



**Extended Data Figure 1 | Water production rates of comet 41P in 2001, 2006 and 2017.** Production rates were derived from hydrogen Lyman- $\alpha$  emission observed by the SWAN instrument on board the SOHO spacecraft<sup>15</sup> in 2001 (black circles) and 2006 (red triangles). For the SWAN data,  $1\sigma$  stochastic errors are shown; systematic uncertainties are at the 30% level<sup>15</sup>. We used Swift/UVOT observations of hydroxyl (OH)

emission to determine the water production rate in 2017 (blue diamond). For the Swift data, the error bars represent the systematic uncertainty. The comet had two 4-mag outbursts in optical wavelengths just before its perihelion in 2001<sup>22</sup>; these are evident as peaks at approximately 35 and 15 days before perihelion.