One can show that the expansion of the semi-major axis follows the formula (new semi-major axis)/(old semi-major axis) = (old mass)/(new mass). This is due to conservation of angular momentum in the orbit and assuming that the mass loss is slow compared to orbital times (which is true all the way up to the time that the Sun will expand into a red giant). This is mentioned explicitly in Iorio 2005 (**http://arxiv.org/abs/gr-qc/0511138**) and many other places.

The typical mass loss rate of the Sun is roughly 10^-14 solar masses per year (many references). So, in a million years, the Sun will be 0.9999999 times as massive as it is now and the Earth's orbit will expand by a factor of 1.00000001 times, about 1.5 km. In a billion years, the effect is 1000 times stronger, so that Earth's orbit is 1500 km larger.

Compared to many other dynamical effects (e.g., perturbations from other planets, the expansion of the Moon's orbit, the interaction of Earth with asteroids and comets, etc.), this is known to be an extremely small effect, practically negligible for virtually all applications. Extremely precise solar system measurements are actually starting to approach the ability to measure this super subtle effect at the present time (Pitjeva & Pitjev 2012, **http://adsabs.harvard.edu/abs/2012SoSyR..46...78P**).

Darin Ragozzine