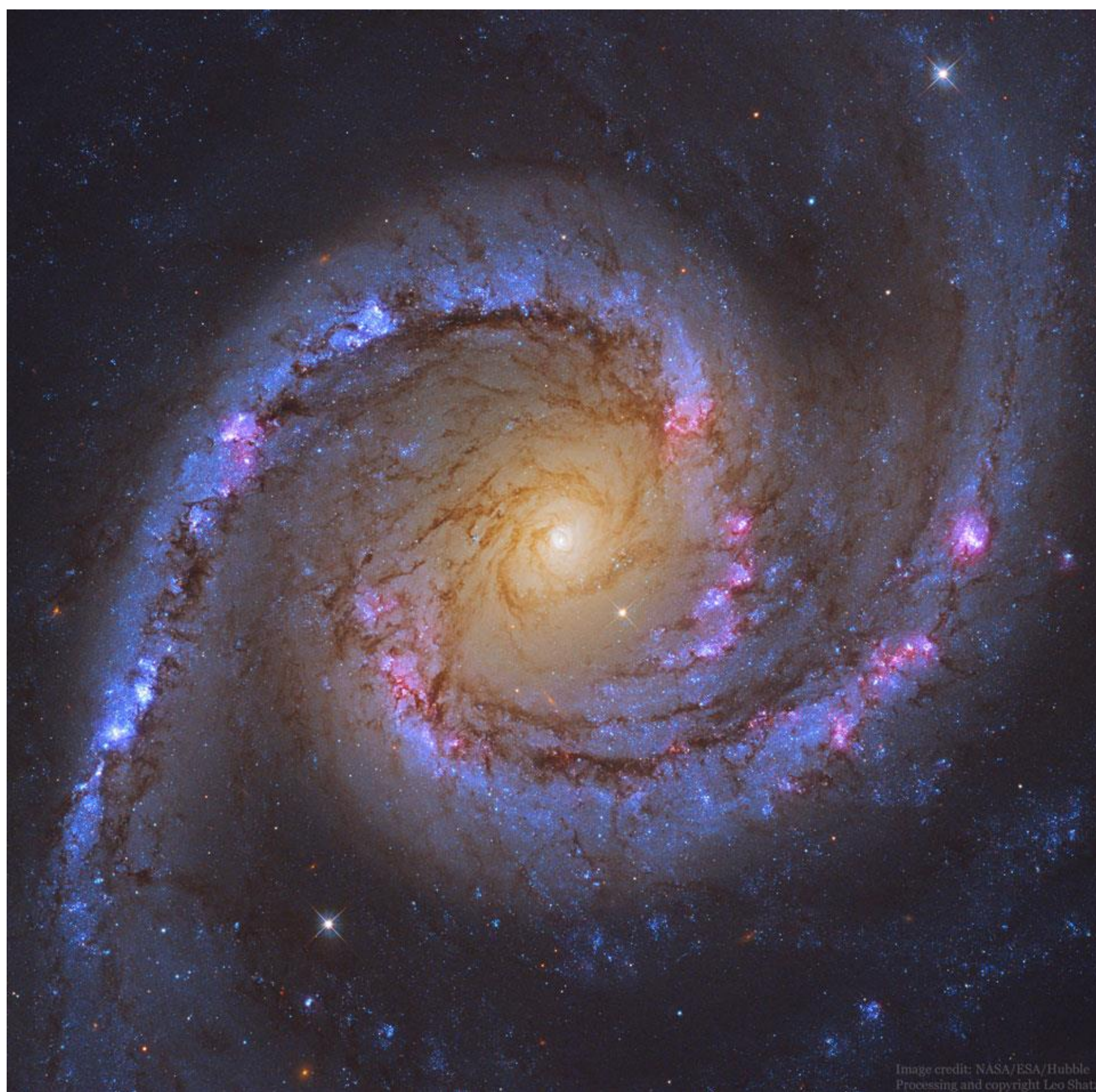


Changing Looks (CL) of the nucleus of the Seyfert Galaxy NGC 1566 compared with other CL AGNs

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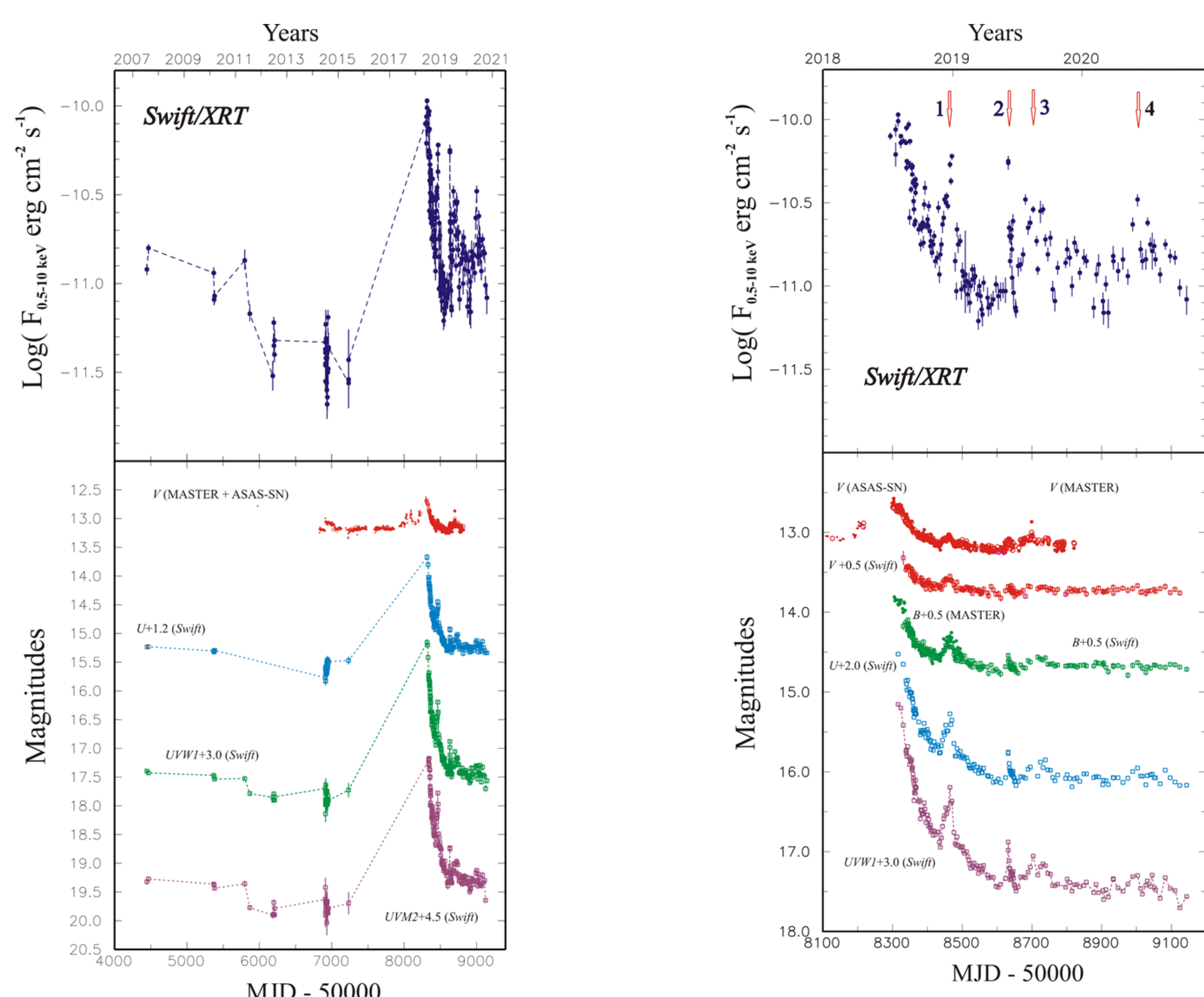
Abstract

We present results of a long-term optical, UV and X-ray study of variability of the nearby changing-look (CL) Seyfert NGC 1566 which was observed with the Swift Observatory from 2007 to 2020. We summarize our previously published spectroscopic and photometric results. We reported on the alteration in the spectral type of NGC 1566 in 2018. Moreover, we focused on the exceptional post-maximum behavior after 2018 July, when all bands dropped with some fluctuations. We observed four significant brightenings in the post-maximum period. We have found differences in X-ray and UV/Optical variability. The Luv/Lx ratio was decreased during 2018-2020. New post-maximum spectra covering the period 2018 November 31 to 2019 September 23 show dramatic changes compared to 2018 August 2, with fading of the broad lines and [Fe X] λ 6374 until 2019 March. Effectively, two changing look (CL) states were observed for this object: changing to type 1.2 and then returning to the low state as a type 1.8 Sy. We suggest that the changes are mostly due to fluctuations in the energy generation. Variability properties of NGC1566 are compared with our results for other CL active galactic nuclei.



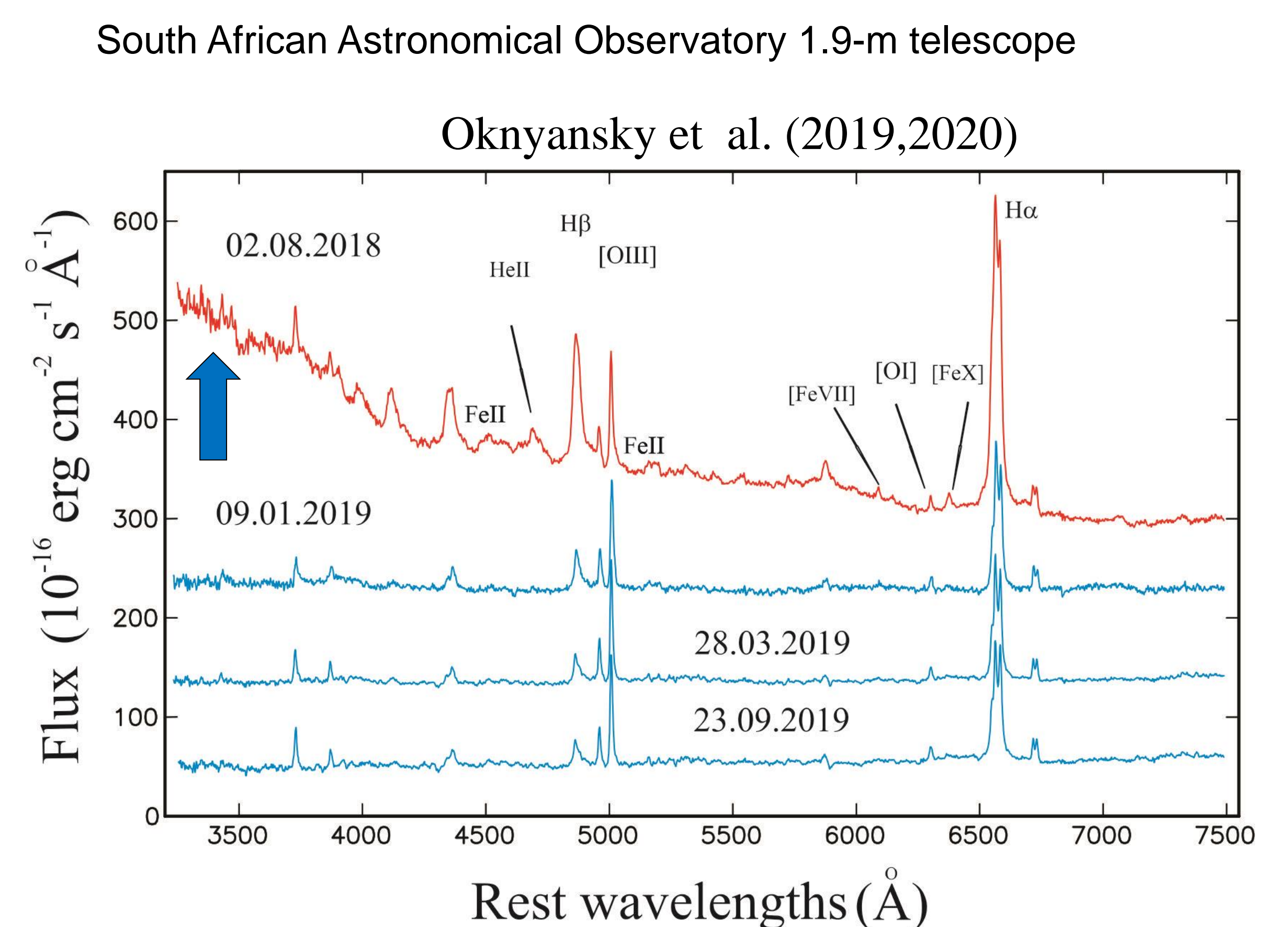
NGC 1566: The Spanish Dancer Spiral Galaxy
Image Credit: NASA, ESA, Hubble; Processing & Copyright: Leo Shatz

Light curves



Multi-wavelengths observations of NGC 1566 spanning period 2007-2020 (left) and last few years (right). *Top panels:* Swift/XRT X-ray flux *Bottom panels:* optical/UV observations (See details Oknyansky et al. 2019,2020,2022)

Spectra



Non-stellar spectra of NGC 1566 obtained by subtraction of the stellar spectra in high and low states (see details in publications). The top 3 spectra are shifted up for display purposes

Common properties of CL AGNs

1. After the strong outbursts, as a rule some re-brightenings occur.
2. CLs are recurrent events .
3. UV/X-ray ratio drops down at post main maximum time.
4. UV and X-ray variations are correlated but some uncorrelated events are typical.
5. During the strong outbursts the dust sublimates and can be recovered at low state for at least a few years.
6. $H\alpha/H\beta$ is $\sim 5-10$ in low states.
7. Coronal lines ([FeX] λ 6374) are variable and blueshifted.
8. Appearance of a strong UV bump in continuum during the high states.
9. Low accretion rate $\ll 1\%$ Edd in minima and a few % in maxima

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