The following paper was originally published in the
Proceedings of the Fifth Annual Tcl/Tk Workshop
Boston, Massachusetts, July 1997

A World Wide Web-to-Database Connectivity using Tcl/Tk: The Hydrology-Meteorology Toolkit

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Abstract

The Hydrology-Meteorology Toolkit is a Tcl/Tk applets library for numerical/graphical processing hydrometeorological data. It uses Tcl/Tk as a basic language. With the Tcl/Tk Plugin installed on the W3 browser side, applets use the HTTP protocol for querying an Oracle database server and managing i/o C programs towards Tcl CGI scripts.

1. The MED-HYCOS project

The World Meteorological Organization (WMO), with the support of the World Bank, promotes the development of a World Hydrological Cycle Observing System (WHYCOS), and the first regional WHYCOS component is the MED-HYCOS project (MEDiterranean HYdrological Cycle Observing System). ORSTOM (French Institute of Scientific Research for Development through Cooperation) hosts the MED-HYCOS Pilot Regional Center.

A MED-HYCOS aim is managing and numerical/graphical processing of hydro-meteorological data *via* the World Wide Web (W3).

2. The Hydro-Meteorology Toolkit

The Hydro-Meteorology Toolkit (HMT) is a W3 tools library for the MED-HYCOS project. HMT is based on a W3-to-Database connectivity using Tcl/Tk as a basic language.

An Oracle relational database management server deals with hydro-meteorological data such as streamflow discharges, temperature, rainfall, and so on.

On the W3 browser side (Navigator, Explorer), HMT needs the Plugin Tcl/Tk to be installed. A Tcl applets (tclets) library deals with data edition, graphical representations, exploratory data analysis (Tukey, 1977) and multivariate statistical analysis. At present, these tclets use the Trusted security policy.

Depending on user interaction, tclets use the HTTP protocol for (i), querying the database towards OraTcl CGI scripts. OraTcl is a well known Tcl extension from T. Poindexter that provides access to a Oracle Database server, and (ii), managing i/o C programs for multivariate analysis methods (*e.g.* Principal Components Analysis) towards Tcl CGI scripts.

Figure 1 shows two tclet examples.

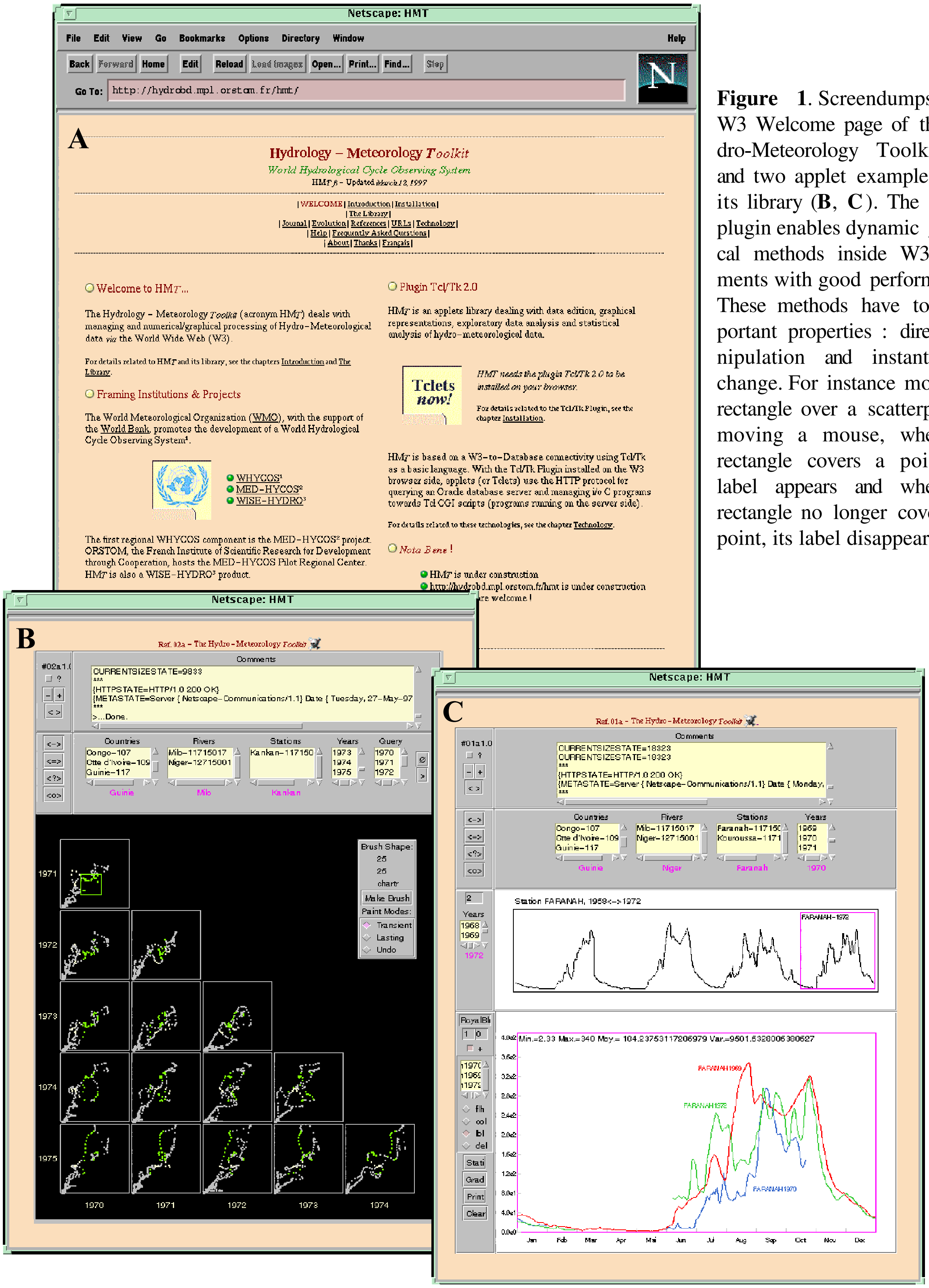
3. Conclusion

At present, HMT (http://hydrobd.mpl.orstom.fr/hmt) is still under development, but firsts results are decisive. The Tcl/Tk environment enables a powerful Human-Machine interaction inside W3 documents, such as dynamic graphical methods (Becker, Cleveland & all, 1987), with good performances. Moreover, it facilitates the development of the information system toward the homogenization of its architecture (*i.e.* Tcl for the CGI scripts instead of Perl and Pro*C for the SQL queries, and Tcl/Tk for applets).

References

Tukey J. (1977). *Exploratory Data Analysis.* Addisson-Wesley .

Becker R.A., Cleveland W.S. and A.R. Wilks (1987) Dynamic Graphics for Data Analysis. *Statistical science*, v2n4, 355-395.



Hydrology – Meteorology *Toolkit*

World Hydrological Cycle Observing System

HM*T β* – Updated *March 12, 1997*

| WELCOME | Introduction | Installation |
| The Library |
Journal	Evolution	References	URLs	Technology
Help	Frequently Asked Questions
About	Thanks	Français

Welcome to HM*T*...

The Hydrology – Meteorology *Toolkit* (acronym HM*T*) deals with managing and numerical/graphical processing of Hydro–Meteorological data *via* the World Wide Web (W3).

For details related to HM*T* and its library, see the chapters Introduction and The Library.

Framing Institutions & Projects

The World Meteorological Organization (WMO), with the support of the World Bank, promotes the development of a World Hydrological Cycle Observing System[1].

- WHYCOS[1]
- MED–HYCOS[2]
- WISE–HYDRO[3]

The first regional WHYCOS component is the MED–HYCOS[2] project. ORSTOM, the French Institute of Scientific Research for Development through Cooperation, hosts the MED–HYCOS Pilot Regional Center. HM*T* is also a WISE–HYDRO[3] product.

Plugin Tcl/Tk 2.0

HM*T* is an applets library dealing with data edition, graphical representations, exploratory data analysis and statistical analysis of hydro–meteorological data.

HMT needs the plugin Tcl/Tk 2.0 to be installed on your browser.

For details related to the Tcl/Tk Plugin, see the chapter Installation.

HM*T* is based on a W3–to–Database connectivity using Tcl/Tk as a basic language. With the Tcl/Tk Plugin installed on the W3 browser side, applets (or Tclets) use the HTTP protocol for querying an Oracle database server and managing i/o C programs towards Tcl CGI scripts (programs running on the server side).

For details related to these technologies, see the chapter Technology.

Nota Bene !

- HM*T* is under construction
- http://hydrobd.mpl.orstom.fr/hmt is under construction

re welcome !

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{HTTPSTATE=HTTP/1.0 200 OK}
{METASTATE=Server { Netscape–Communications/1.1} Date { Tuesday, 27–May–97
***
>...Done.
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***
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Figure 1. Screendumps of the W3 Welcome page of the Hydro-Meteorology Toolkit (**A**) and two applet examples from its library (**B**, **C**). The Tcl/Tk plugin enables dynamic graphical methods inside W3 documents with good performances. These methods have tow important properties : direct manipulation and instantaneous change. For instance moving a rectangle over a scatterplot by moving a mouse, when the rectangle covers a point, its label appears and when the rectangle no longer covers the point, its label disappears.