



Final Open Meeting Exeter 24-25 Nov. 2009

Analytical Platform



Strategic Meeting 2009: Napoli, September 23-24, 2009

ANAE Analytical Platforms

ANAE Design Study aims to implement a new concept of integrated research facilities and infrastructures in Europe for research in continental ecosystems, both managed and semi-natural. The proposed infrastructure integrates four types of platforms:

In natura

In vitro

In analytica

In silico

In analytica Platforms are intended to integrate in-natura and in-vitro ecosystem experimentation with cutting edge analytical capability to understand ecosystem processes at much finer levels of resolution than has been possible.



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ANAE Analytical Platforms

***June 8-10, 2009 Seville
Analytical Platform W.G. Workshop***

***THE NEED OF INTEGRATED ANALYTICAL PLATFORMS FOR
EXPERIMENTATION AND ANALYSIS IN ECOSYSTEMS (In Analytica)
8 Member states & 17 Institutions***





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THE NEED OF In Analytica FOR ANAEE

Essential tool to acquire practical knowledge about continental ecosystem functioning and dynamics. Added value to ANAEE since advanced instrumentation will be available to European scientists conducting experimentation on ecosystems.

In the spatial scale spectrum from which to approach ecosystem analysis, there are obvious gaps that reverts in a poor understanding of whole ecosystem functioning. The need of downscaling.

A knowledge gap in ecosystem functioning and dynamics is associated with the lack of information about belowground processes. The Organic Matter (including biota) takes part in most ecosystem processes and is crucial in the maintenance of ecosystem services as well as in environmental derived problems at a global scale (i.e. global warming, soil and water contamination, erosion and soil losses, ...).



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THE NEED OF In Analytica FOR ANAEE

Soil and OM in particular represents a highly complex matrix which study demands a combination of complementary analytical approaches each one providing a different window of information. To obtain the whole picture about specific processes it is essential to create well structured multidisciplinary Analytical Platforms.

Analytical Platforms will have to include, not only a well organized advanced infrastructure and analytical instrumentation, but also well trained staff with the needed know-how to deal with the application and data interpretation served by complementary techniques.

An important part of the case for a pan-European research infrastructure is the increasing range of techniques available and their high cost. Provision of in natura and in vitro facilities must be tied to provision of analytical facilities to bring the most innovative science to ANAEE.



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DEPICTING THE In Analytica PLATFORM

Analytical Platforms will:

Concentrate/link facilities with high/ultra-high-resolution for an efficient elucidation of chemical and biochemical functions in ecosystems.

Develop and concentrate specific instrumental expertise to unravel analytical results on bio-organo-mineral matrices in ecosystem domains.

Provide answers to ecosystem behavior particularly in the nano- and micro-meter scale.

Provide support to experimental designs in other ANAEE platforms. Will aid the creation of a new generation of models with the minimum of black boxes and upscaling errors.

Serve directly to society demands by providing enough analytical capability to help decision maker to react in the event of catastrophic phenomena affecting ecosystems i.e. ecological disaster.



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Techniques to integrate:

Non invasive instrumental techniques should be used for complex matrices, e.g.: Diffuse Reflectance Infrared Spectrometry; Solid- or liquid- state NMR spectroscopy; Magnetic Resonance Imaging (MRI); Analysis of stable isotopes.

Specific techniques like Analytical Pyrolysis, Liquid- or gas-chromatography coupled to high- or ultra-high resolution mass spectrometry should be used for fractionation and identification of ecosystems biomarkers.

Biomolecular (Proteomics, Metabolomics) and Biotechnological (Genomics) instrumentation should also be part of analytical platforms to follow biochemical functions in ecosystems.

The inclusion of special physical and biophysical instrumentation to couple chemical and biochemical functions to water fluxes in ecosystems is also desirable.



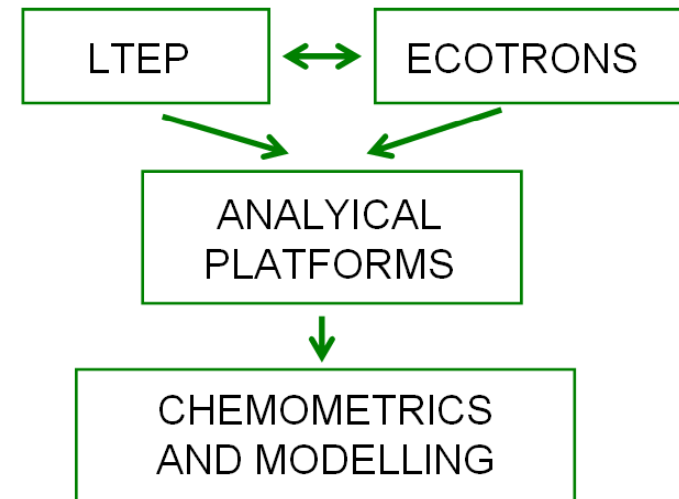
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Relations with other ANAEE Components:

Will be involved in the experimental designs within ANAEE, providing detailed and accurate analysis at molecular level and interfacing with modelling activities.

Will strengthen experiments in Ecotrons and LTEP by helping in elucidating the shifts in environmental variables. The elucidation of ecosystem processes and relative data will also help modelers to develop new concepts about changes at the molecular scale. This will improve the reliability of models to larger scales.





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Other aspects to encompass:

Capability to explore the possibilities of new analytical tools and of novel applications of existing technologies for ecosystem analysis. This could include the development of molecular biology techniques i.e. specific molecular probes for ecosystem research that can be used in aspects such as soil biochemistry and biodiversity, ecosystem resilience, disturbance and recovery, etc.

The development of new sensors, novel approaches of measuring variables as well as data transfer strategies and protocols (nets) for the acquisition of data in natura or in vitro. Data standardization is important, quality assurance and control of variables can be developed in relation with ecotrons and modelling groups.

The establishment of protocols for collection, distribution and management, including the maintenance of sample banks and reference standards. Analytical variables acquisition and experiments follow up should include quality control strategies (ISO/GLP, certifications).



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Organization:

Relevant aspects about organization are still under discussion:

Govern through a permanent multidisciplinary panel of experts for research follow-up and data evaluation.

Convenience of structuring the ANAEE Analytical Platform as single large facilities, unallocated specialized facilities, different groups with specific techniques together within single infrastructure facilities with specific know-how, or a combination of strategies.

Inclusion of logistic centre/s for reception and appropriate distribute of samples.

Inclusion of existing Central Services for General Analysis (like in Austria, Italy, Spain or emergent like in Poland).

Possibility of integration of well equipped mobile platforms for ecosystem analysis.



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Tentative cost:

Ideal infrastructures to best serve European community shall include sufficient financial component for maintain and upgrade equipment and to ensure appropriate personnel. The budget should also allow the movement of scientists and samples as well as to support a continuous training component on environmental data collection and analysis.



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DEPICTING THE TEAM

