Biases in precipitation records found in parallel measurements

Petr Stepanek (1,2), Enric Aguilar (3), Victor Venema (4), Renate Auchmann (5), Fabricio Daniel dos Santos Silva (6), Erik Engström (7), Alba Gilabert (1), Zoia Kretova (8), Jose Antonio Lopez-Díaz (9), Yolanda Luna Rico (9), Clara Oria Rojas (10), Marc Prohom (11), Domingo Rasilla (12), Mozar Salvador (6), Gregor Vetacnik (13), Yzhak Yosefi (14), Maria de los Milagros Skansi (15)

(1) Global Change Research Centre, Czech Academy of Sciences, Brno, Czech Republic., (2) Czech Hydrometeorological Institute, Brno Regional Office, Brno, Czech Republic, (3) Universitat Rovira i Virgili, Center for Climate Change, C3,Tarragona/Tortosa, Spain., (4) University of Bonn, Meteorological institute, Bonn, Germany., (5) University of Bern, Institute of Geography, Bern, Switzerland. , (6) Instituto Nacional de Meteorologia, INMET, Brazil. , (7) Swedish Meteorological and Hydrological Institute, Norrköping, Sweeden. , (8) Main Hydrometeorological Administration, Bishkek, Kyrgizstan, (9)Agencia Estatal de Meteorología, AEMET, Madrid, Spain, (10) Servicio Nacional de Meteorología e Hidrología del Perú (SENAMHI), Lima, Perú, (11) Servei Meteorològic de Catalunya, Barcelona, Spain, (12) Universidad de Cantabria, Santander, Spain. (13) Slovenian Environment Agency, Ljubljana, Slovenia, (14) Israel Meteorological Service, Bet-Dagan, Israel., (15) Departamento Climatología, Servicio Meteorológico Nacional, Buenos Aires, Argentina.

Department of climate modelling and scenarios development
Belidla 986/4a, 603 00 Brno, Czech Republic
stepanek.p@czechglobe.cz

Abstract
In this work we investigate biases introduced by the transition from Conventional to automatic precipitation measurements. This is another study in the framework of The Parallel Observations Scientific Team (POST, http://www.surfacetemperatures.org/databank/parallel_measurements), which is a newly created group of the International Surface Temperature Initiative (ISTI) supported by the World Meteorological Organization (WMO).
The goals of POST are the study of climate data inhomogeneities at the daily and sub-daily level. Long instrumental climate records are usually affected by non-climatic changes, due to various reasons like relocations, changes in instrumentation, measurements schemes etc. Such inhomogeneities may distort the climate signal and can influence the assessment of trends and variability. For studying climatic changes it is important to accurately distinguish non-climatic from climatic signals. This can be achieved by studying the differences between two parallel measurements. These need to be sufficiently close together to be well correlated. One important ongoing worldwide transition is the one from manual to automated measurements. We need to study the impact of automated measurements urgently because sooner or later this will affect most of the stations in individual national networks.
Similar to temperature series, we study the transition from conventional manual measurements (CON) to Automatic Weather Stations (AWS), using several parallel datasets distributed over Europe and America. The ratio series AWS-CON are subject to quality control, and before the analysis obvious errors are removed. Further, the series are inspected for internal inhomogeneities and– if necessary –the records are split into two or more homogeneous segments. Finally, each segment is studied to understand the biases introduced by the transition, its seasonality as well as changes in the empirical distributions. When additional variables are available, an attempt is made to study the effects of other variables on the observed biases.