Data Rescue for precipitation station network in Slovak Republic

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ABSTRACT

Transparency of archive catalogues presents very important task for the data saving. It helps to the further activities e.g. digitalization and homogenization. For the time being visualization of time series continuation in precipitation stations (approximately 1250 stations) is under way in Slovak Republic since the beginning of observation (meteorological stations gradually began to operate during the second half of the 19th century in Slovakia). Visualization is joined with the activities like verification and accessibility of the data mentioned in the archive catalogue, station localization according to the historical annual books, conversion of coordinates into x-JTSK, y-JTSK and hydrological catchment assignment. Clustering of precipitation stations at the specific hydrological catchment in the map and visualization of the data duration (line graph) will lead to the effective assignment of corresponding precipitation stations for the prolongation of time series. This process should be followed by the process of turn or trend detection and homogenization. The risks and problems at verification of records from archive catalogues, their digitalization, repairs and the way of visualization will be seen in poster. During the searching process of the historical and often short time series, we realized the importance of mainly those stations, located in the middle and higher altitudes. They might be used as replacement for up to now quoted fictive points used at the construction of precipitation maps. Supplementing and enhancing the time series of individual stations will enable to follow changes in precipitation totals during the certain period as well as area totals for individual catchments in various time periods appreciated mainly by hydrologists and agro-climatologists.

Fig. 1 **Time Series in alphabetical order**

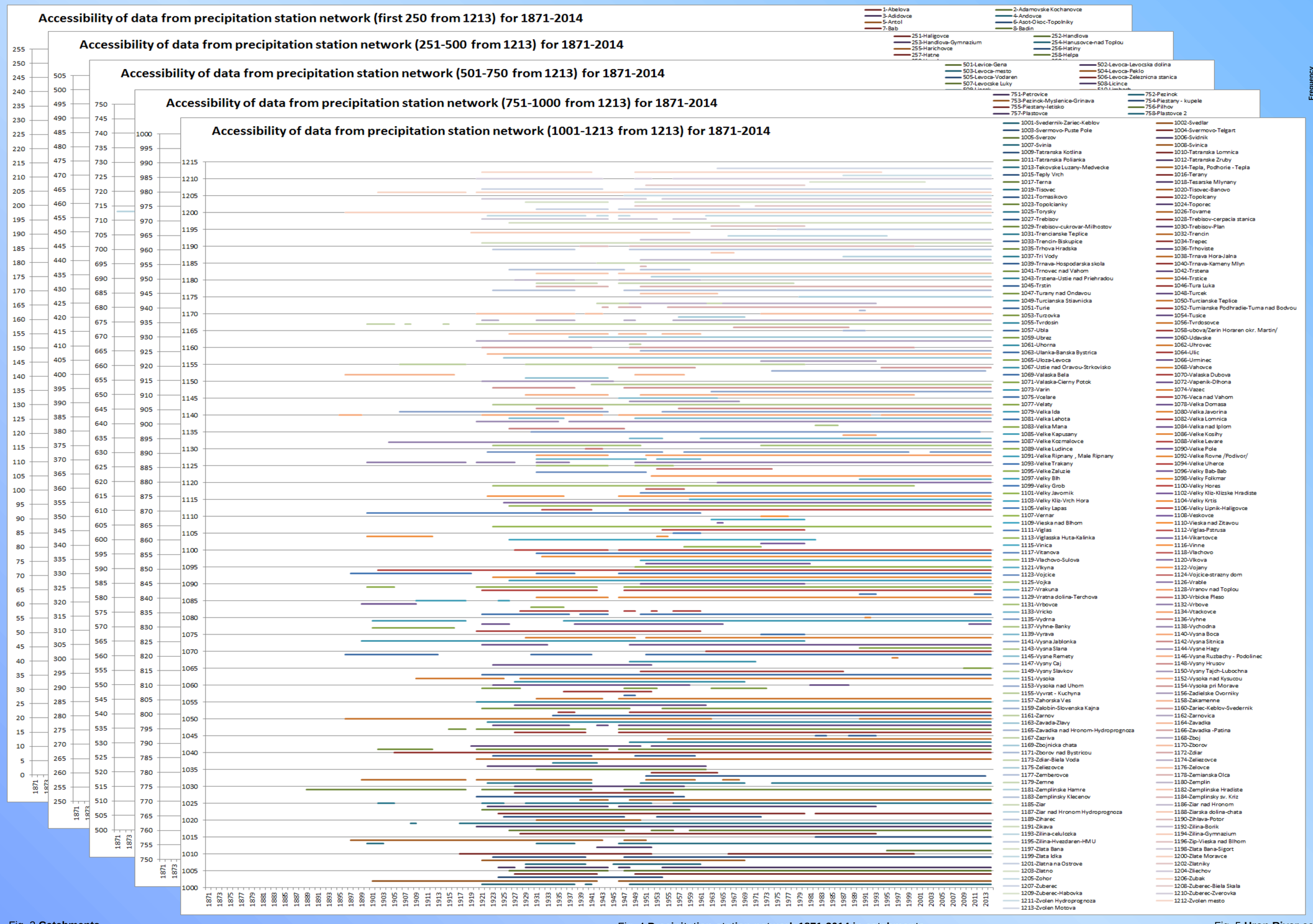
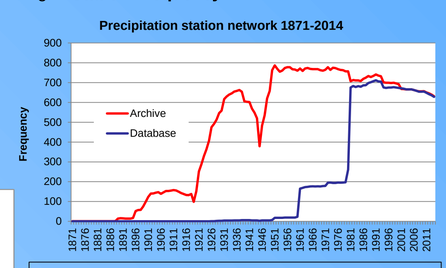


Fig. 2 **Station Frequency**



Basic steps and facts during the process of **Data Rescue** of precipitation station network in conditions of Slovakia:

1. Archive catalogue, which consists precipitation station name, period of observation (from-to), station indicative (if exists) and the place (drawer) in archive. Stations were in alphabetical order, with many errors and duplicities coming from the fact that many stations have changed location during the history of observation so they got two or three names with changeable order in the list. These duplicities have been eliminated after first round of station visualization in tabular form.
2. Stations have been sorted in alphabetical order (to better find if indicative does not exist) and each precipitation station has adopted code number. Line graphs have been drawn (Fig. 1). Because of excel sheet does not enable to display more than 250 time series (lines), 1213 precipitation stations have been divided into five line graphs sorted by station name. This is useful for knowing the length of the time series of concrete precipitation station.
3. Number of precipitation time series since 1871 can be seen in Fig. 2, archived (red line) and digitalized (blue line). It means that almost 60% of precipitation data are not in database.
4. In coincidence with the annual books the latitude, longitude as well as altitude have been added for the exact period and precipitation station. Geographic coordinates have been transformed to JTSK coordinates for GIS visualization.
5. Precipitation data are useful for many sectors especially for hydrology. That's why we use hydrological catchments (Fig. 3). Precipitation stations have been placed into the catchments of Slovakia (Fig. 4). To be clear concrete catchment should be chosen (example Fig. 5 4-23-01 and later on other partial sub catchments of 04-23).
6. Overlapping periods of observations at precipitation stations in chosen 04-23-01 catchment are shown (Fig. 6).
7. Data processing according to standard procedures and rules (e.g. MISH, MASH, AnClim etc.) (Fig. 7).
8. Special (future) task: Mountain stations (often in rare location) not yet digitalized have been separated from the list (Fig. 8). Their time series have various length lying in various altitudes and catchments. According to the digitalized data stored in database and not digitalized data observing at the same time mountain stations may be supplemented and homogenized.
9. Most of the stations not in database but important for mountain precipitation investigation lies in the altitude 500-2000 m a. s. l. (Fig. 9) with the peek of occurrence in altitude interval 701-800 m. Benefit consists of better identification of precipitation and snow conditions in higher altitudes for space data processing dealing with river drain and flow from concrete catchment as well as prediction of avalanches alert.

Fig. 3 **Catchments**

Fig. 4 **Precipitation station network 1871-2014 in catchments**

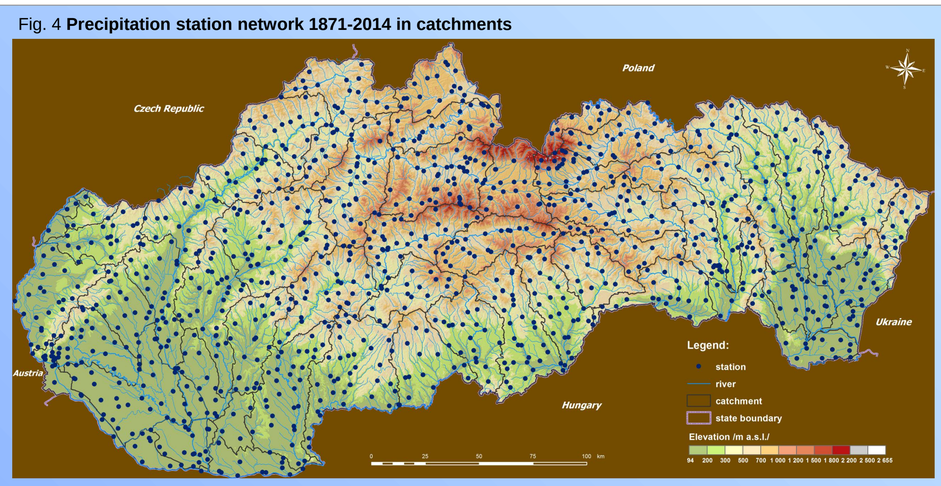


Fig. 5 **Hron River catchments** 4-23-01 (4-23-02, 4-23-03, 4-23-04, 4-23-05)

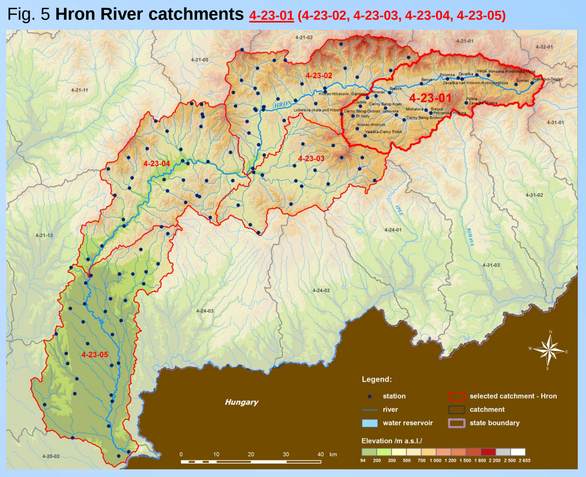


Fig. 6 **Precipitation station network (04-30-03 catchment) in time series**

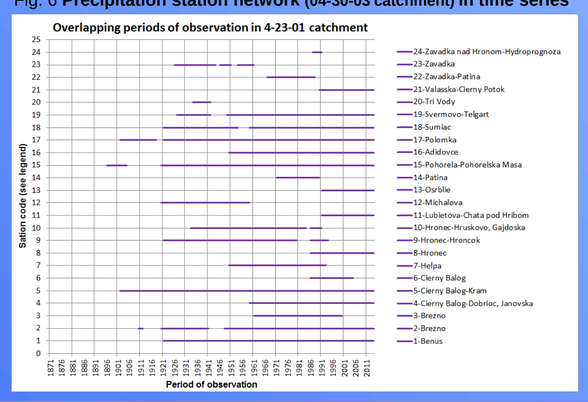


Fig. 7 **Data processing**

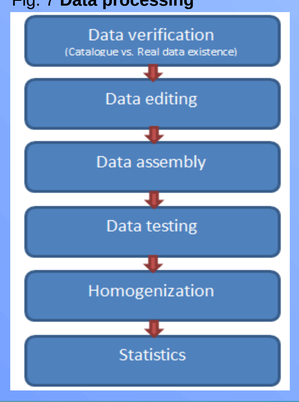


Fig. 8 **Mountain stations (not digitalized) – placement in catchment**

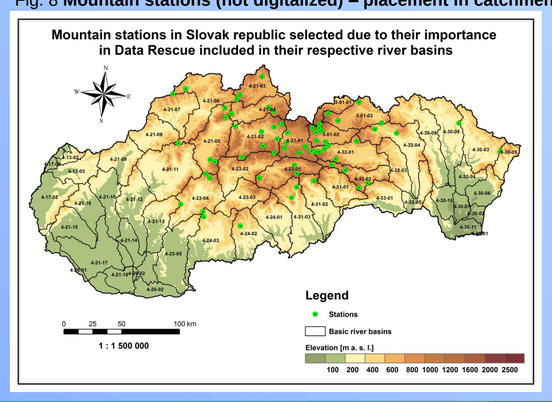
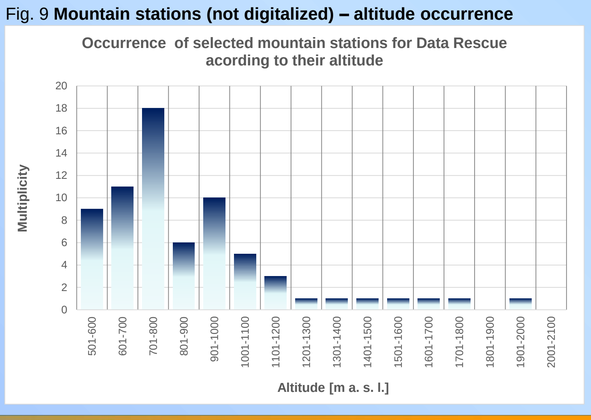


Fig. 9 **Mountain stations (not digitalized) – altitude occurrence**



CONCLUSION

Archive data represent national heritage. Data Rescue is the ongoing process of preserving all data at risk of being lost due to deterioration of the medium and digitizing current and past data into computer compatible form for easy access. The establishment of the data rescue team plays important role and its activities have a high priority within WMO Programs that's why national activities have been encouraged to start. In poster the basic steps during the data rescue process have been mentioned. Many problems dealing with station names consisting of more words, or having been written down twice or more times in the catalogue under the identical time of observation concerning place and position of the station in annual books had to be solved before assigning code for line graph (Fi. 1) describing the time series. Most of the precipitation data have not been digitalized yet (Fig. 2). Professional staff is shrinking (retiring) and students cannot substitute this kind of work. Daily or monthly data have to be decided for digitalizing. Project for data rescue should be supplied and managed internationally. Precipitation data dropping in certain catchment (e.g. there is depicted the catchment of the Hron River) play significant role for the assessment of river flow rate and runoff downstream (especially for hydrology Fig. 3, 4 and 5), snow loading and water snow cover, preparation of standards and determination of areas from the point of avalanches alert as well as tourism. These knowledges lead us to the future solution of mountain stations operated often by foresters (Fig. 8 and 9) and situated in very interesting and significant altitudes in such a way as to include the data from these stations into the future data processing. Homogenization of precipitation data of individual catchments will result in possibility to compare precipitation relations in the respective season in connection with hydrological relations of the same season and catchment for surface as well as ground water.

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REFERENCES

http://www.wmo.int/pages/prog/hwrp/datarescue.php