VVVX Near-IR Photometry for 99 Low-mass Stars in the Gaia EDR3 Catalog of Nearby Stars

- Mejías A.[a]Send mail to Mejías A.;
- Minniti D.[a, b];
- Alonso-García J.[c, d];
- Beamín J.C.[e];
- Saito R.K.[f];
- Solano E.

Abstract

Context. Red dwarf stars, which represent 75% of stars in the Milky Way, can be studied in great detail in the solar neighborhood, where the sample is more complete. Aims. We intend to better characterize red-dwarf candidates selected from the Gαìα Catalog of Nearby Stars using optical and near-infrared multi-filter photometry from the Vista Variables in the Vía Láctea extended (VVVX) Survey, the DECam Plane Survey, the Panoramic Survey Telescope and Rapid Response System, and the Wide-field Infrared Survey Explorer. Methods. We performed a cross-matching procedure among the positions of a color-selected sample of M dwarfs in the VVVX Survey and the Gaia Early Data Release 3 sub-catalog of nearby stars. We explored their stellar parameters and spectral types using the Virtual Observatory SED Analyzer (VOSA). Radii were also obtained from the computed luminosities and Teff using the Stefan-Boltzmann equation. Masses and ages were computed for some of the objects using evolutionary tracks and isochrones. Additional mass estimations were obtained with the MKs 'M∗, relation. We then validated our results for the stellar parameters of two of our objects with spectra obtained with the TripleSpec instrument at the SOAR telescope, as well as those of our total amount of stars through a direct comparison with an independent sample from the literature. We revised the objects in our sample and compared their proper motion vectors with other sources within 3022 to identify possible companions and probed their renormalized unit weight error (RUWE) values to identify unresolved companions. Results. We present a catalog of physical parameters for 99 low-mass objects with distances from 43.2 to 111.3 pc. Effective temperatures range from 2500 to 3400 K, with the majority of stars in the sample compatible with the status of M4 dwarfs. We obtained a good agreement between the stellar parameters computed with VOSA and the estimations from observed spectra, also when comparing with an independent sample from the literature. The distribution of masses obtained with VOSA is concentrated toward the very low-mass regime. Eight objects present values of RUWE ¥ 1.4 and seven are consistent with being part of a binary system. © ESO 2022.

Author keywords

Galaxy: disk; Solar neighborhood; Stars: Fundamental parameters; Stars: low-mass; Virtual observatory tools