

Profiles of Atmospheric Radiation Quantile Regression of Profiles in Time

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In the Czech Hydrometeorological Institute there exists a unique set of meteorological measurements - RADAC data - consisting of the values of vertical atmospheric levels of beta and gamma radiation. An important task required by the meteorologists is assessment of an upper confidence bound for the beta and gamma counts that might be used for warning purposes.

The primary goal of our talk is to improve understanding of the distribution of environmental radiation based on the measurements of the vertical radioactivity profiles by a sonde system. To that purpose we use a nonlinear quantile regression, which is gradually evolving into a comprehensive approach to the statistical analysis of linear and nonlinear response models for conditional quantile functions.

It is well known that the calculation of the nonlinear regression quantiles is from the computational point of view a very complicated problem. Therefore, we will show under which assumptions the quantiles can be calculated in much simpler way directly from the estimated intensity of observed radioactivity process without the need of numerical iterations.

The last part of our talk will concentrate on a combined approach to the quantiles when we have available a parametric model, and when the quantiles are estimated from the corresponding residuals either nonparametrically or parametrically.

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Key Words: Regression quantiles, vertical atmospheric radiation, nonlinear regression, Richards' growth curve.