FAPESP WEEK GERMANY

March 25-26th, 2025

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ATTO

AMAZON TALL TOWER OBSERVATORY

An example of Brazilian-German cooperation in science

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What is ATTO?

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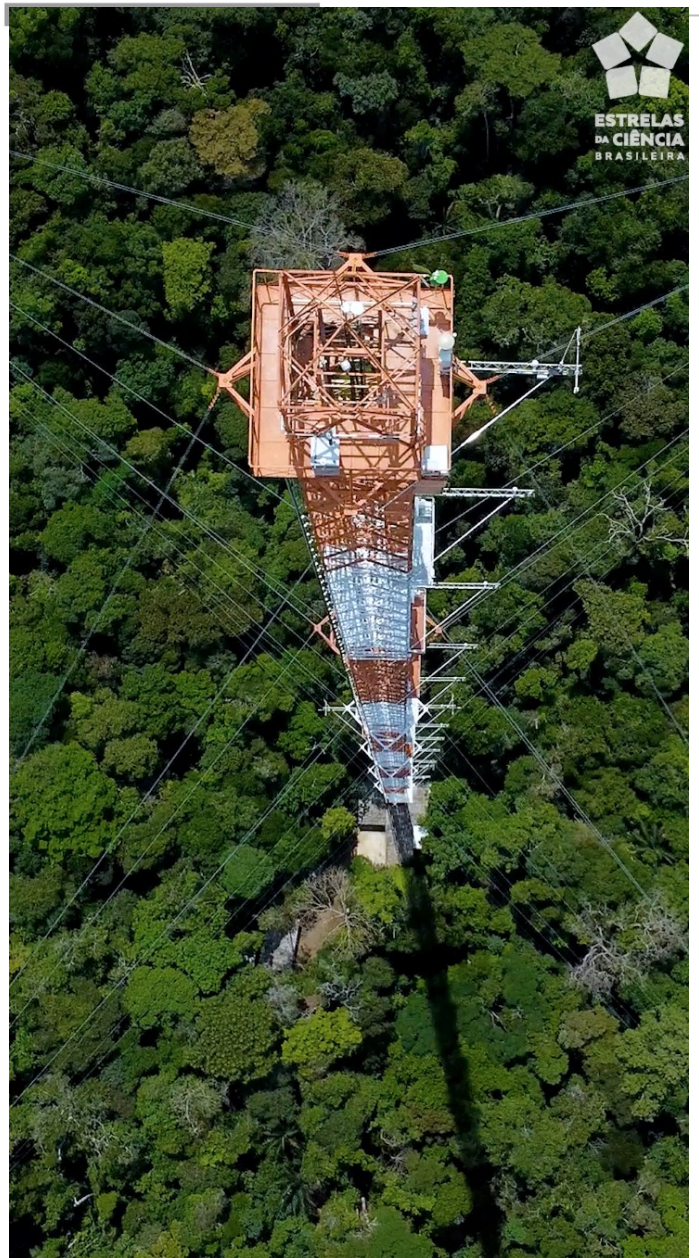


ATTO is one of the five largest science infrastructure projects in Brazil

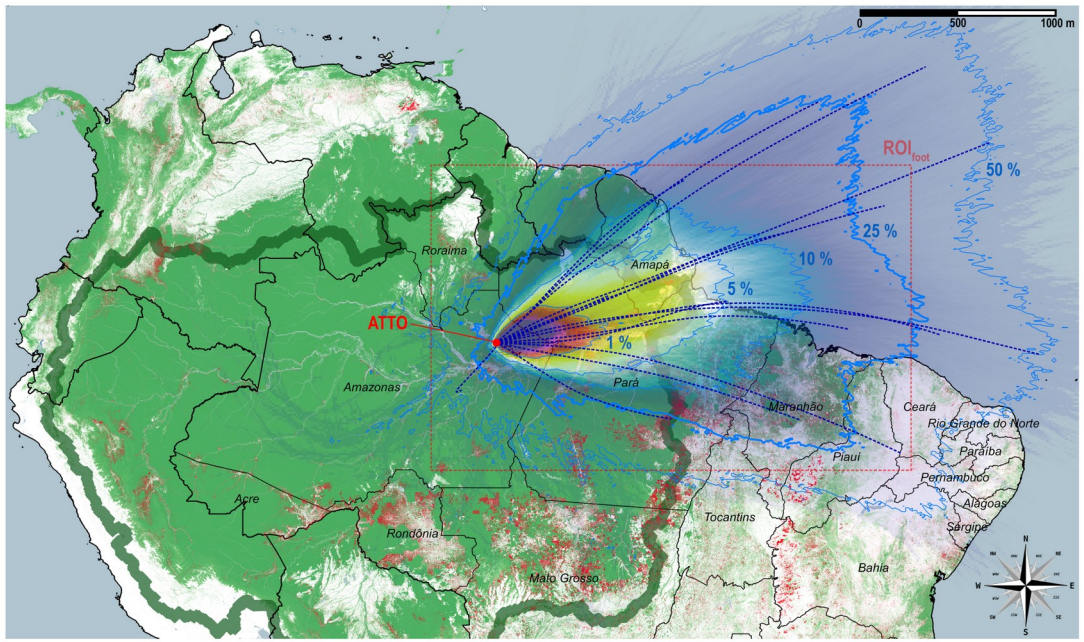
Tall tower construction financed by bilateral agreement in 2009. Statement of bilateral support for ATTO science renewed in 2023.

Leadership

Susan Trumbore – Germany (MPI-BGC)
Carlos Alberto Quesada – Brasil (INPA)

Where is ATTO?

ATTO is located ~150 km northeast of Manaus (upwind, minimal pollution)
In the Uatumã Sustainable Development Reserve (minimal forest disturbance)



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Overarching questions

How do intact rainforest, atmosphere and climate influence each other?

How are those interactions affected by climate change and weather extremes?

And what does this mean for the future of Amazon forests?

Why a tall tower? Provides a platform for continuous observations that allow us to deduce the influence of the forest on the atmosphere over regions of several hundred kilometers upwind (and even further)

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ATTO is not just a tall tower

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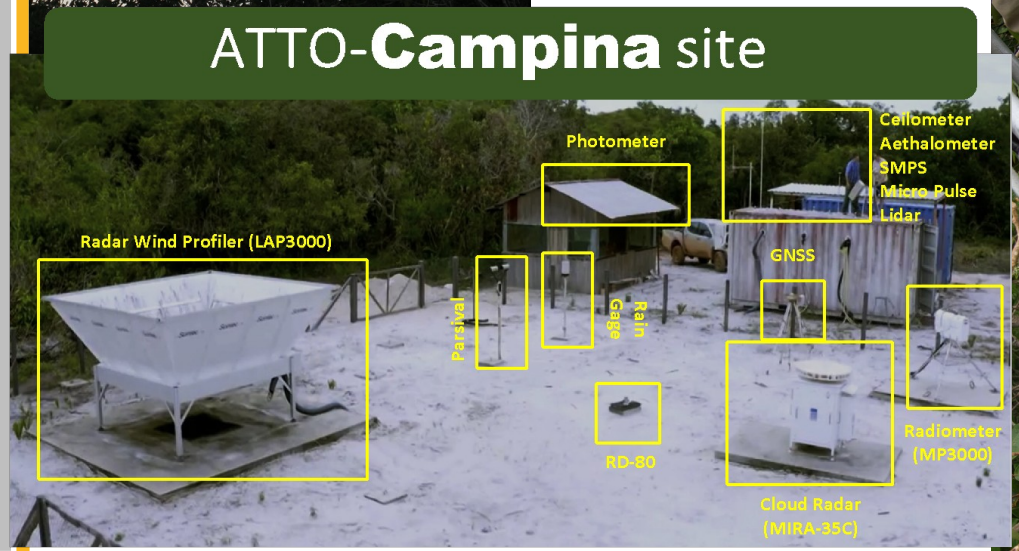
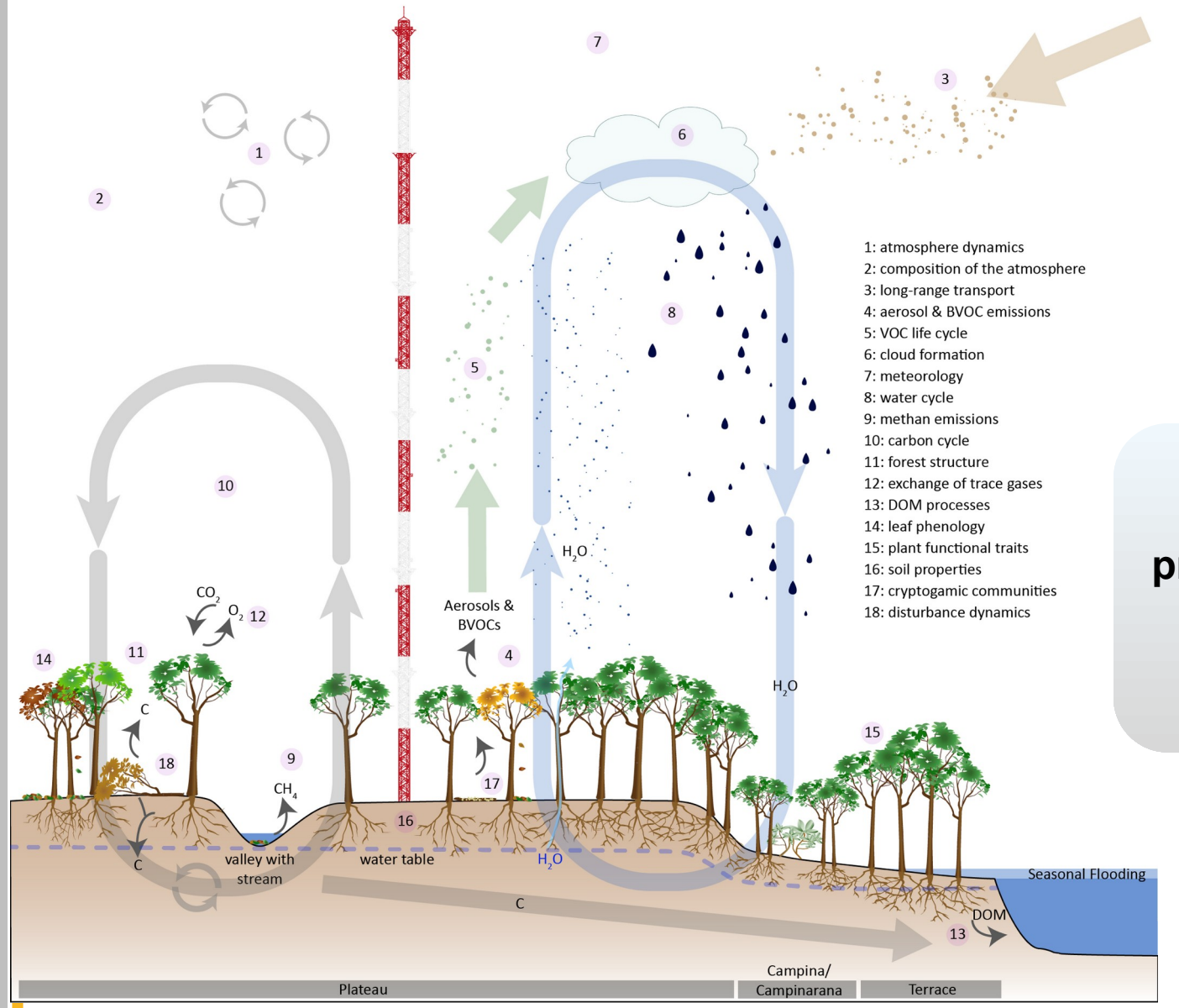
- 3 smaller towers to study local forest-atmosphere processes
- 'Campina' site for characterizing local atmosphere
- Forest plots to study dynamics of different vegetation/ecosystem types
- Drones + Lidar to connect to satellite remote sensing
- Field camp and laboratories



Simultaneous investigations at the same place



Four main research themes

- Regional greenhouse gas balance
- Ecosystem processes and the role of biodiversity
- Physical climate: energy, water, and air exchange
- Aerosols, atmospheric chemistry and clouds

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How does the forest make its own rain?

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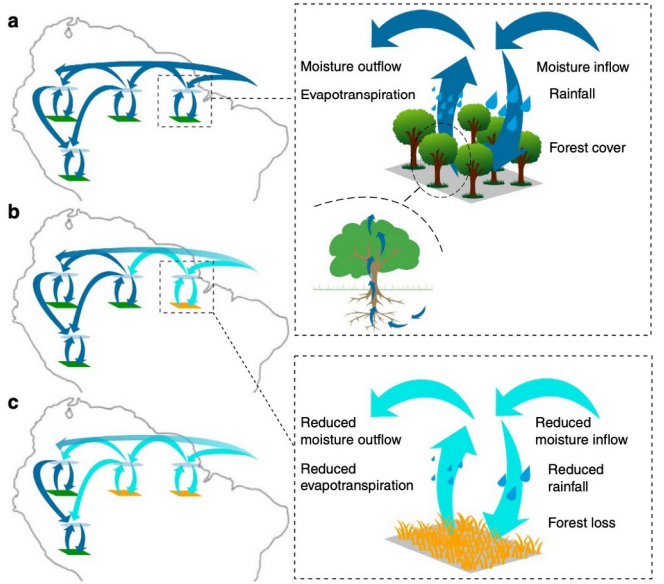
Long distance transport of particles
e.g. smoke and dust from Africa

Organic gases emitted by plants and soils get oxidized in the atmosphere and form coatings or small aerosols

Spores and pollen - primary aerosols

Rain requires: **water**, **particles** (aerosols) and the right thermodynamic conditions



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How are processes changing?

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Photo: Sebastian Brill

Other major synthetic goals

What determines the carbon balance of intact forests, especially during extreme drought/wet years?

Why is methane increasing more rapidly and what is the role of tropical wetlands?

How does the diversity of ecosystems and species influence their response to extreme events?

How have damaging storms increased in the last decades and will they continue into the future?

ATTO is people

2024 annual workshop at INPA

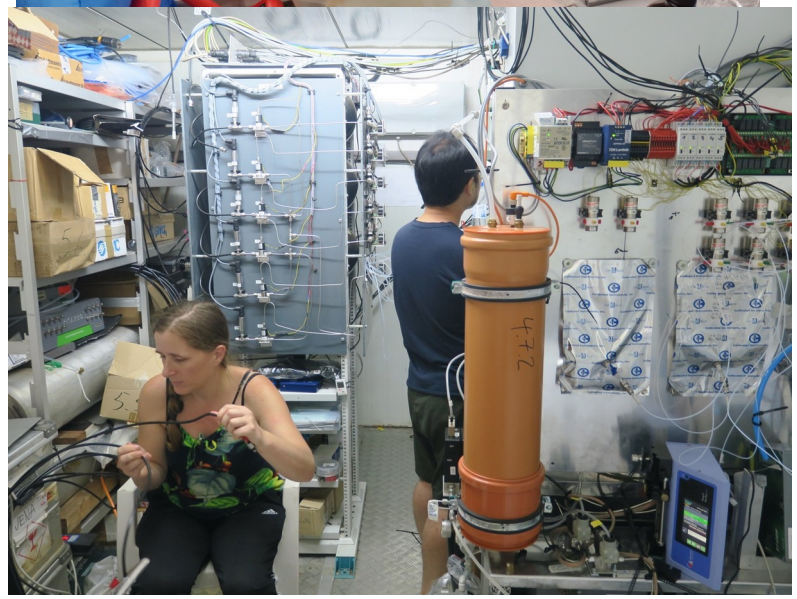
~ 200 people on the Expedition License

Since 2018, 75 students (39 PhDs and 36 Masters) have been or are being trained as part of the project

Regular exchanges of scientists between Germany and Brazil

Camp personnel

ATTO



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Outreach and Education

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Bi-weekly ATTO Seminar (on line) to connect our researchers and invite new people

Local teachers visit ATTO
Volunteers visit local schools

German materials (print & pdf)

Mission ATTO

The materials cover topics from the subjects of biology, chemistry and physics and are suitable for year 8 and above. Ten double-sided copy templates (print or digital version) cover topics such as the carbon cycle, VOCs - volatile organic compounds, flying rivers and global particle transport.

Learn more

Digital platform in Portuguese.

ATTO Projeto Escola

An educational tool that connects the research carried out at the Amazon Tall Tower Observatory (ATTO) with teachers and communities. Our digital version is based on the collaboration with the local communities near ATTO & built to further the connections between the teachers and ATTO research.

Learn more

Digital platform in English and Portuguese.

CLOUD ROOTS

GoLocalGlobal

Physical and biological experiments, to learn how the forest is feeling, and how the forest is connected to the atmosphere above. The platform was created by the CloudRoots project team in collaboration with ATTO.

Learn more

Thanks for your attention

You can find more information about ATTO at our website – ATTOproject.org

Or use the QR-Code

You can find ATTO also on social media on Twitter and Instagram

@ATTOresearch @ATTOresearch

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Coordination:

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INPA INSTITUTO NACIONAL DE PESQUISAS DA AMAZÔNIA

UEA UNIVERSIDADE DO ESTADO DO AMAZONAS

MAX PLANCK INSTITUTE FOR CHEMISTRY

Max Planck Institute for Biogeochemistry

Financing Bodies:

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MAX PLANCK GESELLSCHAFT

DLR Projektträger

AMAZONAS GOVERNO DO ESTADO

Finep INOVAÇÃO E PESQUISA

FAPEAM Fundação de Amparo à Pesquisa do Estado do Amazonas

FAPESP 60 SCIENCE, CULTURE AND DEVELOPMENT 1962 - 2022

CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico