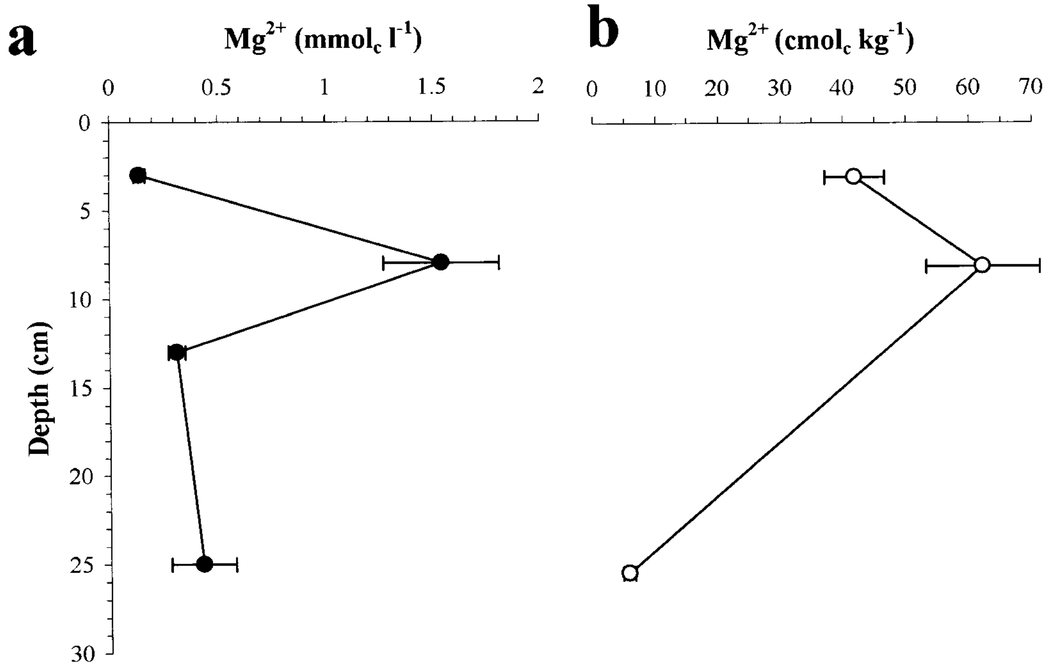

Fig. 1. Mean values of (a) Mg^{2+}concentration ($mmol_cL^{-1}$) and (b) exchangeable Mg^{2+} content on the resin ($cmol_c$ kg^{-1} of dry resin at 60°C) after 2 yr in a podzolized Cambisol on loess. Horizontal bars on each point represent standard deviation.

could increase the sensitivity of the wicks to weathering and contamination of the soil solutions. This could increase the requisite duration for an optimal cleaning of the wicks, in the laboratory and in the field. In conclusion, we believe that the concluding statement by Goyne et al. (2000) should be more nuanced in that PCAPS might be useful to monitor the composition of dilute soil solution after a suited pretreatment of the fiberglass wicks. Therefore, in agreement with Goyne et al. (2000), we also believe that it is necessary to develop and to investigate alternative pretreatments to improve the cleaning of the fiberglass rope prior to use PCAPS in acid forest soils.

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Response to "Comments on 'Artifacts Caused by Collection of Soil Solution with Passive Capillary Samplers'"

We thank Drs. Brahy and Delvaux for their interest and comments regarding our manuscript. Like these authors, we maintain that passive capillary samplers (PCAPS) have potential utility in geochemical studies. The abstract in Goyne et al. (2000) states that "the PCAPS used in this study are not suitable for aqueous geochemical studies of dilute soil solutions." Further, the conclusions state that "they can be problematic when used to collect dilute soil solutions for complete geochemical investigations". We stand by these statements and can, in fact, attribute our results unequivocally to weathering of the PCAPS wicks. We do not imply that other PCAPS *must be* likewise problematic. But our caution to others employing this technique without critical evaluation is that *they can be.*

As we stated in the paper, we constructed all of our PCAPS from the fiberglass rope used by Holder et al. (1991) and Boll et al. (1992) (no. 1381 from Pepperell Braiding Co., Pepperell, MA). We did not evaluate the suitability of alternative fiberglass wicking material. Since Brahy et al. (2000) do not report the source of the fiberglass wicking material that they utilized, a direct comparison between PCAPS used in their study and ours may not be advisable.

Although we agree that PCAPS and zero-tension samplers (ZTS) may collect different fractions of soil solution with different residence times and chemical composition (Marques et al., 1996, Goyne et al., 2000), this was not the causative factor in our study. The tension applied by our PCAPS was 5.4 kPa versus 60 kPa for suction cup samplers in Marques et al. (1996). Prior research at our study site involved a chemical comparison between B horizon soil solutions sampled with ZTS and ceramic suction cup solution samplers evacuated to 60 kPa (Swistock et al., 1990). These authors found that despite the large difference in tensions, there were no significant differences in the solution concentrations of H^+, NO_3^-, Cl^-, Na^+, and Al_T collected with the two types of samplers. In contrast, we observed (Table 2) large significant differences for H^+, Na^+, Al_T, alkalinity, and other ions for both A and B horizons, but still no difference for NO_3^-, which is evidently not a component of the wick material (Goyne, 1998; Goyne et al., 2000). The alteration occurred despite the fact that the tension exerted by our PCAPS was <0.1 that of the suction cup samplers used by Swistock et al. (1990).

It is possible that prewashing the wicks with 0.01 *M* HNO_3 increased the sensitivity of the wicks to further weathering in the field. However, our preliminary laboratory studies indicated that (i) washing the material with deionized water for 1–2 wk was insufficient for removing soluble materials that would later contaminate acidic soil solutions and (ii) wick dissolution effects appeared to diminish with time in the field (on the time scale of months).

It is apparent that researchers should be aware of potential artifacts in order to minimize them. In our case, direct comparison with other means of in situ soil solution collection proved to be a useful way to reveal problems. As mentioned in Goyne et al. (2000), we believe that alternative sources of fiberglass wicking material and cleaning procedures should be investigated to diminish unwanted effects.

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Abbreviations: PCAPS, passive capillary samplers; ZTS, zero-tension samplers.

Comments on "Using surface crack spacing to predict crack network geometry in swelling soils"

The paper, "Using surface crack spacing to predict crack network geometry in swelling soils", by Chertkov (2000) uses a mathematical approach to estimate soil-crack-network geometry. His approach may be suitable for random cracking, but random cracking is not natural in soils. The cracking geometry of soils can be deduced from soil structure characteristics (White, 1967).

The boundaries of soil peds are planes of weakness, and the peds separate at the same locations with each drying event. Visible soil cracks follow the boundaries of peds. Ped boundaries may be somewhat indistinct in very wet and very dry soils. At intermediate moisture contents, ped boundaries may be more easily observed. As the soil dries, very narrow cracks can form between the peds. With additional drying, cracks close at some locations and widen at others. The arrangement and distribution of the crack space is moisture dependent.

In soils with some clay content, the larger subsoil peds are prism shaped and their size tends to increase with depth. Cracks form because the desiccation contraction forces exceed the tensile strength of the soil (White, 1972). Soil particles are packed more closely with increasing depth because of the weight of the overlying soil. Thus, a greater distance of subsoil is needed before the contraction force can exceed the tensile strength to cause a crack to form. This relationship causes several small prisms to be joined together at their base to form a larger prism (White, 1966; 1970).

Cracks are at locations where the energy used in the average dehydration-contraction and hydration-expansion cycle is at minimum values in a ped and group of peds. In other words, the average soil particle moves the least possible distance. This quasi equilibrium occurs first in the smallest peds and subsequently in successively larger peds and eventually includes both the upper and lower layers of the soil if they have been moistened and then dried.

The diameter of the larger prisms decreases as the soil dries so that a crack is formed around the prism and smaller overlying prisms. Surface soil may fall into the crack so the outline of the larger prism may be easily seen (White, 1989, p. 154 picture). The larger prisms often have surfaces coated with some dark-colored clay-rich material likely washed down from the overlying soil. The cracks between the smaller overlying prisms will decrease in width as the basal-prism diameter decreases. Successively larger prisms form with increasing depth as the soil dries so that the crack space in overlying layers is rearranged into a larger crack at the edge of the larger prism that formed at that depth. Thus the width of the upper part of the crack is a function of the depth of drying.

If the lower part of the soil is infrequently moistened, open cracks in the layer will act as a template for the formation of a crack when the upper part of the soil dries. This process also causes the crack space between smaller prisms to move to the margin of the larger prisms. Giant desiccation cracks, some 20- to 30-cm wide, likely form by this process (White, 1970). The giant cracks form where regional or local conditions have occasionally caused the lower subsoil to be moistened while the upper soil is moistened and dried annually. Giant cracks are most frequently found in fields where alfalfa (*Med-*