The challenge of porting scientific results to operational applications

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Abstract
Topic: Products - Climate service centers and data collections for scientific and public use

Climate researchers develop new methods and create new visualizations to monitor the current climate, analyze its past, or predict its future. The great challenge is then to port this results to operational applications and deliver climate products that are understandable and usable by the climate information customer. Major challenges include the unification or standardization of similar methods in different application areas, the visual and textual processing of scientific contents in reports and many more. MeteoSwiss established an internal framework of Climate Analysis Tools (CATs) to implement and operate the analysis of climate data in an operational context. The CATs aim at coordinated development, automatic production, and easy maintenance of a wide variety of climate products for internal as well as for public use (e.g., via the MeteoSwiss web site: http://www.meteoswiss.admin.ch/home/climate/present-day.html). The CATs are based on the open-source statistical software “R” (www.r-project.org) and are organized as a collection of “R”-packages with mandatory documentation. The CATs are able to provide functionalities and methods that can be (re-)used by other CATs. This ensures the usage of standardized methods for several applications. Basic tasks such as the data retrieval from the MeteoSwiss Data Warehouse (DWH) or application of consistent color tables and automatic labeling in the plots are handled coherently in all tools. Common libraries also include more scientific issues such as unified definitions of climate indices or skill scores for validation purposes. The automatic dissemination of reports ease and accelerate the work flow to provide climate information in an operational environment. In particular, automated products are very important during extreme events, when manpower is limited and information needs to be at hand immediately. In that context, e.g., a reporting CAT classifying rare and extreme meteorological events within a reference period has been implemented. The automated reports are produced by “knitting” R and Latex together (http://yihui.name/knitr/) to generate dynamic, automated and formatted reports including descriptive text passages and statistical data analysis (such as extreme value analysis). This contribution will present the strategy and structure of the underlying CATs and will present examples of such tools linking climate research, statistics, and operational production for climate services.