Comparisons of radiative transfer models help to validate theory, used in the calculation algorithms, to estimate the accuracy of approximative calculations and to reveal bugs in program codes. Another typical cause of difference between models is incomplete agreement between optical characteristics of the atmosphere, which are used in simulations. We estimated differences of calculations, which follow from using grid functions with a finite step to determine optical characteristics of the atmosphere. Influence of grid functions is more important for limb-viewing observations, because they have the sharpest weighting functions for problem of retrieval of vertical profiles of the atmospheric gases and aerosol.

Two Monte Carlo spherical radiative transfer models took part in a comparison: MCC++ and SIRO. The geometry of the comparison coincides with the SOLSE/LORE experiment of 1997 on observation of scattering limb brightness. It is necessary to determine optical characteristics for Monte Carlo simulation not only at the grid points, but to give some distribution function between the points also. The MCC++ and SIRO models use different distribution functions between grid points by default. MCC++ uses a piecewise constant distribution function with discontinues at the grid points, while SIRO uses a piecewise linear continues one with discontinuous of derivative at the grid points. The calculations show that such divergence causes the difference in limb brightness from 0-0.1% (at tangent altitude equal to 10 km) to 0.8-1% (at 60 km) for both total and single scattering calculations. A piecewise linear function gives always a positive bias in comparison with a piecewise constant one. A decrease of a grid step to 0.2 km leads to a decrease of r.m.s. differences up to values less than 0.3% (0.04%) for total (single) scattering, what completely coincide with
probabilistic assessment of the accuracy of calculations. It was carried out a complete agreement of distribution functions of two models for a grid step of 1 km for a few simulation cases, what also gives agreement of radiance within the statistical accuracy of calculation (0.3%).