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Determination of correlations between solid concentration and wind speed fluctuations during a wind-tunnel experiment.

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Particle concentration is a fundamental parameter in snowdrift studies because it plays a determinant role either in the constitutive equations of the numerical model or in theoretical physical models. Nevertheless, its direct measurement at short time rates leads to great difficulties so that quantitative results about the concentration fluctuations are still lacking.

A new experiment designed by the snow engineering team of Cemagref, Grenoble, allowed the quantification of the solid rate fluctuations at given wind velocities in a wind tunnel. Each transport event was filmed with a fast camera at high frequency (500Hz). A light shit provided by a Laser beam ensured to operate in the middle section of the wind-tunnel channel. For practical reasons, only sand or PVC was used. Correlations with the wind speed fluctuations were searched. These latter measures were obtained using a hot-wire anemometry system in a non-charged flow for similar wind speeds.

The results of both these two measurements (films and anemometry) were analyzed with image processing and spectral methods.