

Since the number of these “spikes” is small, they do not affect δ . Nevertheless, we have excluded from the list T all stars whose coordinates were considered doubtful by Peters and Knobel [320].

In addition, we excluded from the list T all stars whose coordinates can be considerably deformed by refraction (see Canopus in Table 1).

7. Statistical Analysis of the Almagest Star Catalogue

7.1. Preliminary remarks. The star catalogue in the Almagest contains 1025 stars. Their coordinates (ecliptical longitudes and latitudes) are given in the catalogue with a “claimed accuracy” of $10'$, i.e., the author believed that he really reached an exactness of $10'$. All stars are collected in constellations which are arranged in a natural order from north to south. We have studied a “canonical” version of the catalogue from a fundamental work [320], which contains, in particular, results of the identification of the stars from the Almagest with “modern” stars. As we mentioned above, some “fast” stars had to be deleted from the catalogue because of their uncertain identification. One can find in [320] real errors in the coordinates of stars from the Almagest star catalogue. These errors were obtained by Peters, given that the dating of the Almagest is about 100 A.D. Although these calculations do not completely fit our situation, they can be used for deleting some “large deviations” (more than 1°). We pointed out that such “doubtful” stars are not informative. As a result, we obtained a “clean catalogue” which contains 864 stars. This served as the subject of our statistical investigations.

It is interesting to note that two stars (Canopus and Previandematrix), which were removed from the catalogue, turned to be spikes, see [310] for details.

Let again l_i and b_i be the ecliptical longitude and latitude of the i -th star from the clean catalogue. Let $L_i(t)$ and $B_i(t)$ be real corresponding values for time t . A detailed and careful statistical analysis shows (see [321]) that the longitudes in the Almagest cannot be considered reliable numerical data. R. Newton showed in [321] that these data were the result of some complicated recalculations of the initial ones. But all specialists agree that latitudes are the initial observed data. We based our investigation on latitudes only. It turns out that an analysis of only latitudes gives us the possibility of separating all stars into groups having “well-measured” coordinates and groups having “badly measured” ones. We *demonstrate* in this paper *that star catalogues (not only the Almagest but many others!) can be dated with the help of only latitude data.*

Recall that the initial mean-square errors of star latitudes in the Almagest,

$$\delta = \left[\left(\sum_{i=1}^N (b_i - B_i(t))^2 \right) / N \right]^{1/2},$$

is equal to approximately $20'$. This accuracy does not really depend on time t ($0 \leq t \leq 25$).

7.2. Classification of latitude errors. Let t^* be the real (but unknown to us) year of the observation of the stars. We started with a decomposition of the real latitude