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Migration to BUFR/CREX of meteorological observation reports

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The World Meteorological Organization (WMO) is tring to finalize its decades-long migration plan of the format of conventional observation reports, from telgram-based traditional alphanumeric codes (TAC) to the table-driven code forms (TDCF). For major types of observatios, the deadline of migration was November 2014, and several countries terminated dissemination of reports in TAC.

There are two forms of TDCF: the preferred form is binary called BUFR, while an alternative one called CREX can be used for single-case character-based telecommunication channel. In both forms, the message contains a list of 16-bit numbers called element descriptors defines the structure of following data. Each element descriptor represents either a number (with units), an ASCII character string, an enumeration or a flag field (referring to external table). The descriptor list may include (maybe nested) repetition, and that allows XML-like semi-structured data such as list of a structure associated with other type of data.

With respect to self-descriptivity, the benefit of a TDCF message is that a new data structure can be analyzed without documentation, while the self-description is completed only after referring to external tables. Some features are considered old-fashoned (in comparison to XML), such as being binary, number-based, referring to external tables. Sometimes it is explained that the telecommunication bandwidth was much more expensive at the early stage of TDCF development in 1990s, and the short size had to be pursued at the sacrifice of readability. But the features have benefit of reducing freedom of representation, which is important for stability of operational system.

The migration to TDCF is almost perfect for satellite data, while it takes many yeares for surface-based observation, since all WMO members have to change their own systems. Use of upper-air sounding in TCDF requires great effort and care; firstly the TDCF was planned to have more elements and precision, while many countries circulate reformatted TAC with compromised content.

Keywords: WMO, World Weather Watch Programme, Upper-air obsservation, Table-driven code form, BUFR, TEMP