

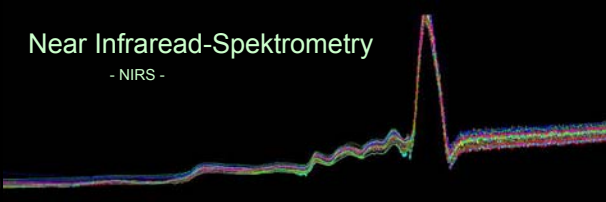


Methods

- Near infrared Spectrometry
- Stable isotopes

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Near Infrared-Spektrometry - NIRS -

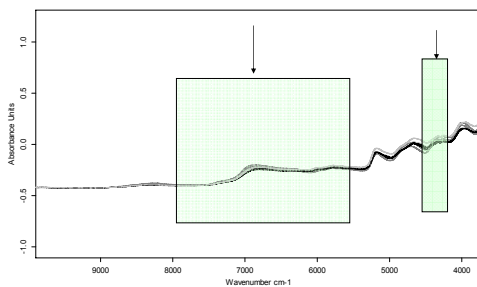


Applications

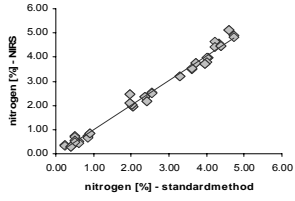
- Analyses of chemical parameters
- Analyses of ecological parameters

Total spectrum

Example for frequencies used to develop the models



Near Infrared Spectrometry Analyses of Plant Composition

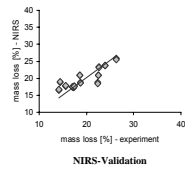
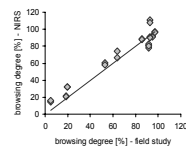


Comparison of traditional Kjeldahl Method (x-axis) with predictions based on NIRS.
Bamboo from Madagascar. Samples by C. Tan; Model by C. Stolter

From Ortmann *et al.* 2006

Near Infrared Spectrometry Analyses of ecological Properties

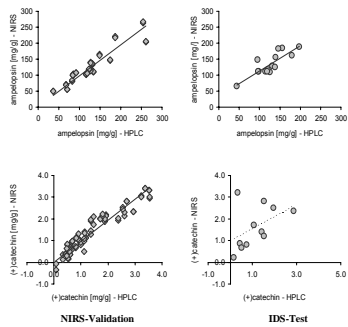
Comparison of browsing and litter decomposition measured in the field (x-axis) and predictions based on NIRS models.



From Stolter and Ganzhorn 2005

NIRS-Validation

Validation of NIRS-models with independent data-sets



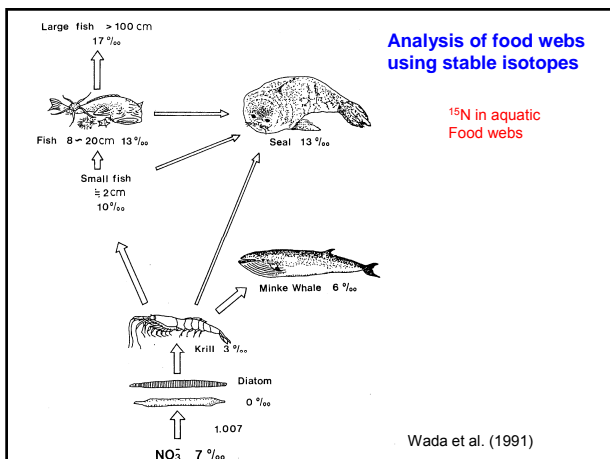
Stolter and Ganzhorn 2005

Perspective

- Chemical landscape: Pattern description
- Chemical landscape: Dynamics

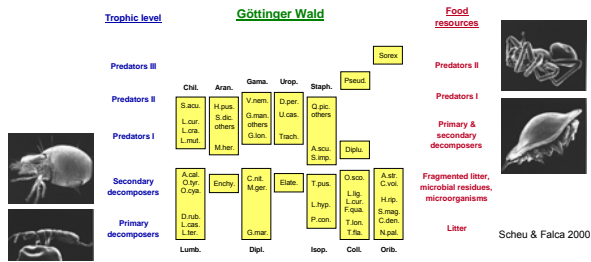
Stable isotopes

- Carbon 13 (^{13}C) and Nitrogen 15 (^{15}N) are incorporated by animals through their food.
- Are enriched by about 3 - 5 ‰ (^{15}N) for every trophic level. Lighter isotopes are preferably excreted.
- Measured as $R_{\text{sample}}/R_{\text{standard}} [\text{‰}] \rightarrow \delta^{13}\text{C}$
(R = ratio between heavy isotope and light isotope)
- Standard : concentrations in air
- Isotope Analyser / Isotope Ratio Mass Spectrometer



Analysing the trophic structure of soil food-webs

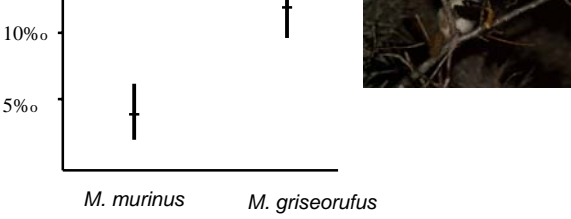
Evidence from ^{15}N analyses



- The ^{15}N content in animal tissue reliably reflects feeding guilds
- Higher taxonomic units do not reflect feeding guilds except for very general categories such as predators and decomposers
- There is a continuum from primary to secondary decomposers
- Soil animals span over about four trophic levels (excl. vertebrates)



Food composition of two *Microcebus* spp. measured with $^{15}\text{N}/^{14}\text{N}$



Relative contribution of different plants to diet using $^{13}\text{C}/^{12}\text{C}$

Higher concentrations of ^{13}C in C_4 plants
 Could be used to distinguish C_4 grass from other plants (baboons in arid environments)

For further examples see Oecologia 144 (4) 2005
