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"Artificial Intelligence" at Streamgaging Stations

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Two types of problems are related to collecting
hydrologic data at streamgaging stations. One includes
the technical/logistical questions associated with
measuring and transferring data for processing. Effort
spent on these problems ranges from improving devices
for sensing data to using electronic data loggers.
Emphasis on the largely successful solution of this
class of problems may have diverted attention from the
second class, which has to do with proper sampling of
hydrologic data. Some data are collected essentially
continuously, such as streamflow. These data can be
"sampled" later if desired, but it may be more
efficient to keep only those observations required for
a specified task. Other data, such as water quality,
are not as easily obtained, so measurement times must
be set. Equal time interval sampling is often used, but
can be inefficient because of the episodic nature of
many variables. There are also problems in using data
collected systematically in some statistical analyses.
Field microprocessors using sampling algorithms that
depend on sensing appropriate variables in real time
can help solve both of these problems. Data can be
omitted during unimportant events and sampled
according to probability based methods.

A new scheme called SALT statistically samples
concentration to estimate suspended sediment yield.
SALT depends on estimating suspended sediment
discharge using stage. A device was developed to link a
stage sensor, a programmable calculator, and a
pumping sampler. The hardware has proven useful not
only to operate SALT, but also to collect concentration
data according to other schemes and to collect water
stage data at "break points". All of these applications
require the calculator's real time programming
capability to operate.

912