

# Study of Variable Stars in the Field of Open Cluster Stock 1

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#	Name	Other	Coord (J2000)	Type	Max	Min	System	Period	Epoch (JD)	ttype	Sp	Comment	L.Curve	Find.Chart	Data
1		Gaia DR3 2021434299305459968	19 35 15.765 +24 59 41.15	EB	16.23	16.74	R	0.4394	2459784.2454	Min		<a href="#">Comm. 1</a>	<a href="#">42749_ph.png</a>	<a href="#">42749_fchart.png</a>	<a href="#">lc_42749.txt</a>
2		Gaia DR3 2021446978049705216	19 35 19.187 +25 11 59.30	EB	16.12	16.46	R	0.539	2459784.4152	Min		<a href="#">Comm. 2</a>	<a href="#">42686_ph.png</a>	<a href="#">42686_fchart.png</a>	<a href="#">lc_42686.txt</a>
3		Gaia DR3 2021521538687523200	19 35 53.651 +25 26 17.20	DSCTC	14.578	14.605	R	0.07147	2459781.4300	Max			<a href="#">09983_ph.png</a>	<a href="#">09983_fchart.png</a>	<a href="#">lc_09983.txt</a>
4		Gaia DR3 2021521160730408960	19 36 07.670 +25 27 10.78	BY:	13.97	14.01	R	0.8492		Max			<a href="#">09376_ph.png</a>	<a href="#">09376_fchart.png</a>	<a href="#">lc_09376.txt</a>
5		Gaia DR3 2021428041491192960	19 36 18.142 +24 59 10.62	EB	16.94	17.55	R	0.471	2459785.3252	Min		<a href="#">Comm. 5</a>	<a href="#">43778_ph.png</a>	<a href="#">43778_fchart.png</a>	<a href="#">lc_43778.txt</a>
6		Gaia DR3 2021453575119944832	19 36 23.346 +25 07 11.71	EA	15.98	16.64	R	0.784	2459785.4393	Min		<a href="#">Comm. 6</a>	<a href="#">04979_ph.png</a>	<a href="#">04979_fchart.png</a>	<a href="#">lc_04979.txt</a>
7		Gaia DR3 2021468276749118208	19 36 53.515 +25 17 02.91	DSCTC	15.966	16.017	R	0.2069	2459785.3330	Max			<a href="#">18739_ph.png</a>	<a href="#">18739_fchart.png</a>	<a href="#">lc_18739.txt</a>
8		Gaia DR3 2021452853565343104	19 36 59.882 +25 07 20.69	DSCTC	14.948	14.965	R	0.2484	2459782.3384	Max			<a href="#">05151_ph.png</a>	<a href="#">05151_fchart.png</a>	<a href="#">lc_05151.txt</a>
9		Gaia DR3 2021456495697916928	19 37 03.364 +25 16 14.45	EA	15.60	15.97	R	1.347	2459788.4341	Min			<a href="#">19321_ph.png</a>	<a href="#">19321_fchart.png</a>	<a href="#">lc_19321.txt</a>
10		Gaia DR3 2021462405573585920	19 37 06.357 +25 17 29.37	EB	16.07	16.22	zr	11.5489	2458341.8267	Min		<a href="#">Comm. 10</a>	<a href="#">18512_ZTF_ph.png</a>	<a href="#">18512_fchart.png</a>	<a href="#">lc_18512.txt</a>
11		Gaia DR3 2021462336854101632	19 37 09.453 +25 16 40.96	EB	16.56	16.92	R	0.4272	2459781.4248	Min		<a href="#">Comm. 11</a>	<a href="#">19093_ph.png</a>	<a href="#">19093_fchart.png</a>	<a href="#">lc_19093.txt</a>
12		Gaia DR3 2021462543012544128	19 37 12.750 +25 18 21.41	EB	15.18	15.32	R	0.8360	2459781.2796	Min		<a href="#">Comm. 12</a>	<a href="#">17905_ph.png</a>	<a href="#">17905_fchart.png</a>	<a href="#">lc_17905.txt</a>
13		Gaia DR3 2021455048249451264	19 37 18.958 +25 12 01.45	EA	16.42	16.70	R	1.058	2459782.3488	Min		<a href="#">Comm. 13</a>	<a href="#">12110_ph.png</a>	<a href="#">12110_fchart.png</a>	<a href="#">lc_12110.txt</a>
14		Gaia DR3 2021450551462745344	19 37 31.203 +25 05 24.47		15.77	15.94	R			other		<a href="#">Comm. 14</a>	<a href="#">03857_ph.png</a>	<a href="#">03857_fchart.png</a>	<a href="#">lc_03857.txt</a>

## Comments:

- Known variable star of EW type in the [VSX](#). According to our data, variability type of the star is different. MinII = 16<sup>m</sup>.40.
- MinII = 16<sup>m</sup>.26. According to the Gaia DR3 Part 1 Main source catalog, the star is indicated as a possible variable star.
- Known variable star of EW type in the [VSX](#). According to our data, variability type of the star is different. MinII = 17<sup>m</sup>.15.
- Known variable star of EA type in the [VSX](#). MinII = 16<sup>m</sup>.33.
- Our original observations were insufficient to determine periodicities. We used the available longer-term ZTF catalog data for this star via [SNAD ZTF viewer](#) (Malanchev et al., 2023).
- Known variable star of EW type in the [VSX](#). According to our data, variability type of the star is different. MinII = 16<sup>m</sup>.74.
- Known variable star of EW-type in the [VSX](#). According to our data, variability type of the star is different. MinII = 15<sup>m</sup>.25.
- Twice longer period is also possible.

14. Unclassified variable star - insufficient data.

**Remarks:**

We present the results of searching for variable stars in the vicinity of the open cluster Stock 1 in Vulpecula with the center at  $\alpha=19^{\text{h}}36^{\text{m}}$ ,  $\delta=+25^{\circ}.2$ (J2000.0). For 9 stars we did not find any references in the available star databases: [GCVS](#) (Samus et al., 2017), [VSX](#), and [ASAS-SN Variable Stars Database](#). The coordinates were extracted from Gaia DR3 (Gaia Collaboration et al., 2023).

Our observations were carried out at the Maidanak Astronomical Observatory of the Astronomical Institute of the Academy of Sciences of the Republic of Uzbekistan (Ehgamberdiev, 2018) using the 0.5-meter AMT-1 telescope with Mathis Instruments MI-750/1000 equatorial fork mount equipped with an Apogee Alta U16M (2K×2K) CCD camera. The physical size of a CCD pixel is 9 microns. We used 2×2 binning, which corresponds to 0.907"/pixel, and the field of view was 30.9"×30.9". We used Bessel R filter with exposure time 210 seconds. The temperature of the camera was set to 15°C. Calibration images: bias, dark and flat were also obtained for each observational date. Observations were carried out during the time interval from July 20 to July 28, 2022 (JD 2459781.27 – 2459789.26). During 7 nights we obtained 466 images. All of them were processed with master bias, dark, and flat frames using standard IRAF packages. The [VaST](#) software package (Sokolovsky and Lebedev, 2018) was used to search for variable stars.

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