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Development of new N2O reference materials for d15N, d18O and 15N site preference within the EMPIR project SIRS

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In recent years, research on nitrous oxide (N2O) stable isotopes has significantly advanced, addressing an increasing number of research questions in biogeochemical and atmospheric science. An important milestone was the development of optical isotope ratio spectroscopy (OIRS), which is inherently specific for structural isomers (15N14N16O vs. 14N15N16O) and capable to collect real-time data, complementary to the well-established isotope-ratio mass-spectrometry (IRMS).
The compatibility between different IRMS and OIRS laboratories, however, was shown to be limited, in particular for 15N site preference. This was attributed to two reasons: first, no international N2O reference material with stated uncertainty is available; and second, the link between 15N site preference and the international 15N/14N scale is currently inhibited by non-quantitative $NH4NO_3$ decomposition. The ongoing EMPIR project "Metrology for Stable Isotope Reference Standards (SIRS)" 2017-2020 is addressing the above tasks by focusing on the following subjects:
1) Develop improved techniques to characterize N2O gases for d15N, d18O and 15N site preference including an uncertainty assessment.
2) Develop new international gaseous N2O reference materials for d15Na, d15Nb, d15N and d18O, available both as pure substance and diluted in whole air.
3) Conduct an inter-laboratory comparison to demonstrate the compatibility after the completion of the SIRS project.