Photo – National River Flow Archive

Harmonization of Methodologies, Quality Control and Access to Data

WMO RA-VI Hydrology Forum

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Structure

1. Background
2. Survey of Forum Members
3. Quality control (including example regarding data infilling methods)
4. Standards (including example from the UK)
5. Training and knowledge exchange
6. Possible future forum activities
7. Discussions

Background

- Hydrology Forum 2012:
  - Data management a recognised problem.
  - Both data systems (e.g. databases, data standards) **AND** practices (e.g. quality control, development of rating curves).
- 2012-2014:
  - Forum task to assess NHSs requirements around data management.
  - Linked to forum tasks on monitoring needs (Dominique Bérod), network design (Elise Trondsen) and data sharing (Ulrich Looser).
  - CHy progress: data standards (e.g. WMO/OGC HDWG – WaterML) and operational standards (QMF-H)
  - National developments, for example: UK Development of national data management standards.

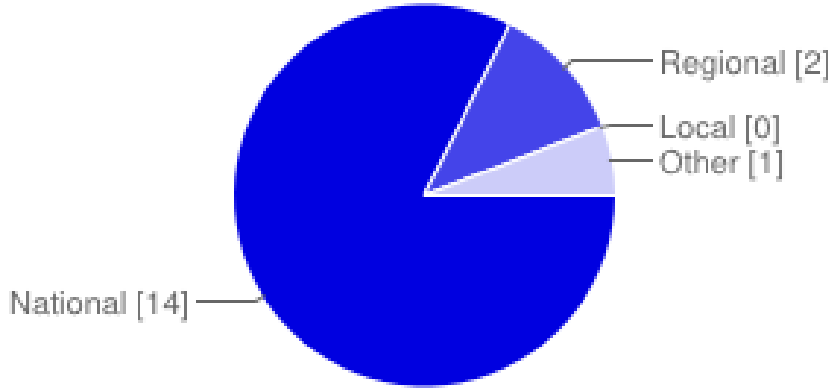
Survey of Forum Members

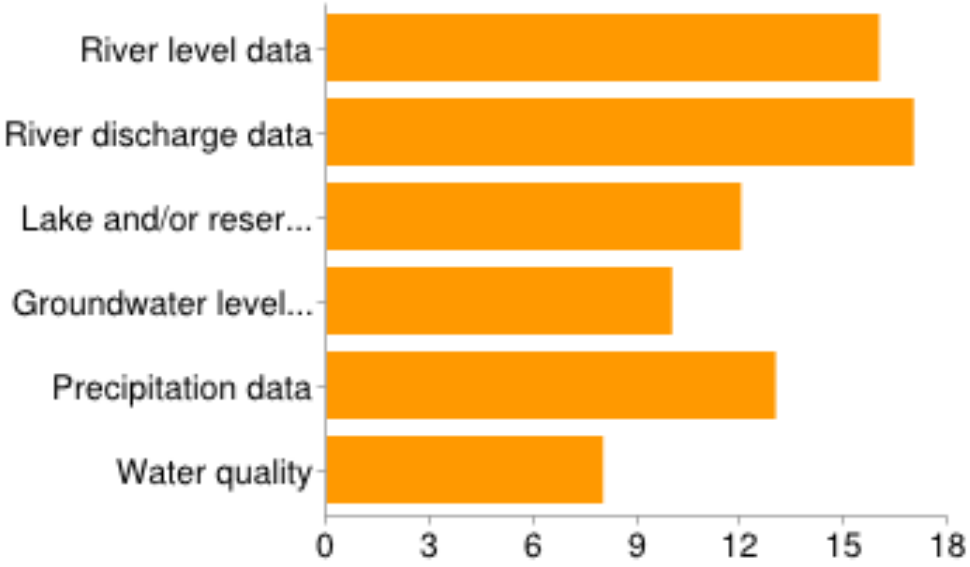
- Survey concentrated on data management practices and gather ideas for future forum activities.

1. Data quality control and processing: e.g. infilling missing data
2. Data management standards
3. Knowledge exchange and training

Response

- 17 responses – THANK YOU!
- Spread across Region VI





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Quality Control and Data Management

We're all using common methods:

Visual (graphical) inspection of records.	94%
Manual comparisons with backup data and/or other records	88%
Automatic arithmetic checks	53%
Comparisons with observations from neighbouring sites/catchments	88%
Catchment water balance checks	47%
Other	18%

Other common factors:

- Initial quality control: Daily/Weekly/Monthly
- More detailed quality control: Yearly
- Quality control often completed by different hydrologists (sometime different organisations).

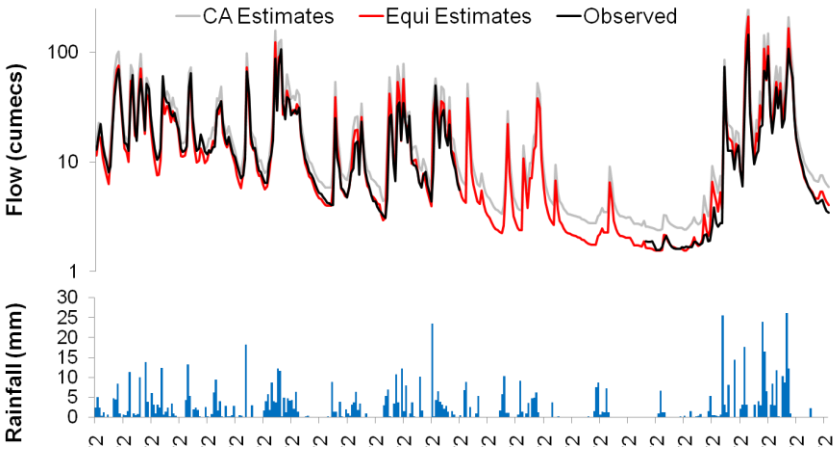
Quality Control and Data Management

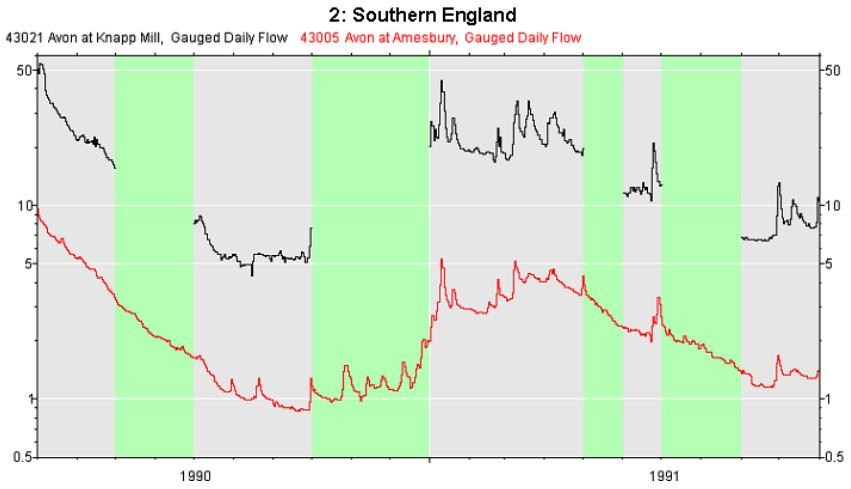
We're facing common problems, for example:

- Qualified personnel / resources
- Data formats and units
- Databases / software
- Management and quality control of data from new instruments/technologies (e.g. ADCPs)
- Consistence in quality control over time
- When and how to infill data

Example: Infilling Missing Data

- ≈80% of us regularly infilling gap in data
- Commonly using analogue stations or interpolation





UK Experience

- Multiple organisations using different methods
- Metadata not consistent
- Research to assess 10 common methods
- Better performance of equipercentile and multiple donor techniques
- Results inform operational guidance/standards

Results may be useful to others:

Harvey, C.L., Dixon, H. and Hannaford, J. (2012). An appraisal of the performance of data infilling methods for application to daily mean river flow records in the UK. *Hydrology Research.* 43 (5). 618-636. doi: 10.2166/nh.2012.110.

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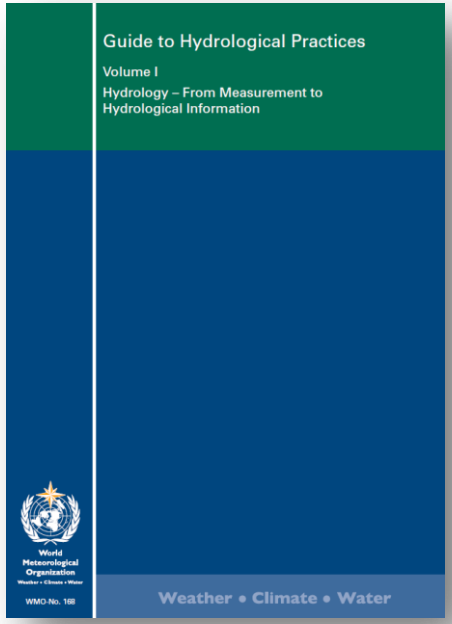
Standards

Standards for data formats/metadata/QMS exist or are being developed (e.g. WaterML 2.0, ISO 9001).

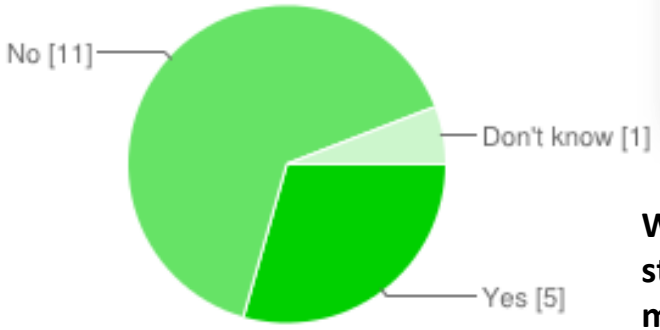
Do we need standards for hydrometric data processing & management?

WMO guidance exists but can we go further?



National Standards

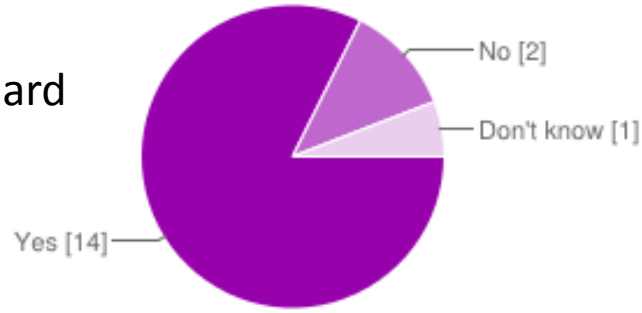
- Often internal organisation's guidelines only
- Based on WMO guidelines and ISO 9001



International Standards

- Currently no ISO / CEN standard
- CEN proposal (Sept 2014) to develop a European Standard

Would an international standard on hydrometric data management be beneficial to your organization?



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Example: UK Standard

Code of Practice for the Management of Observed Hydrometric Data

Based on BS 7898: 1997 but significant rewrite to take account of new technology and measurement methods.

1. Principles of hydrometric data management
   - Requirement for data management
   - Data types and terminology
   - Maximizing data utility

2. Metadata
   - Monitoring station metadata
   - Monitoring site metadata
   - Monitoring point metadata
   - Observation metadata

3. Precipitation data
   - Raw data
   - Derived data
   - Precision and accuracy
   - Data processing and formatting
   - Quality control
   - Precipitation specific metadata

4. Water level data

5. Velocity and discharge data

6. Volume data

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Public consultation: closes 30 Sept 2014

http://drafts.bsigroup.com/Home/Details/53339

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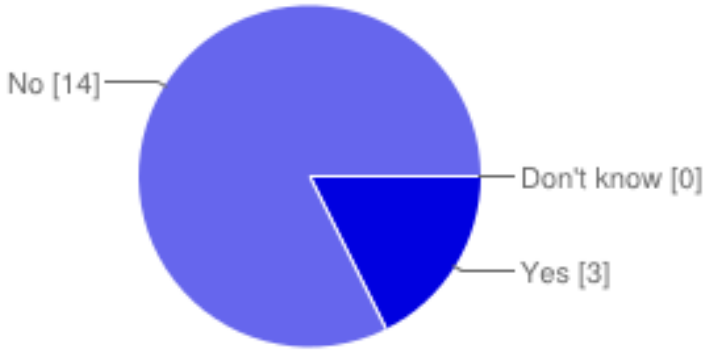
Training & Knowledge Exchange

Training and education in Data Operations and Management is top priority for RA-VI

Training Programmes for Hydrometric Data Management

- Most countries don't have formal training programmes.
- National training initiatives in Slovakia & Lithuania.



Knowledge Exchange Routes

- One-to-one learning / personal communications.
- Internal technical training courses.
- Workshops / seminars / working groups.
- Meetings between different national organisations (sometime including users).
- Written instructions / guidance documents.

Training & Knowledge Exchange

Current Key Problems

- *"Good practice and knowledge are not written down and transmitted from expert to expert"*
- *"Maintaining standards and ensuring knowledge transfer especially when personnel change"*
- *"Weak international cooperation relation to hydrometric data management knowledge exchange"*
- Requirements:
  - Staff training.
  - Budget (including for training).

Possible other ways of improving international knowledge exchange:

- Web-based e-forum for sharing best practice, information, ideas, documents.
- Training courses, e-learning, personnel exchanges.

Possible Future Forum Activities

Working Group for Climate & Hydrology – Task Team on Data Operations & Management

Standards

- International comparisons of different national standards/guidelines/practices in hydrometric data management.
- Support for the development of CEN standard for Hydrometric Data Management.

Knowledge Exchange

- Development of knowledge exchange routes for sharing skills/best practice in the region:
  - Online e-forum; training workshops / e-learning; Personnel exchange

Data Rescue

- Expansion of RA VI/CCl Website on Data Rescue to include hydrology data

What other things could we do? **We need volunteers!**

Other ideas from questionnaire:

- Raise profile of hydrometric data management (PRs, public, politicians, etc..).
- Greater activity around hydrometry.

Photo – Nick Everard, Environment Agency

Dixon, Harry; Hannaford, Jamie; Fry, Matthew J. (2013).
The effective management of national hydrometric data – experiences from the United Kingdom.
Hydrological Sciences Journal.
10.1080/02626667.2013.787486

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