

Section 3.1

Statistical Properties: Introduction

3.1. Statistical Properties: Introduction

In the sections of this part a number of statistical properties of the Hipparcos and Tycho Catalogues are presented. For selected fields of both catalogues the variations of the values over the sky are displayed. Histograms give the frequency distributions of the values of the various parameters. The dependence of average values on the value in another field is given for relevant cases. These results can be found in Section 3.2 for the Hipparcos Catalogue, and in Section 3.3 for the Tycho Catalogue.

Furthermore, results from comparisons of the Hipparcos and Tycho Catalogues with other catalogues: the Hipparcos Input Catalogue (HIC), the Fifth Fundamental Catalogue (FK5), and the Catalogue of Positions and Proper Motions (PPM) are presented in Section 3.4.

In Section 3.5 astrophysically related properties of the Hipparcos Catalogue are given, including Hertzsprung-Russell diagrams for different selections of stars.

Section 3.6 gives tables with key data from the Hipparcos Catalogue for selections of stars with a common property: nearby stars, high proper motion stars, stars with high transverse velocity, and the most luminous stars.

In interpreting the results in these sections, the reader should keep in mind that the Hipparcos Catalogue is only partly a survey; more than half of its entries have been selected on the basis of specific proposals for observation. So the distributions cannot always be considered as representative of the real stellar distribution. A much better representation of the latter is given by the Tycho Catalogue, which is a genuine survey of all stars down to its sensitivity limits.

3.1.1. All-Sky Plots

The all-sky plots in Sections 3.2, 3.3, and 3.4 are in Aitoff projection. For spherical coordinates λ ($-180^\circ \leq \lambda \leq 180^\circ$) and β this projection is defined as:

$$x = -2R \cos \beta \sin(\lambda/2) / \sqrt{1 + \cos \beta \cos(\lambda/2)}$$

$$y = R \sin \beta / \sqrt{1 + \cos \beta \cos(\lambda/2)}$$

where R is half the vertical dimension of the projection. The horizontal dimension of the projection is $4R$. The longitudinal coordinate is 0 at the centre, and increases from right to left.

In order to facilitate the interpretation of the sky plots, Figure 3.1.1 gives a coordinate grid for the Aitoff projection, and Figures 3.1.2 to 3.1.7 provide coordinate grids for the various combinations of coordinate systems and projections.

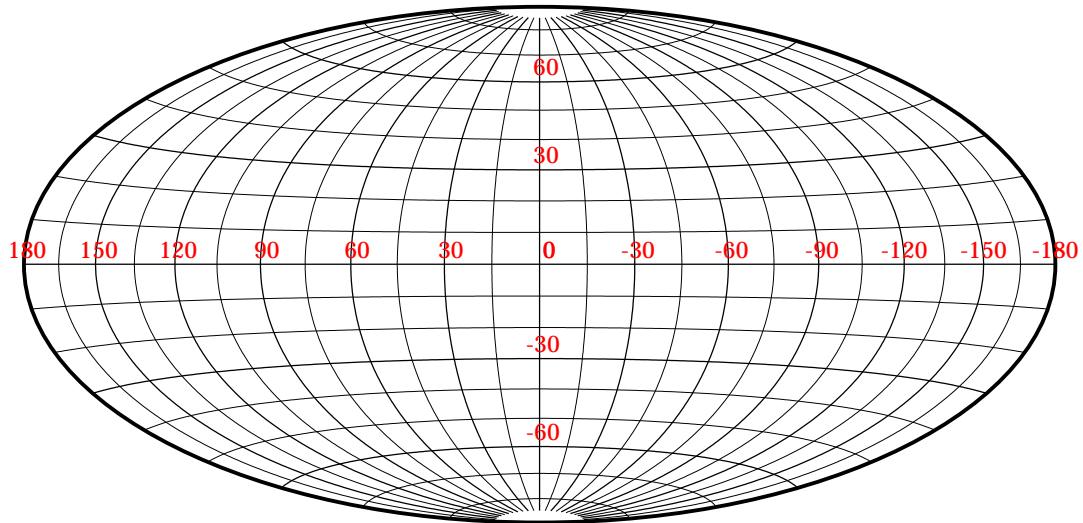


Figure 3.1.1. *Coordinate grid for Aitoff projection.*

In the sky plots, the value in each cell is the median of the values for all participating stars in the cell. The cells have been defined such that for higher latitudes a lower number of cells is chosen in the longitudinal direction, so as to preserve approximately the indicated cell size. In some plots, as indicated in the captions, the cell contents have been smoothed by taking a weighted average of the contents of the cell and its eight closest neighbours, thereby reducing the noise in the image.

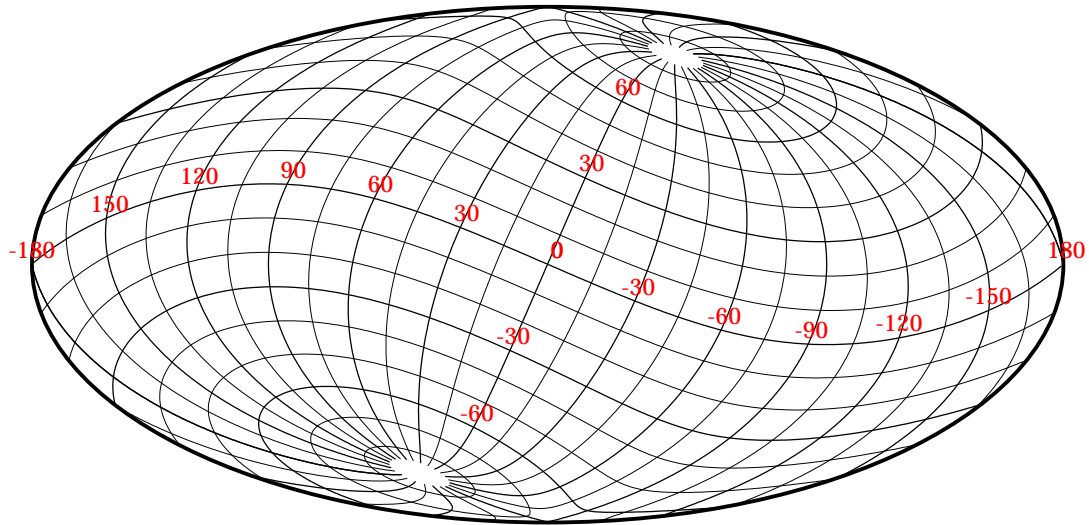


Figure 3.1.2. Aitoff projection in equatorial coordinates, showing the corresponding grid for ecliptic coordinates.

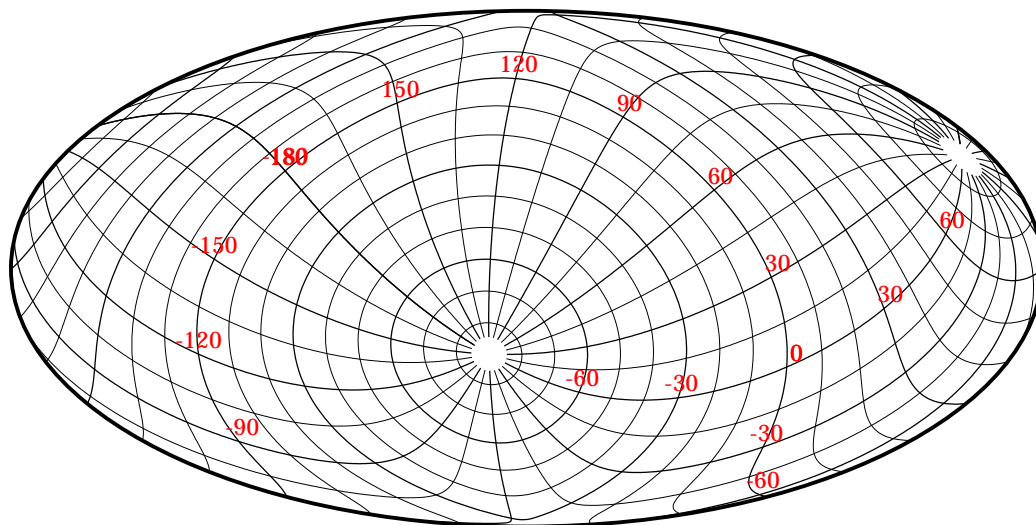


Figure 3.1.3. Aitoff projection in equatorial coordinates, showing the corresponding grid for galactic coordinates.

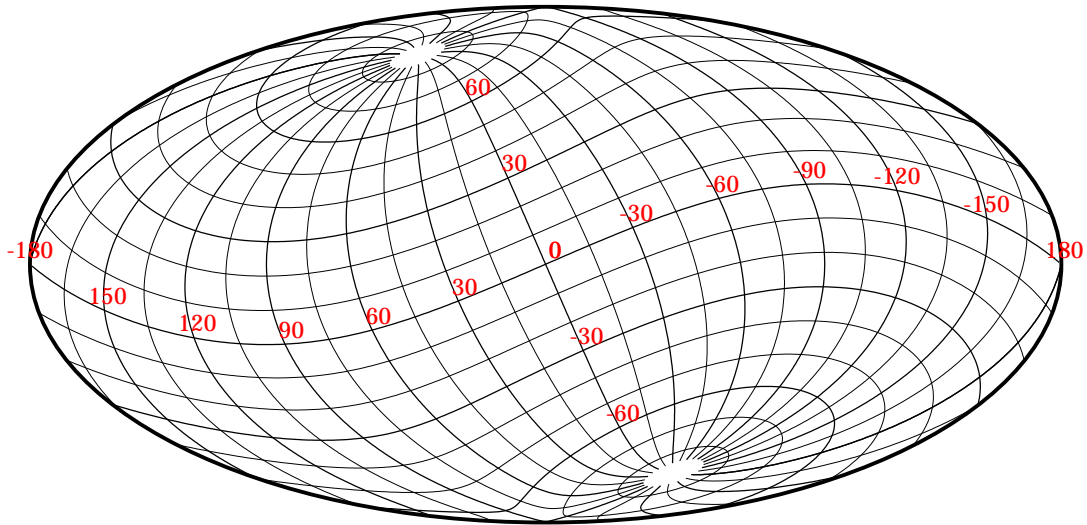


Figure 3.1.4. Aitoff projection in ecliptic coordinates, showing the corresponding grid for equatorial coordinates.

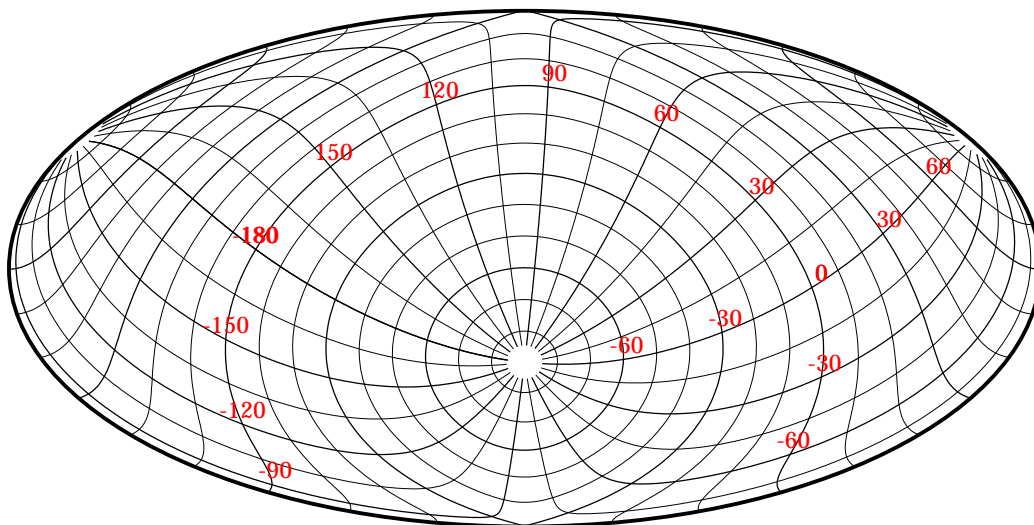


Figure 3.1.5. Aitoff projection in ecliptic coordinates, showing the corresponding grid for galactic coordinates.

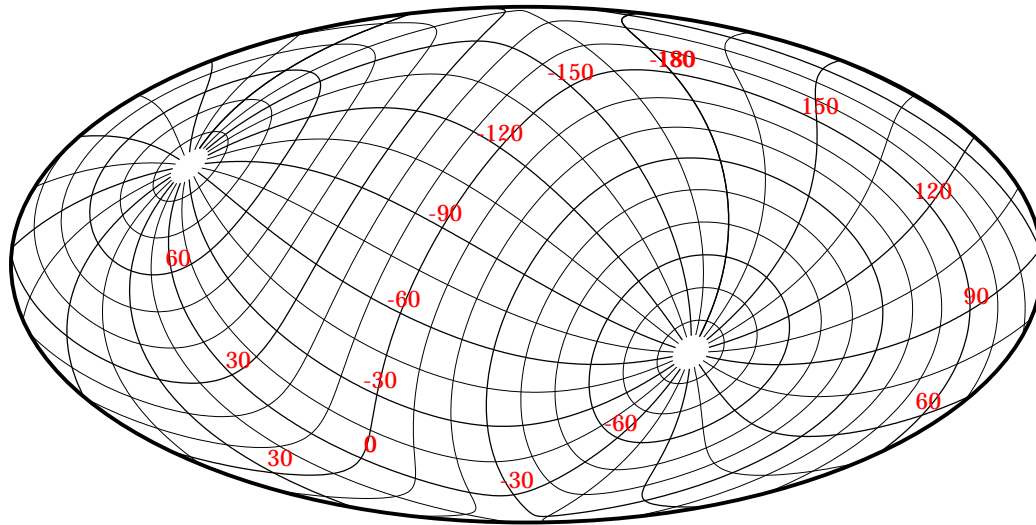


Figure 3.1.6. Aitoff projection in galactic coordinates, showing the corresponding grid for equatorial coordinates.

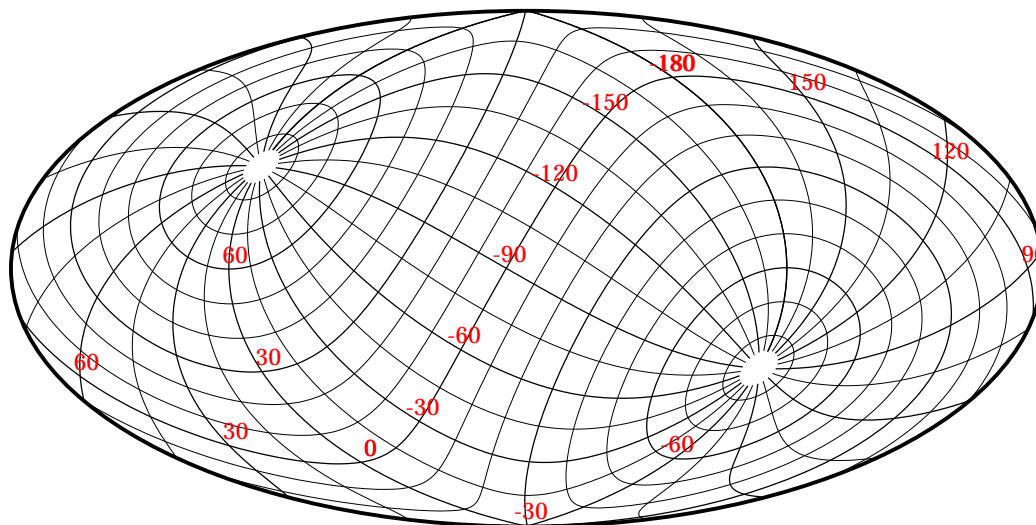


Figure 3.1.7. Aitoff projection in galactic coordinates, showing the corresponding grid for ecliptic coordinates.

