The Astrophysical Journal, 847:144 (3pp), 2017 October 1 https://doi.org/10.3847/1538-4357/aa89ee


# Erratum: "Revisiting Stochastic Variability of AGNs with Structure Functions" (2016, ApJ, 826, 118)

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*Received 2017 August 4; revised 2017 August 30; published 2017 October 3*

## 1. Erratum

This erratum is meant to fix or clarify three issues in the paper by Kozłowski (2016).

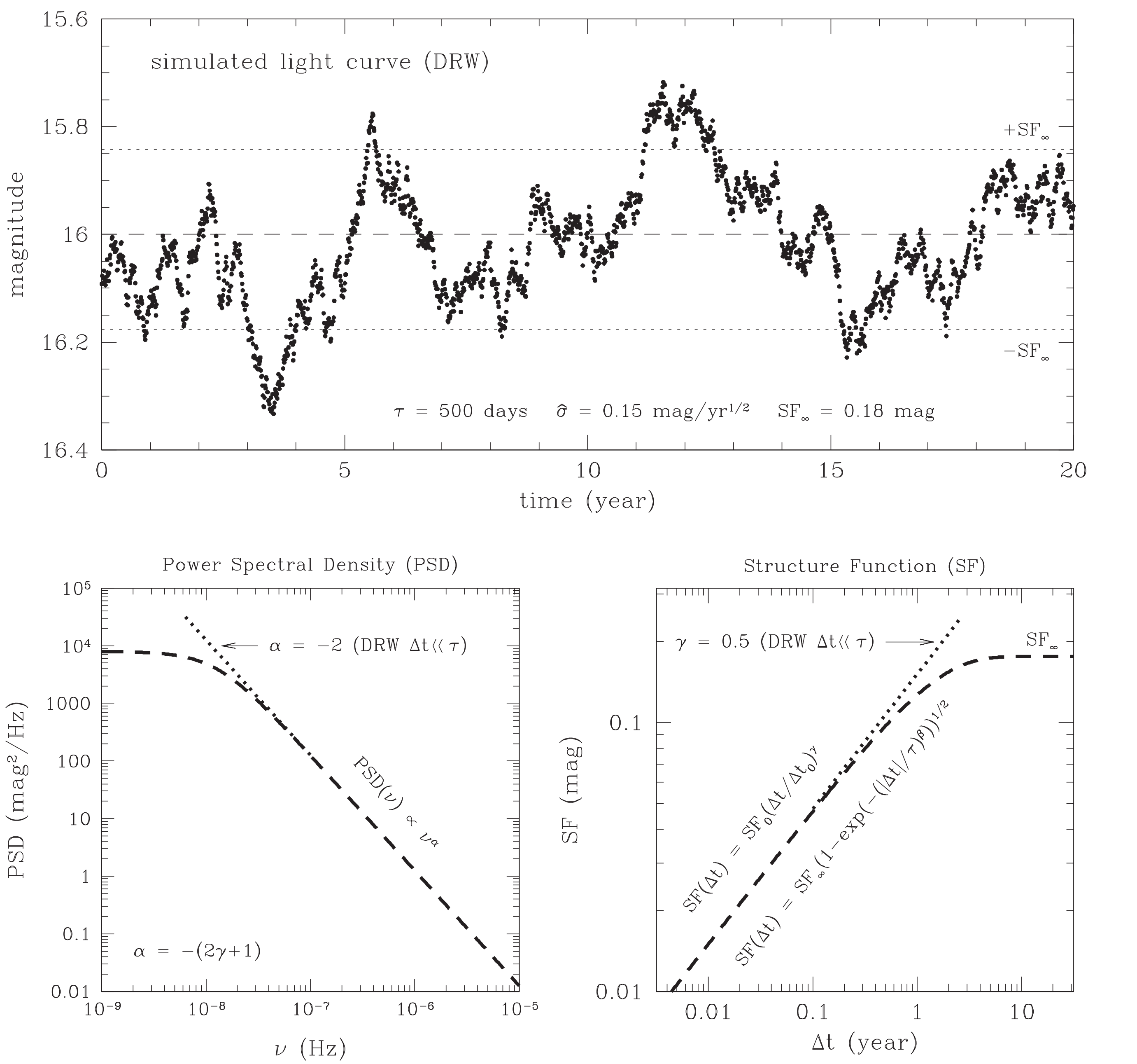


**Figure 1.** Presentation of basic active galactic nuclei (AGN) variability concepts and measures. Top panel: an idealized simulated AGN light curve using damped random walk (DRW) is shown. It can be either directly fit by the DRW (or continuous-time autoregressive moving average, CARMA) model and return the model parameters or studied via the PSD (bottom left panel) or SF (bottom right panel) analysis. Each panel also presents basic variability features related to these AGN variability measures.

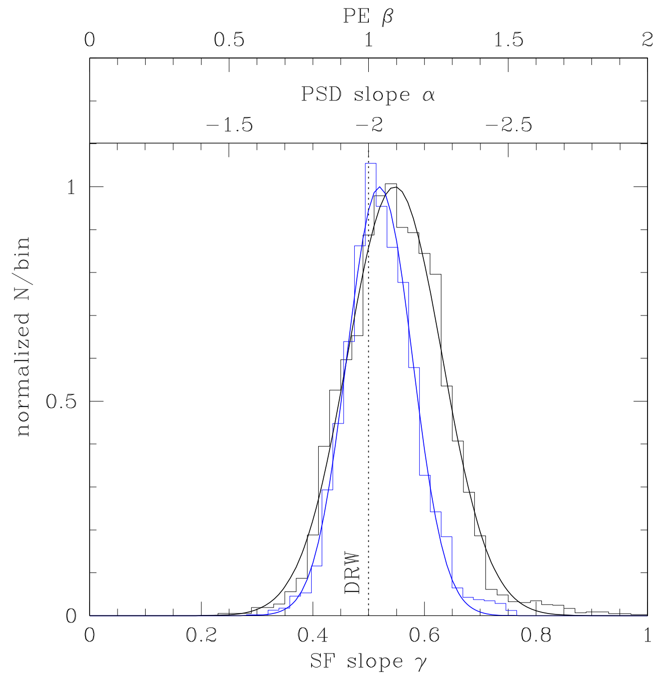


**Figure 12.** Histograms, weighted with the number of AGNs in a bin and normalized so the Gaussian fits peak at 1, of SF slopes $\gamma$ (PE $\beta$ and PSD slope $\alpha$ on top) from fitting the full SF function (black) and a single power law (SPL) SF for $4 < \Delta t < 365$ days (blue) to the redshift–absolute magnitude bins (corrected for biases). The histograms can be modeled relatively well as Gaussians with the mean values $\gamma = 0.55$ and 0.52, and dispersions $\sigma_\gamma = 0.08$ and 0.06, respectively. The DRW model ($\gamma = 0.5$) is marked with the vertical dotted line.

(1) In Section 2.5, I incorrectly assumed, instead of thoroughly checking, that for the power exponential (PE) auto-correlation function (ACF) of the form

$$\mathrm{ACF}(\Delta t) = e^{-\left(\frac{|\Delta t|}{\tau}\right)^{\beta}}, \tag{27}$$

when $\beta \to 0$, the PE ACF turns into the white noise ACF, which is obviously not true, as then $\mathrm{ACF}(\Delta t) = 0.37$ for all $\Delta t$. The white noise ACF is 1 for $\Delta t = 0$ or 0 for $\Delta t \neq 0$. In fact, for $\beta = 0$, the ACF from Equation (27) is not even a valid ACF function as it does not obey the basic ACF property because ACF for $\Delta t = 0$ must be equal to 1. From this false assumption, I claimed that for $\beta \to 0$, the power spectral density (PSD) power-law slope is $\alpha \to 0$, which is again not true, as it is $\alpha \to -1$. This can be checked by doing the inverse Fourier transform of the ACF to obtain PSD, so

$$\mathrm{PSD}(\nu) = \int_{-\infty}^{\infty} \mathrm{ACF}(\Delta t)\, e^{-2\pi i \nu \Delta t} d\Delta t. \tag{25}$$

The conversions between the power-law slope powers of the PSD ($\alpha$), structure functions (SF; $\gamma$), and the PE ($\beta$) are

$$\alpha = -(\beta + 1), \tag{E1}$$

and since the SF slope $\gamma = 0.5\beta$, we have

$$\alpha = -(2\gamma + 1), \tag{E2}$$

which is exactly the equation as reported by e.g., Bauer et al. (2009). I correct Figures 1 and 12 accordingly. Because the PSD analyses were not used in this paper, this has no impact on the results presented in the paper.

(2) In Section 2.4, Equation (20) is presented in a "simplified" notation, where the $\mathrm{IQR}(\Delta t)$ means the interquartile range of the magnitude differences $\Delta m$ of data points separated by $\Delta t$, and not IQR of plain $\Delta t$. Similarly, the $\mathrm{IQR}(n)$ means, the interquartile range of the magnitude differences $\Delta m$ of data points separated by $\Delta t < 2$ days, are hence regarded as the photometric noise $n$.

(3) In Section 4.2, both discussions and conclusions on the impact of the data length or cadence on the measured DRW parameters are too simplistic. I have thoroughly studied these issues in a subsequent paper and the reader is kindly asked to refer to that paper (Kozłowski 2017).

S.K. acknowledges the financial support of the Polish National Science Center through the OPUS grant number 2014/15/B/ST9/00093 and MAESTRO grant number 2014/14/A/ST9/00121.

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