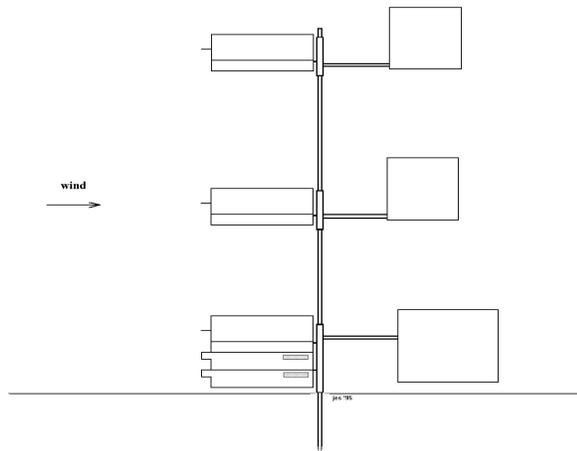


# Measuring the Mass Flux Profile

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We use two separate sampler designs to measure the full mass flux profile. We use a near-surface sampler to obtain measurements within the lowest 20 mm and a BSNE (Big Spring Number Eight) sampling cluster for higher heights.

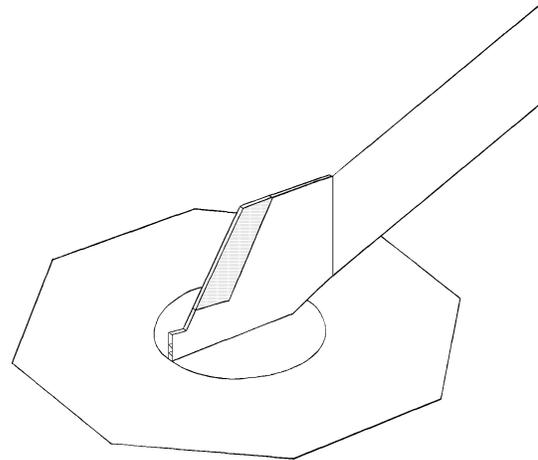


**Figure 1.** BSNE (Big Spring Number Eight) sampling cluster used to measure sediment mass flux at various heights above a wind-eroding surface.

Figure 1 shows the BSNE sampling cluster. The BSNE samplers were developed by Fryrear (1986) and have been independently tested by Shao, McTainsh & Leys (1993). The sampling cluster consists of an array of five samplers each attached to a pivoting wind vane and each mounted at a different height on a central pole. The heights of the individual samplers can be adjusted up or down the supporting pole. We typically sample at 0.05 m, 0.1 m, 0.25 m, 0.5 m, and 1.0 m. The inlet areas are about 200 mm<sup>2</sup> for the

lowest two samplers and about 1050 mm<sup>2</sup> for the upper samplers.

Sediment-laden air enters the sampler inlet and is slowed within the sampler by a diffuser section. Particles gravitationally settle into a collection pan located directly beneath the diffuser. Ventilation screens aspirate the sampler so that the inlet flow is nearly isokinetic (Stout & Fryrear, 1989). The mass of trapped soil is divided by the inlet area and the sampling time to obtain a time-averaged value of the horizontal component of sediment mass flux at each sampling height.



**Figure 2.** Near-surface sampler used to measure the sediment mass flux close to the eroding surface.

The near-surface sampler, shown in Fig. 2, was based upon a design by Stout & Fryrear (1989) but modified to collect material from three different heights within the first 20 mm from the surface. The first inlet extends from the surface to a height of 3 mm; the second inlet extends from 3 to 9

mm; the third inlet spans 9 to 20 mm. All inlets are rectangular and have a width of 5.5 mm. The near-surface unit is mounted on a turntable and is directed into the wind by a vane. Sampling inlets funnel sediment to a collection pan located beneath the surface.

The combination of the near-surface sampler and the BSNE sampling cluster provides a total of eight sampling points above the eroding soil surface.

These simple samplers are constructed from sheet metal and are sufficiently rugged to withstand long periods in harsh field conditions. Another important feature of this type of sampling system is that they do not require an external source of power to operate; they are essentially wind-powered devices that are inexpensive, easily transported, and cost nothing to operate.

### **References**

Fryrear, D. W. 1986. A Field Dust Sampler. *Journal of Soil and Water Conservation*, **41**(2):117-120.

Shao, Y., G. H. McTainsh & J. F. Leys. 1993. Efficiencies of sediment samplers for wind erosion measurement. *Australian Journal Soil Research*, **31**:519-531.

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