



Engler Saal
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Zoom Room

<https://wsl.zoom.us/j/63741013879?pwd=Y0FMQUdrV2pOU0lqTzZCSmNSWkZLUT09>

Meeting-ID: 637 4101 3879
Code: 304178

Tuesday, April, 2023
3:00 pm (CET)

Birmensdorfer Tree-Ring Lecture

Paolo Cherubini

WSL, Birmensdorf, Switzerland

Tree rings and volcanic eruptions: How could trees predict the 2002 flank eruption on Mt. Etna?

Early detection of volcanic eruptions is of major importance for protecting human life. Ground deformation and changes in seismicity, geochemistry, petrology, and gravimetry are used to assess volcanic activity before eruptions. Studies on Mt. Etna (Italy) have demonstrated that vegetation can be affected by pre-eruptive activity before the onset of eruptions. During two consecutive years before Mt. Etna's 2002/2003 flank eruption, enhanced vegetation index (NDVI) values were detected along a distinct line which later developed into an eruptive fissure. However, the mechanisms by which volcanic activity can lead to changes in pre-eruption tree growth processes are still not well understood. We analysed $\delta^{13}\text{C}$, $\delta^{18}\text{O}$ and ^{14}C in the rings of the survived trees growing near to the line where the pre-eruptive increase in NDVI was observed in order to evaluate whether the uptake of water vapour or fossil volcanic CO_2 could have contributed to the enhanced NDVI. We found a dramatic decrease in $\delta^{18}\text{O}$ in tree rings formed before 2002/2003 in trees close to the eruption fissure, suggesting uptake of volcanic water by trees during pre-eruptive magma degassing. Moist conditions caused by outgassing of ascending magma may also have led to an observed reduction in tree-ring $\delta^{13}\text{C}$ following the eruption. Furthermore, only ambiguous evidence for tree uptake of degassed CO_2 was found. Our results suggest that additional soil water condensed from degassed water vapour may have promoted photosynthesis, explaining local increases in NDVI before the 2002/2003 Mt. Etna flank eruption. Tree-ring oxygen stable isotopes might be used as indicators of past volcanic eruptions.

Chaired by
Holger Gärtner

Birmensdorfer Tree-Ring Lectures Programme

Tree-Ring Lectures - Forthcoming: ... 2023 *Scientific talks and presentations given by WSL scientists and staff, typically a 1-hour monthly meeting*

Special Invited Tree-Ring Lectures - Organized *ad hoc* and *ad libitum!* *Invited guest lectures given by scientists, students, guests, visitors in the labs who are not present to give a talk during a regularly scheduled Tree-Ring Lecture*

Tree-Ring Spring's Event - Forthcoming: May 2023 *A springtime event, at Birmensdorf or surroundings*

Tree-Ring Summer Meeting - Forthcoming: August 2023 *A one- or half-a-day scientific meeting dealing in depth with one topic, finishing with a BBQ in the WSL gardens*

Tree-Ring Fall Excursion - Forthcoming: October 2023 *A one- or two-day scientific excursion of the whole tree-ring community with talks and presentations on research achievements or ongoing projects in the region*

Tree-Ring November Journal Club - Forthcoming: November 2023 *A half-a-day presentation of the most influential papers published by not-WSL staff in the different fields of tree-ring related sciences during the past year, chosen by selected WSL scientists and students*

Tree-Ring December's Forum - Forthcoming: December 2022 *A discussion among WSL scientists on hot and emerging issues in tree-ring science, moderated and including invited talks and a panel discussion or not, concluding into the traditional Dendro X-mas Party ****

Audience

WSL Dendrosciences Group's scientific and technical staff, WSL tree-ring scientists, PhD students, Master students, WSL scientists, tree-ring interested scientists and students working in the Zurich area (e.g., ETHZ, PSI, UZH) and in Switzerland or European countries (although we don't believe that people from overseas will run, swim and fly to these meetings, of course, scientists from other parts of the world are warmly welcome too!).

Chair

Each meeting will be chaired by a WSL scientist depending on the topic and willingness.

Proposals for meetings....

.... are welcome!

Language

English preferred.

Scientific Committee

Dr. Paolo Cherubini, Dr. Patrick Fonti, Dr. Holger Gärtner, Dr. Kerstin Treydte, Dr. Georg von Arx

Organisation

Dr. Paolo Cherubini, Dr. Georg von Arx