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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

# System for patching river and reservoir water quality data

*A Water Research Commission (WRC) study has developed a user-friendly, interactive modelling system to patch daily water quality data.*

## Background

Salinity modelling, along with associated water quality operating rules, is an integral part of the Water Resources Planning Model (WRPM) that is used extensively in South Africa to plan water resources.

Operation of the salinity modelling component requires calibration of the Water Quality Total Dissolved Salts (TDS) (WQT) hydro-salinity model. However, validity of the salinity modelling is dependent on the observed water quality data against which it is calibrated. The integrity of the model simulations and the management decisions based on them is thus dependent on obtaining a sound sequence of observed salinity data.

Observed raw water quality data comprises relatively infrequent grab samples separated by long gaps. Relationships established between flows (for which there are continuous measurements) and the water quality grab samples can be used to patch the missing water quality data and thereby establish a much better estimate of the aggregated flow-weighted monthly salt concentrations required to calibrate the WQT model.

Various techniques are incorporated in the MOVE program to patch river and reservoir salinity data, both of which require different techniques. A moving regression, with or without anchoring, has proved to be particularly useful for patching water quality at river stations.

However, the original program lacks user-friendly features and is cumbersome to use, involving a complex multi-step process that requires much scarce specialist time to complete.

Thus, this project was aimed at developing a user-friendly interactive modelling system to patch daily water quality data and aggregate it into flow-weighted monthly values compatible with the monthly time step used in the system water resources planning models.

## Features of the new model

The new water quality patching model incorporates the following features:

- Object orientated code designed for user friendliness and flexibility.
- Superior data input management allowing more flexible data input.
- Incorporation of user-friendly interactive plotting facilities.
- Logging and reporting of outlier removal and the reinstatement of previously removed values.
- Regression between primary and secondary water quality variables.
- Inclusion of combination of flow data from different stations.
- Merging of water quality station datasets.
- Improved partitioning of datasets, by flow range or by season. The new model also allows the automatic splicing together of partitioned patched data and the relevant statistics.
- Relaxation of the minimum number of patched water quality values required before monthly averages will be aggregated, to take account of days when there is no flow. Allowance is also made for specifying seasonal (monthly) minimums.
- Superior data and chart export and reporting.
- Provision of online help screens.

## Conclusion

The new MOVE program represents a powerful new tool for the patching and evaluation of water quality data. The moving regression patching technique is an innovation.

### Further reading:

To obtain the report, *System for patching river and reservoir water quality data* (WRC Report No: 2327/1/16) contact Publications at Tel: (012) 761-9300; Email: [orders@wrc.org.za](mailto:orders@wrc.org.za) or Visit: [www.wrc.org.za](http://www.wrc.org.za) to download a free copy.