

covery of the oscillations of the ecliptic, all "advantages" of ecliptical coordinates disappeared.

Some of the stars in the ancient catalogues have proper names—they are the named stars. Usually these are very bright stars; among them are stars with considerable proper motion, for example, Arcturus. It is natural to suggest that proper names were given to stars that were important to ancient observers and to assume that the coordinates of such stars would have been measured with special care, and certainly several times. Hence these "named stars" can be thought of as the "information kernel" of the ancient catalogue. Later we will see how this idea gets additional support from the numerical calculations. The information kernels can vary between catalogues, but in the actual catalogues listed above, these kernels are very similar. The named stars form a clearly visible basis (or frame) on the celestial sphere, making it very convenient to measure the positions of other stars (without proper names) relative to this system of basic points.

The exactness, the accuracy, of each catalogue is very important for dating it. It is natural to suggest that the claimed accuracy of a catalogue corresponds to its scale, i.e., to the size of the unit in the scale used. For example, the size of the unit in the *Almagest* is $10'$, in Tycho Brahe's catalogue it is $1'$ and in Hevelius's catalogue it is $1''$ (see [324]). But many investigations (see [321] for example) lead us to conclude that the accuracy of the ancient catalogues must be considered most carefully. For example, R. R. Newton (see [321]) proves by statistical methods that the errors in the latitudes of some stars in the *Almagest* are $20'$, not $10'$, and that the error in the arc deviation is equal to $1^\circ 12'$. The last error contains some systematic error. When the systematic error is removed, the arc deviation error decreases to $30'$. Thus we see that the accuracy of the latitudes of the stars in the *Almagest* is greater than their longitudes [321]. The accuracy of Tycho Brahe's catalogue is considered by modern specialists to be $2'-3'$ (but not $1'$). This fact was confirmed by our own investigations (see below). It is reasonable to suppose that the accuracy of Hevelius' catalogues is close to that of Tycho Brahe's, since the two observers used practically the same instruments, making the accuracy of Hevelius' catalogues about $2'-3'$, but of course not $1''$. This hypothesis is confirmed by our calculations.

4. Errors in the Coordinates in Ancient Catalogues

For lack of space we will not discuss the possible reasons for the appearance of errors in ancient catalogues but refer the reader to R. R. Newton's book [321]. Here we list only the most important facts.

(A) Analysis of the methods used in making ancient observations and measuring coordinates shows that for actual catalogues the possible errors in the latitudes of the stars (latitude deviation) must be less, in a statistical sense, than the errors in longitudes and hence less than the errors in the arc distance (between stars). In other words, the latitudes shown in ancient catalogues are the firmest and most accurate coordinates of the stars, which is confirmed by our investigations.

(B) The *longitude deviation* can include some additional terms which are the