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Correcting Radiation Damage in Macromolecular Diffraction Data by Statistical Methods. Zbyszek Otwinowski, Dominika Borek, Wladek Minor, Biochemistry, UT Southwestern Medical Center, 5323 Harry Hines Blvd, Dallas, TX 75390-9038 USA.

Radiation-induced changes in diffraction intensities collected at synchrotron sources impact structure solution at all steps. The source of measured intensity is constantly changing, not only by decaying, crystal lattice. The non-decay changes may be larger than phasing signal. However, very regular nature of these changes allows modeling and incorporating them into the experimental analysis. In case of well-diffracting crystal radiation-induced changes can be easily measured but they can also be avoided by reducing the dose. The correction for radiation changes is the most important when the phasing signal is at the margin of being sufficient to solve the structure. In this case the error analysis is more complex and requires treatment of correlations between measurements errors of signals coming from anomalous dispersion and radiation damage. The presented approach is complex, however it is optimal in terms of extracting diffraction signals from samples when the radiation damage limit can be reached. The examples such analysis in practice and discussion of novel phasing possibilities will be presented.