DISCUSSION ABOUT REFRACTION CORRECTIONS IN STAR CATALOGUE WORK AND GEODETIC ASTRONOMY

Chairman: J.A. Hughes

J.A. Hughes; gave, as an introduction, a summary of the problems involving refraction which are encountered in fundamental astrometry (star catalog programs):
As is well known, the values calculated on the basis of commonly used refraction tables (or theories) are not sufficiently accurate, and hence it is necessary to analyze circumpolar observations in order to deduce corrections. This procedure is only marginally acceptable since a single number (derived from many different nights and from only one part of the sky) is propagated, on a more or less ad hoc basis, over the entire sky. Thus the main problem is how to get information regarding the systematic local or regional effects, and regarding their variations as well.

B. Garfinkel: asked for information on the limitation of the Space Telescope, which will be outside of the earth's atmosphere.

J.A. Hughes: The astrometric limitations of the Space Telescope derive from the fact that it can measure very small differential angles only. The prime task of fundamental astrometry involves measuring large arcs in an absolute instrumental system.

G. Teleki; discussed several questions:
1) He underlined the importance of the connection and comparison of the old and new astrometrical observational series and for this task the refractional influences must be known with higher accuracy than nowadays.
2) Related to the refractional influences there are several philosophical and theoretical considerations, but the astrometry needs the practical instructions for the calculation of these values. Therefore it is necessary to translate our words into deeds, and to introduce nothing but new methods for the refraction calculations which are closer to the reality.
3) It is much to be wished to devise such observing methods of determining latitudes, declinations etc., which would enable us to reduce or even eliminate the refraction influences.

E. Tengström and G. Teleki (eds.), Refractional Influences in Astrometry and Geodesy, 129–130.

K. Ramsayer: For the calculation of refractional influences we must use the true atmosphere instead of a model atmosphere. On the basis of measurements of pressure and temperature with balloons we can calculate the refractive index variations and can construct the topography of the layers of equal refractive index. From these layers we could calculate by numerical integration a better value of the refraction. However, the difficulty is that the distances between the meteorological stations are too large and that the stations are in most cases too far away from the observation place.

J.A. Hughes: Agreed completely with Ramsayer's remarks, and mentioned the possible use of LIDAR to measure the isopycnic tilts. Whether or not this method could be used to absolutely measure the density of the atmosphere remains to be seen.

K. Poder: added his opinion to Ramsayer's idea, and mentioned that H. Moritz has shown that the refraction correction is a kind of conformal mapping. In this case we need several mathematical relations between purely refractional measurements and also astrometrical or geodetical observations.

B. Garfinkel: stressed the importance of refraction values calculation on the basis of modern theories, based on polytropic atmospheres, and not on the last century theories, which used the exponential distribution of density (temperature). In his opinion it would be better, instead of the application of actual atmosphere, to determine the adequate polytropic atmosphere using the balloon observations and to check this calculation against what we know.

C. Sugawa: informed about his intention to compare the formulae for the calculation of refraction for radio and optical waves in the troposphere.