



Dynamic pressure problems in soil respiration measurements with closed dynamic chambers.

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Soil respiration measurements performed with closed dynamic chambers are very sensitive to pressure differences between the chambers and outside: pressure differences as small as 1 Pa can induce errors that are of the same magnitude as the flux itself. The problem is usually solved by adding a vent on the experimental set-up. However, as this set-up gives satisfying results in most cases, it is not sufficient at sites highly exposed to the wind, like agricultural sites, notably. This is due to air movement that creates a Venturi effect at the vent, leading to aspiration of air from within the chamber.

At the CarboEurope-IP agricultural site of Lonzée (Belgium), we used a vertical vent tube and placed the upper end between two horizontal plates. This system has proven to be efficient in most conditions. However, at our site, it didn't give reliable results in strong wind and bare soil conditions. This is probably because the vertical wind gradient is large close to the soil and the wind captured at the vent height is not the same as at the chamber level, inducing dynamic pressure differences.

Measurements of soil flux using automatic closed dynamic chambers equipped with vents of different geometries were tested. They were confronted with pressure differences and wind velocity and direction measurements. An optimal geometry allowing measurements in windy terrains was finally proposed.