

Little River Research & Design

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Sole Source Statement Emriver moveable bed geomodels and flumes

Utility of moveable bed river models.

Little River Research & Design offers *Emriver* moveable bed river models (MBRM) and flumes. MBRMs and flumes are small-scale physical models of rivers using recirculated flowing water and moveable media. These models overcome science teaching challenges by connecting river science and conservation to everyday life. They realistically and dynamically simulate a wide range of river processes, including sediment transport, meander development and movement, floodplain formation, flow around structures, and fluid dynamics. The models move beyond hands-on learning; most students find it difficult to keep their hands *off* these river models. *Emriver* models excite the imagination and strongly motivate students to explore and understand river conservation issues.

Photographs, video, and full specifications of *Emriver* models are available at <http://www.emriver.com>.

Sole Source Justification.

There are several other MBRMs and flumes on the market. All have limitations that greatly restrict their usefulness. In particular, they are much smaller than *Emriver* models, the largest MBRM being only 12 square feet in size. The *Emriver Em2* is 2.75 ft. x 6.3 ft., giving a surface area of 17 square feet, the *Emriver Em3* is 3.25 ft. x 10 ft. giving a surface area of 32.5 square feet, and the *Emriver Em4* is 12.14 ft. x 3.9 ft, giving a surface area of 47.3 square feet. The narrow widths of even the largest competitors (26 inches) are inadequate to properly show river meandering processes. The smaller size and box perimeter of the other models also greatly limit the number of students who can observe the model. The *Emriver Em2* can easily accommodate a dozen students, while the *Emriver Em3* accommodates at least 15 students, and the *Emriver Em4* at least 20 students.

Other flumes available on the market are several times the size of our desktop, portable *Emflume1*. They can take up an entire room, are very loud – which makes teaching difficult - and use very large quantities of water. The *Emflume1* is easily portable, quiet, efficient, and uses only 6 gallons of recirculating water.

The *Emriver* models and flumes are designed and built for many years of hard use with very little maintenance. They are optimized for size and portability. All other MBRMs use lightweight plastic boxes or tubs to contain the modeling media and water. *Emriver* models use very strong, engineered aluminum boxes. The *Emriver's* supports (most other models provide no support and must be used on a table) are very durable and also capable of safely supporting several hundred pounds. The *Emriver's* pumping, metering, and flow control systems use the highest quality components. The models use a durable 12-volt marine pump, which allows field use of *Emriver* models using battery power. This is not possible without using generators with other models.

Emriver models use a precise electronic controller to control flow rates, and Little River Research & Design also offers a digital flow controller to measure flow rates; none of the other models provide flow metering.

All other models employ sand as a modeling media. The *Emriver* models use plastic modeling media for river modeling, which is much lighter than sand. It is safe and clean, and its bright, varied colors show sediment transport processes better. It is also made from recycled materials. Our color-coded by size modeling media is unique worldwide. Its four colors, each a different particle size, demonstrate sediment transport processes with accuracy at the compressed space and time scale of the *Emriver* stream tables. Sand is not able to accurately show sediment transport processes at such small scales.

The *Emriver* models come with a comprehensive 90-page instruction manual with many exercises and demonstrations suitable for both academic and informal education. The *Emriver* models also include a DVD for use in understanding the *Emriver* models and a guide to teaching river conservation. This DVD contains over forty clips and includes teaching notes. The *Emflume1* comes with a use & care manual, and a lab manual focusing on experiments in fluid dynamics.

Little River Research & Design offers high-quality technical support and a one-year guarantee against manufacturer defects.

To the best of our knowledge, these features are offered **exclusively** by Little River Research & Design's *Emriver* models:

- Design and construction specifically aimed at ease of travel and storage.
- Specially manufactured thermoset plastic modeling media.
- Strength and durability for a lifetime of use including frequent travel and rough treatment.
- The *Em2* has a 17-square-foot working area able to accommodate over a dozen students.
- The *Em3* has a 32.5-square-foot working area able to accommodate at least 15 students.

- The *Em4* has a 47.3-square-foot working area able to accommodate sophisticated research and at least 20 students.
- A trouble- and maintenance-free high-quality 12-volt pump capable of field demonstrations using a 12-volt deep-cycle battery.
- Adjustable standpipe drain for base level demonstrations and experiments.
- Precise flow metering (optional with digital flow controller).
- Recirculation of water through 27-gallon reservoirs; sediment trapping.
- Extensive Use and Care Manual and Lab Manual that includes dozens of exercises; accompanying DVD with over forty short movies.
- The Emflume1 working area is 22 inches long by 3.7 inches wide by 6 inches high. Weighs 65 lbs and holds 6 gallons of water. Uses an electronic flow controller, and the system tilts over 8 degrees. Lab exercises available.
- Strong technical support by trained and experienced geoscientists.