Study of nitrogen compounds in different atmospheric compartments

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Why study of nitrogen compounds?

> Studies known about atmospheric nitrogen:
  • Inorganic nitrogen
  • Amino acids
  • Metaproteomic (few studies)

> Gap between nitrogen compounds researches: what about small peptides? secreted proteins?

> Proteins / small peptides could be:
  • enzymes (compounds degradation)
  • allergens (health diseases)
  • communication molecules (cellular activity - communication)
  • ... and contribute to nitrogen cycle
Sampling

- Aerosols, clouds, precipitations (rain - snow)

- Sampling is made in liquid media containing protease inhibitor

- Sampling sites:
  - Aerosols - Opme (Clermont - Ferrand, France)
  - Clouds - Puy du Dôme (Clermont - Ferrand, France)
  - Rain - Opme (Clermont - Ferrand, France)
  - Snow - Puy du Dôme (Clermont - Ferrand, France)
Small peptides characterization example in rain

Proportion of Amino Acids in small peptides:
- Max - Valine, Leucine / Isoleucine, Alanine and Lysine
- Min - Arginine, Proline, Histidine and Lysine

Majority of free quadripeptides in this sample

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Photochemical fate of small peptides

Amino acids proportion compared to OH reactivity

Comparison between Amino Acids proportion in small peptides and their OH reactivity constant after rain water irradiation under solar light like
Perspectives / Outlook

> Proteome investigation of atmospheric microorganisms: activity of a specific strain in atmospheric conditions (cold shock...)

> Metaproteomics will permit to determine community activity in atmosphere

> Photochemistry: photo-degradation of proteins and small peptides to determine their contribution to nitrogen cycle