

The asymmetric sunrise effect on Thales' alleged measurement of the sun angular size

J. Cuadra^{1,2}

<https://doi.org/10.22201/ia.14052059p.2026.60.05>

Reports from the 2nd and 3rd Century AD attribute the first measurement of the angular size of the Sun to Thales of Miletus, in the 6th Century BC. Cleomedes, also in the 2nd Century AD, described a method to perform the measurement, based on timing the duration of the sunrise. Several modern authors have suggested Thales used Cleomedes' method, but others are skeptical of the connection. I present an objection that has not been discussed in the literature, namely, that the proportionality between the size of the Sun and the duration of sunrise is not constant, but changes with latitude and time of the year, due to what I call the "asymmetric sunrise effect". I show that this effect is large enough to have prevented Thales from obtaining the roughly accurate recorded value.

Please find a copy of the poster at https://jrcuadra.github.io/plaga/larim_thales/ or read the full-length paper at <https://doi.org/10.1093/pasj/psad026>.

¹Universidad Adolfo Ibáñez, Departamento de Ciencias, Viña del Mar, Chile (jorge.cuadra@uai.cl).

²Núcleo Milenio de Formación Planetaria (NPF), Santiago, Chile.

Unsupervised decontamination of field stars in color-magnitude diagrams of star clusters

D. M. F. Illesca^{1,2} and A. E. Piatti^{1,2}

<https://doi.org/10.22201/ia.14052059p.2026.60.06>

Knowledge of the fundamental parameters of star clusters is key to understanding the structure and evolution of galaxies. This is because star clusters are excellent tracers of the different galactic subsystems. In this work, we present an unsupervised method for decontaminating stars from the field in color-magnitude diagrams (CMD) of star clusters, developed in Python, which allows assigning statistical probabilities of membership to each star observed in the field of a star cluster.

The membership probability of a star to a star cluster is evaluated from the comparison of the properties observed in color-magnitude diagrams of the regions surrounding the cluster of interest and that of the cluster.

The method of cleaning the star clusters' CMDs consists in the implementation of a Python code that compares the CMDs of areas adjacent to the star cluster with the observed CMD of the cluster of interest. The stars removed from the observed cluster CMD are those closest to the field CMD stars. We perform this process with a thousand different adjacent fields and then estimate the membership probability of each star in the cluster based on survival in the elimination process.

This statistical method was applied to more than 30 star clusters in the Small Magellanic Cloud. This is the first step in order to determine their astrophysical parameters (e.g., age, metallicity and heliocentric distances), with the aim of analyzing their kinematics in the galaxy.

¹Instituto Interdisciplinario de Ciencias Básicas (ICB, CONICET-UNCUYO), Padre J. Contreras 1300, Mendoza, M5502JMA, Argentina.

²Consejo Nacional de Investigaciones Científicas y Técnicas, Godoy Cruz 2290, Buenos Aires C1425FQB, Argentina.