TERRESTRIAL AGES OF THE SHIŞR 015 METEORITE STREWN FIELD FROM THE SULTANATE OF OMAN, DETERMINED USING MEASURED IN SITU ^{14}C and ^{10}Be

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Introduction: Terrestrial age determination via ^{14}C analysis of purified silicate fractions from meteorites is now routinely done at the University of Bern. The extraction system has undergone several changes and optimizations in the past year, and we are now able to perform numerous measurements (approx. 30-40) whilst maintaining the system closed, i.e. not breaking the vacuum. Our current aim is to measure several meteorite strewn fields from the Sultanate of Oman to *i*) extend the database of meteorite terrestrial ages, *ii*) to study the meteorite flux over time, and *iii*) to better understand and quantify the parameters affecting weathering. So far, we measured three fragments of the L5 meteorite strewn field Shişr 015 (purified silicate fractions). The successfully extracted CO_2 gas has been sent to the Accelerator Mass Spectrometry (AMS) MICADAS system [1] at the University of Berne for $^{14}C/^{12}C$ measurements. The ^{10}Be concentrations for the silicate fractions of the Shişr 015 fragments were already determined at the ASTER (Accélérateur pour les Sciences de la Terre) Accelerator Mass Spectrometry (AMS) facility at CEREGE in Aix-en-Provence, France [2], and are used together with the ^{14}C data to determine $^{14}C/^{10}Be$ terrestrial ages, which are less dependent on shielding and are therefore more reliable than ages determined using ^{14}C only. In the next step we might combine the $^{14}C/^{10}Be$ ages with the shielding indicator $^{22}Ne/^{21}Ne$ to further improve the ages (if necessary).

Experimental Setup: Several changes and improvements were applied to the ^{14}C extraction line since the first description of the setup [3,4]. In the current version, the extraction unit consists of a high frequency generator (RF) and a quartz glass crucible with an inner platinum (Pt) crucible. Platinum was the material of choice because it withstands oxidation even at high temperatures and at oxygen partial pressures. In addition, Platinum is conductive and can efficiently be heated using RF heating. Therefore, samples are heated and oxidized via the Pt crucible, eliminating the need to add iron or steel to the sample to promote heating. As before, quartz granulate fills the bottom of the quartz glass crucible, preventing contact between the Pt and the outer crucible. In addition, to prevent the Pt crucible from tilting and damaging the outer crucible walls, three U-shaped pieces of tungsten wire are placed between the top of the Pt crucible and the wall of the quartz crucible. Pre-heating of samples still takes place in UHP O_2 flow for 1 h at ~500°C with continuous pumping, and the extraction of ^{14}C is performed in 15-30 mbar O_2 partial pressure at ~1600°C for only 10 mins, instead of 40 mins in the earlier setup.

Tests to establish the correct pre-heating and extraction temperatures, i.e., currents of the RF generator, were performed using the previously measured and well-studied JaH 073 strewn field. Note that the temperature of the Pt crucible cannot be measured directly but is determined indirectly by the color of the crucible. As a first quality check we can also compare the extracted CO_2 pressure with the CO_2 pressures for earlier measurements (system blank, procedural blank, sample). However, the most reliable proof for the reliability of the current setup comes from the AMS data. In addition, melting of samples is often clearly indicated by a sudden considerable drop of the O_2 partial pressure in the crucible (>10 mbar in 1-5 minutes, instead of 2-3 mbar in 5 mins). Reproducibility tests, also using the JaH 073 strewn field, indicated good results which are also comparable to literature data [4,5].

Results and Discussion: Three individuals of the L5 meteorite strewn field Shişr 015 were measured, with two replicates per individual. Consisting of 43 stones, Shişr 015 has a combined weight of 23.7 kg. The strewn field has an E-W orientation and measures 21.1 km in length. The weathering grade of the strewn field ranges between 3 and 4, with majority of the individuals of grade 4.

Aliquots of 0.05 g of purified powdered silicates (125-250 μm grain size) were used. We measured ^{14}C activities between 0.86±0.02 and 1.33±0.04 dpm/kg, and by using a ^{14}C saturation activity of 51.1±1.0 dpm/kg we calculate a ^{14}C terrestrial age between 30.0±1.0 and 33.6±1.1 kyr. The data therefore indicate only a small variation among the different individuals of the strewn field. The measured ^{10}Be activities of the same fragments range from 14.3 to 16.4 dpm/kg. If combined with the ^{14}C data we calculate $^{14}C/^{10}Be$ ages of 27.7±0.2, 28.1±0.4, and 29.9±0.2 kyr for the three measured individuals. The average $^{14}C/^{10}Be$ terrestrial age is 28.6±0.6 kyr.

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