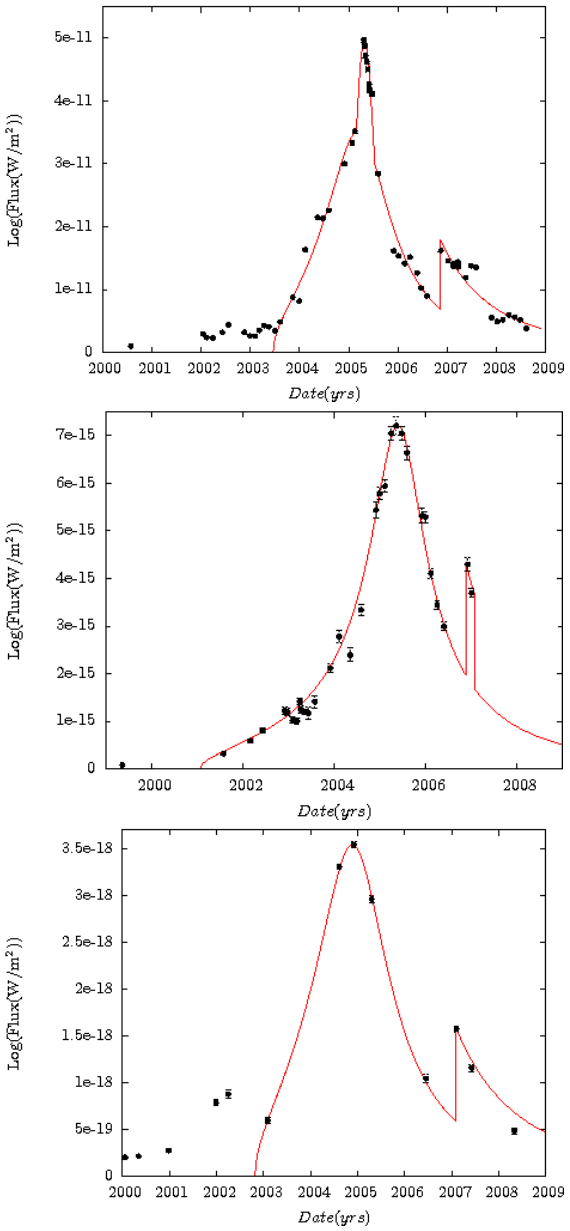

Fig. 1. From top to bottom the figure show the observed points of HST-1 in X-Ray, UV and Radio light curves from the observations (Harris et al. 2009; Madrid 2009; Chang et al. 2010) respectively. The continuous curve on the figure is the best fit to the observations using the semi-analytical model described in the text with a linear fit to the data yielding the ejection rates (see Table 1).

energy loss inside the working surface is calculated as the difference between the initial energy of the material and the energy of the flow inside the working surface. Assuming an efficient mechanism which converts all this kinetic energy into radiation power, then the total luminosity is given by $L := \mathrm{d}E_{\mathrm{r}}/\mathrm{d}t$,

TABLE 1

EJECTION RATES IN X-RAYS, UV AND RADIO

Wavelenght	$\dot{m}_{\mathrm{ini}}$	$\dot{m}_{\mathrm{second\,peak}}$
X-rays	5.59×10^{-7}	1.10×10^{-7}
UV	6.52×10^{-6}	1.78×10^{-6}
Radio	2.11×10^{-11}	3.48×10^{-12}

For all the data the units of $\dot{m}$ are in solar mass per year.

where $E_{\mathrm{r}} = E_0 - E_{\mathrm{ws}}$ is the radiated energy within the working surface (Mendoza et al. 2009).

In what follows we use the approach followed by Mendoza et al. (2009) in order to show that their model can describe the important features observed on the evolution of $HST-1$. To do so, the injected velocity is assumed to have a periodic variation given by $v(\tau) = v_0 + c\eta^2 \sin\omega\tau$, with a constant mass discharge $\dot{m}$ and a velocity of light c. We will present our results on the physical system of units for which $\dot{m}$ are dimensional constant.

2.1. *Fit to the data*

The data sample of HST-1 covers a period of time between the years 2000 to 2009. Since we use observations on different wavelengths, then it is best to normalise all observations to the intrinsic luminosity of HST-1. To do so, for X-rays we use the procedure developed in Harris et al. (2006), which gives a power law index for the flux of 1.5. For the UV data we use the flux density using the reference wavelength of the camera ACS/F220W at 2255.5 AA (Madrid 2009) and for the radio data a wavelength of 2 cm was used (Chang et al. 2010).

The X-ray light curve fit does not work with a simple variation of the velocity and so, we additionally adopt a periodic variation on the injected mass given by $\dot{m} = \dot{m}_i + \psi \sin\Omega$ just for the first flare. After the main peak (see Figure 1), the standard assumption made above fits quite well the observations. The local peaks can be easily modelled by assuming a rapid variation on the value of the discharge $\dot{m}$ injected in the jet according to the high variability of the core of M87 (Harris et al. 2009).

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