Comparability of commonly used met hods to study lignin degradation in de composing foliar litter

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Lignin is a major component of plant litter. Degradation of lignin is thought to be an important control of litter mass loss during late phases of litter decomposition. However, no existing method can determine the exact content of lignin in a litter sample. Commonly used methods to study lignn degradation utilize largely varying approaches and the comparability of these different methods is uncertain.

We assessed lignin degradation in 5 foliar litter types (ash, beech, maple, pine, spruce), exposed in the field for 27 months. Methods to analyse lignin in the litter were (i) ^{13}C-TMAH thermochemolysis and (ii) CuO oxidation each combined with GC/MS; (iii) determination of acid-detergent lignin (ADL) combined with near infrared spectroscopy. Furthermore, dissolved organic matter (DOM) produced during litter decomposition was examined for indicators of lignin-derived compounds by ^{13}C-TMAH GC/MS, UV absorbance at 280 nm and fluorescence spectroscopy.

First results suggested stronger lignin degradation in beech and needle than in ash and maple litter. Beech and needle litter showed less accumumation of ADL lignin and a stronger increase in Ac/Al ratios of CuO oxidation products during incubation. DOM production from beech and needle litter was increased in the later incubation period, and the DOM showed a high aromaticity and molecule complexity. These results suggest enhanced contribution of lignin degradation products to DOM, probably because of strong side chain oxidation indicated by high Ac/Al ratios. DOM properties thus seemed to reflect the degree of lignin degradation in the litter samples. In summary, the applied methods provided complementary information on differences in lignin degradation between the litter types over time. Combining methods that assess lignin in solid litter and DOM helped to better understand the fate of lignin during litter decomposition and its role in DOM production.

Characterization of a new laser ablation xenotime U-Pb age standard

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With the *in situ* U-Pb dating of xenotime by SIMS and LA-MC-ICP-MS new possibilities of linking geochronological and petrological data have been opened up. But wide application of the method is presently hampered by the absence of any accepted xenotime standard for U-Pb dating.

Xenotime from a specific Weinsberg granite variety (type Plochwald) from the Bohemian Massif (Austria) seems to meet all recommendations to be suited as a U-Pb age standard. It shows a concordant U-Pb TIMS age of 315.9 ± 0.6 Ma (2SD). No detectable age zonation and only relatively minor amounts of REE-U-Th-Pb inter- and intra-crystal zonation (c. 20 % with the exception of Eu with 70%) were found.

Analytical setup: New Wave 193 nm solid state laser ablation system with He as carrier gas, Nu Instruments HR-MC-ICP-MS, Nu Instruments DSN-100 desolvating nebulizer. The MS was setup to allow the simultaneous acquisition of the masses ^{238}U-^{233}U-^{232}Th-^{207}Pb-^{206}Pb-^{205}Tl-204-Pb-^{203}Tl. During analysis a ^{233}U-Tl spike solution was added to the ablated material as a dry aerosol. Raw signal intensities are corrected for gas blank using 40 sec of signal acquisition prior to sample analysis. Power law and ^{205}Tl/^{203}Tl and ^{233}U/^{205}Tl in the spike solution are used to correct for mass bias of ^{207}Pb/^{206}Pb and U/Pb ratios. The U/Pb elemental fractionation is corrected for using an intercept method applying linear regression. The calculated intercept values are corrected for mass discrimination using standard bracketing. 115 measurements on 15 xenotime crystals of 150 to 200 μm size were performed. Lines with 5μm spot size and 30 μm length were rastered with 5 μm/sec. Orientation of the laser raster parallel to the prominent {110} cleavage or parallel to crystal faces did not result in any age discrimination. All analyses resulted in concordant data points. On average, ages from single line analysis have 2SD precisions of 7.6%, 8.3%, and 5.7% for the ^{207}Pb/^{235}U, ^{206}Pb/^{238}U, and ^{207}Pb/^{206}Pb ages, respectively. The total mean age of all analyses (without rejections) is 313.4 ± 1.9 Ma (2SD).

We propose that the investigated xenotime can effectively be used as a standard for *in situ* LA U-Pb age dating with a spatial resolution as low as 5 μm.