = +47.1 km/s and spans the velocity interval V=-46.4, +47.8 km/s

All the components follow the optical light curve with a typical phase delay of 10-15% (~30-50 days)

- the components “Comp I” LHC and RHC peak at V = +47.4 km/s and
- the components “Comp II” LHC and RHC peak at V = +47.0 km/s and V = +46.8 km/s respectively

O and H₂O masers are emitting in similar velocity ranges & our observations locate the current flaring region at a ~200 mas (~26 AU) east of o Ceti.

This suggests that the outburst of OH maser emission originates from a region closer to the star than the distance of OH maser emission in the standard model.

This is in agreement with the location of OH flaring events deduced from studies of several stars by Etoka & Le Squerre (1996 & 1997).

### OH Maser Flaring Event in o Ceti

**Flaring region characterisation**

- The difference measured between the position of the maser spot observed in the new flaring event and the strongest one in the 1995 map is Δα = +0.62° and Δδ = -3.24°, while it is Δα = +1.35° and Δδ = -3.84° with respect to the faintest spot in the 1995 map.
- With an expected positional offset due to proper motion of 0.02 mas yr⁻¹ and 0.03 mas yr⁻¹ (van Leeuwen 2007)

**Well observed events**

- The difference measured between the position of the maser spot observed in the new flaring event and the strongest one in the 1995 map is Δα = +0.62° and Δδ = -3.24°, while it is Δα = +1.35° and Δδ = -3.84° with respect to the faintest spot in the 1995 map.
- With an expected positional offset due to proper motion of 0.02 mas yr⁻¹ and 0.03 mas yr⁻¹ (van Leeuwen 2007)

**Comparison with the 1990’s event**

- MERLIN observations of the previous event taken in Nov. 1995 revealed 2 maser regions separated by about 1 arcsec. Only one of these survived until the next observations in May 1998
- The difference measured between the position of the maser spot observed in the new flaring event and the strongest one in the 1995 map is Δα = +0.62° and Δδ = -3.24°, while it is Δα = +1.35° and Δδ = -3.84° with respect to the faintest spot in the 1995 map.
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**OH and H₂O masers are emitting in similar velocity ranges & our observations locate the current flaring region at a ~200 mas (~26 AU) east of o Ceti**

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**References**


### Binarity and/or stellar activity?

- There seems to be a recurrence in the OH flaring events of the order of a decade
- We are following this rare event (in particular we are hoping to obtain a more accurate position of the stars by direct radio imaging) in order to further characterise the flaring region and determine the triggering agent(s)