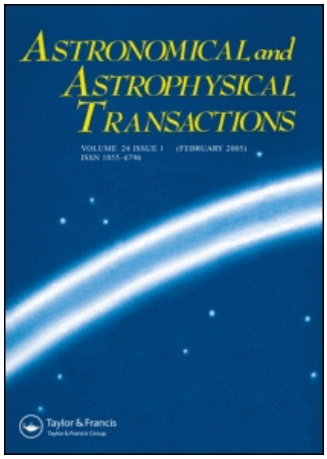

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A NEW ASTRONOMICAL STATION ON MOUNT DUSHAK-EREKDAG

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A new observational station of the astronomical observatory of Odessa State University was put into operation in Kopet-Dag Mountains in Turkmenistan in summer, 1992. The site has coordinates $\phi = +37^0 56'$ N, $\delta = 3^h 52^m$ E; its latitude is 2020 m. The station is located at a short distance from the observatory of Turkmenistan Academy of Science now being constructed. The meteorological characteristics and data on sky transparency are given. Observational data illustrate high quality of atmospheric transparency in this region of Central Asia.

KEY WORDS Astronomical observatory, equipment

For a modern high precision studies of stars we need to choose a site with good astroclimate. The astroclimate of Central Asia, as it has been shown, for example, by Shevchenko (1972), Kusaev (1972), is most suitable for observations with modern equipment mounted at large telescope.

In addition to the astroclimate, we take into account the following factors: the altitude of the site; possibility to observe southern stars; broad open horizon; location close to a town, easy access to the station in any season of the year and good security – and absence of ambient light at the same time; permanent supply of electrical power; and stable political situation too.

After comparison of some well-known sites: Maidanak in Uzbekistan, Sanglok in Tadzhikistan, Tien-Shan High Altitude Observatory near Alma-Ata, Mount Dushak-Erekdag in Turkmenistan – we have chosen the latter. The geographic longitude ($3^h 52^m$ E) of this station makes it possible to fill the central-Asian "gap" in location of observatories in existing asteroseismological networks of the Northern hemisphere. The latitude ($+37°56'$ N) permits to cover the part of sky to $-40°$ in the Southern hemisphere.

The station is placed on the south-western slope of Mount Dushak-Erekdag (in the spurs of Kopet-Dag Mountains), 5 km to the south–west and 450 m below the summit. The latitude of the site is 2020 m.

Ashkhabad, the capital of Turkmenistan, is in 45 km to the east and is the main source of light pollution. There are no other sources of the ambient light around.

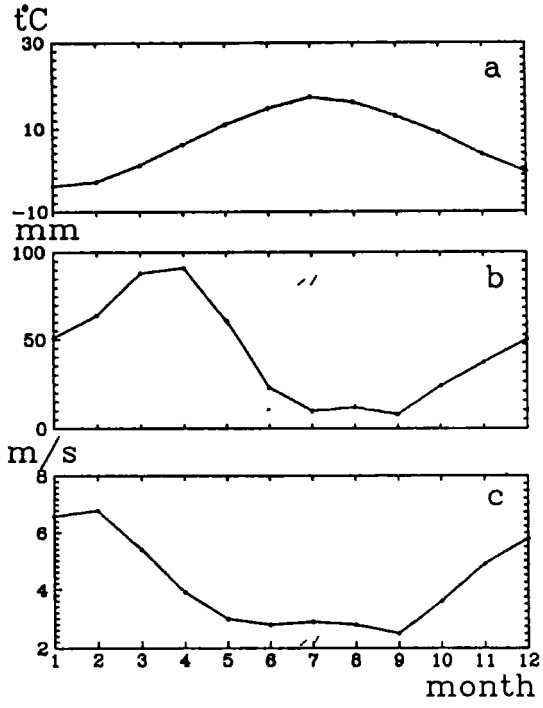

Figure 1 Diagrams of average monthly meteorological data at Mount Dushak-Erekdag during 40 years (1930–1970): *a*, temperature; *b*, precipitations; *c*, wind velocity.

The maximal screening of the horizon is 7° in the north–east. The other sides of the horizon are screened to 2–4°.

The scientists of Turkmenian Academy of Sciences tested astroclimate of the site in the seventies and the eighties (for instance, Ovezgel'dyev *et al.*, 1984; Gur'yanov and Khan, 1989; Khan, 1989). Ovezgel'dyev *et al.* (1984) presented the mean value of night-sky brightness around Pole, 22.28 mag/□, we obtained 21.5 mag/□ in zenith in May, 1993. Certainly, in autumn the brightness of the sky is lower.

We presented in Figure 1 the data integrated over 40 years which have been obtained at a meteostation that lies at a short distance from our station. One can see less than 20 mm from May to October. Due to weak winds (less than 3 m/sec) and low air humidity, the atmospheric transparency is very stable at that time. These months are most favorable for astronomical observations. It should be noted that the altitude of the site is higher than the level of dust pollution of the air. It improves and stabilized the character of atmospheric transparency, too.

We show in Table 1 mean values of the extinction coefficients for the station Dushak-Erekdag and compare these with the August–September extinction coefficients obtained by Vidmachenko *et al.* (1987) for the mountain station at Majdanak (column 5) and by Kiselev *et al.* (1989) for Sanglok station (column 6). In the third

Table 1. Comparison of extinction coefficients

band	station λ, nm	Dushak-Erekdag* 1976–1980	Dushak-Erekdag 1992	Majdanak* 1977–1985	Sanglok 1982–1985
U	370		0.65	0.51	0.71
B	420	0.36	0.30	0.30	0.46
V	520	0.26	0.23	0.20	0.32
R	630	0.17	0.17	0.15	0.26

column, the extinction coefficients are taken from the work by Ovezgel'dyev *et al.* (1984); in the fourth column, corresponding coefficients were obtained by us using several photometrical standards for Johnson's wide band system in August 1992. The data marked by an asterisk were obtained using narrow band filters, corresponding effective wavelength are given in column 2. Atmospheric transparency coefficients presented in these paper have been transformed into extinction coefficients.

The astronomical seeing was investigated by Khan (1989), and is also indicated by Khecelius (1984). It has been shown that Dushak-Erekdag is comparable with Maidanak and Sanglok observatories by of astronomical seeing.

This site has 160 clear days, 70 cloudy days, and more than 2000 photometric hours per year, according to Ovezgeldyev *et al.* (1984) There are from 80 to 90% clear nights during the observational season from August to October according to our observations in 1992–1994.

Astroclimatic advantages of the site being evident it should be noted that until now this has not been tested sufficiently enough. Further investigations are needed and regular observations at the station would allow to examine astroclimate of the site more thoroughly.

The observatory of the Physical and Technical Institute, Academy of Sciences of Turkmenistan, is presently being constructed. The wide-angle telescope with the primary mirror of 1 m diameter works there. Television observations of artificial Earth satellites and asteroids are carried out with the telescope. A dual-tube AZT-30 telescope (each mirror has 50 cm diameter) is to be put into operation. The construction of a dome for a 1.25 m telescope is in progress.

The Odessa observational station was built in 500 m distance from the Turkmenian observatory in 1991. A Ritchey-Chretien telescope with an 80 cm diameter primary mirror was mounted at the station. This telescope has a relative aperture 1:14.3 and a 20′ field of view. The telescope was produced at the Odessa Astronomical Observatory by optical and mechanical groups headed by N. N. Fashchievsky and L. S. Paulin. It has an original tubeless design, its mass is lower than that of other models. A dual-channel photometer (Dorokhov and Dorokhova, 1990) is attached to the telescope. The photometer has been constructed at the astronomical spectroscopy department of the Odessa observatory. We took part in several international photometric campaigns using this photometer during summer and autumn of 1992–1994.

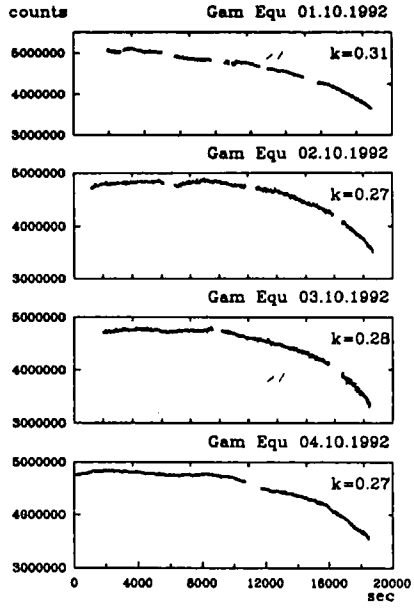

Figure 2 Stroemgren v-filter observations of the low amplitude ($0^m.0008$) roAp star γ Equ ($V = 4^m.6$), uncorrected for atmospheric extinction. Extinction coefficients for this filter for each night are indicated in the right upper corner of the diagrams.

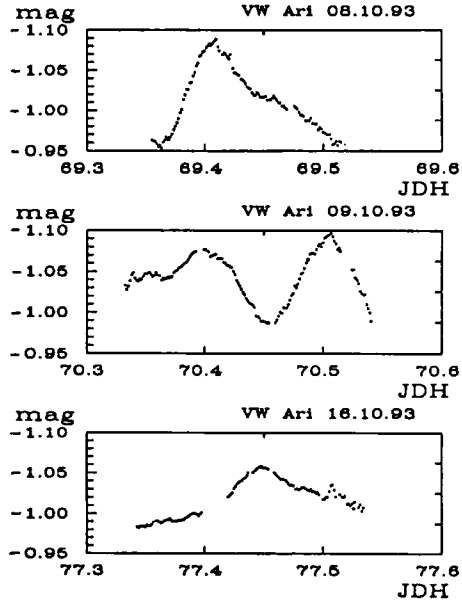

Figure 3 Light of the δ Scuti star VW Ari for different dates relative to a comparison star ($V = 7^m.5$). The comparison star was tracked with the secondary channel of the dual-channel photometer. The observations were carried out during the STEPHI campaign, 1993.

First observations of different objects: rapidly oscillating (ro) Ap and δ Scuti stars, the cataclysmic variable star TT Ari, the asteroid Toutatis etc., show good quality of data.

We present in Figure 2 raw observations of the roAp star γ Equ made during the September–October, 1992 photometric campaign organized by T. Kreidl and M. Nelson (Lowell Observatory). Observational data obtained in Stroemgren's "v"-band illustrate good stability of atmospheric transparency. In Figure 3 light curves of the δ Scuti star VW Ari in relative magnitudes are shown. This variable star was observed during the STEPHI (STEllar PHotometry International, see Belmonte *et al.*, 1991) campaign, 1993.

In spite of great political and economical difficulties in our former country, the Mount Dushak-Erekdag station of the Odessa Astronomical Observatory continues to work.

References

Belmonte, J. A., Roca Cortes, T., Vidal, V., Shmider, F. X., Michel, E., Baglin, A., Chevreton, M., Anverne, M., Alvarez, M., Jiang, S. Y., Liu, Y. Y., Fu, J. N., Dolez, M., Sareyan, J. P., and Valtier, J.-C. (1991) *A&A* **246**, 71.

Gur'yanov, A. E. and Khan, Yu. V. (1989) *Izvestiya AN TSSR* **3**, 92.

Dorokhov, N. L. and Dorokhova, T. N. (1990) *Photometry and its metrological equipment*, Moscow, p. 121.

Khan, Yu. V. (1989) *Izvestiya AN TSSR* **3**, 73.

Khecelius, V. G. (1984) In *Astroclimate and the Efficiency of Telescopes*, Leningrad, Nauka, p. 286.

Kiselev, N. N., Rakhimov, V. J., Siklitskij, V. L., and Chernova, G. P. (1989) *Bulletin Astrophysical Institute*, Tadjikistan Science Academy **78**, 65.

Kusaev, E. A. (1972) In *Young Star's Complexes. Astroclimate.*, Shevchenko V. S. (ed.), Tashkent, p. 164.

Ovezgel'dyev, O. T., Berkielyev, M. B., Korobejnikova, M. P., Nasyrov, G. A., Khan, Yu. V., and Khodjadurdyev, B. B. (1984) In *Astroclimate and the Efficiency of Telescopes*, Leningrad, Nauka, Leningrad brunch, p. 152.

Shevchenko, V. S. (1972) In *Young Stellar Complexes. Astroclimate*, Shevchenko V. S. (ed.), Tashkent, p. 84.

Vedmachenko, A. P., Dovgopol, A. N., Klimenko, V. M., and Shavlovsky, V. I. (1987) In *Methods of Improvement Optical Telescopes' Efficiency*, p.51.