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Conversion of historical temperature scales

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The main method adopted to evaluate the trend of climate change is the analysis and comparison of surface temperature records trough the history of meteorological observations. The main problem of such investigation is the usage of historical data, which brings many issues which can cause wrong results. Sources of inhomogeneities in historical series can be caused by the usage of various temperature sensors with different accuracy, stability, sensibility and by differences in calibration of these sensors, caused by the practice adopted in different periods and due to different international temperature scales. To allow a comparison immune to the differences introduced when a new temperature scale was adopted, all data must be corrected and converted to the current ITS-90: the International Temperature Scale of 1990, now adopted for any temperature measurement in the range of interest. In this paper we are going to concentrate on the differences in international temperature scales and their relation with the ITS-90, by presenting the mathematical model we propose to allow the conversion from historical scales to the current one. This work is also going to present the implementation of this mathematical model to a program which can be used as a conversion tool. This conversion program is focussed for the use in climatological application to directly convert also large files of historical records to the current international temperature scale. Such fast and easy comparison tool will help in the harmonisation processes of the series, including this small, but existing contribution, thus improving the quality of the resulting analysis. The work here presented has been implemented in the framework of the project “MeteoMet” funded by the EURAMET, the European association of National Institutes of Metrology, and is part of a major general effort in identifying the several sources of uncertainty in climate and meteorological records. This work was also supported by the Slovak University of Technology, grant agency VEGA - grant number 1/0120/12, APVV – grant number 0090-10 and program KEGA grant number 005STU-4/2012.