CURRICULUM VITAE

PAOLO CHERUBINI
Senior Scientist
WSL Swiss Federal Institute for Forest, Snow and Landscape Research
CH-8903 Birmensdorf, Switzerland
TEL. +41-44-739 2 278
e-mail: paolo.cherubini@wsl.ch
https://www.wsl.ch/de/mitarbeitende/cherubin.html
http://www.researcherid.com/rid/N-9702-2013
https://orcid.org/0000-0002-9809-250X

Birth	Pisa (Italy), 29 October 1964
Dual Citizenship	Italian and Swiss
Languages	Italian, English, French, German, Spanish
Education	Maturità Classica, Liceo Classico "Galileo Galilei", Pisa (Italy), 1983 Degree in Forest Sciences, Università di Firenze (Italy), 1989 Ph.D. in Botany, Universität Basel (Switzerland), 1996
Employment History	Post-Degree Fellow, Università di Firenze (Italy), 1989-1990 Post-Degree Fellow, Istituto Sperimentale per lo Studio e la Difesa del Suolo, Firenze (Italy), 1990-1992 Fellowship "Hörer in Fortbildung", Dept. Forest Sciences, ETH Zürich (Switzerland), 1992-1993 **PhD student**, Universität Basel (Switzerland), 1993-1996 **Research Scientist** (1996-2003), **Senior Scientist** (2003-present) Swiss Federal Research Institute WSL, Birmensdorf (Switzerland)
Institutional Responsabilities	Deputy Head of the Section *Forest ecosystems and ecological risks* (2004-2005), Head of the Research Group *Tree Physiology* (2006-2010), Deputy Head of the Research Unit *Dendrosciences* (2006-2009), Head (a.i.) of the Research Unit *Dendrosciences* (2010), Head of the Research Group *Dendroecology* (2011-2012), a.i. Head of the Research Group *Dendrosciences* (2017) Member of the **Steering Committee** Libraries Research Institutes ETH Domain (**LIB4RI)** (2016-present) **Chairman** of the **Research Commission (FoKo) WSL** (2016-present)
Appointments	**Adjunct Research Scientist**, Lamont-Doherty Earth Observatory, *Columbia University*, Palisades, New York, U.S.A., 2002-present **Adjunct Faculty**, School of Natural Resources, *University of Nebraska-Lincoln*, Lincoln, Nebraska, U.S.A., 2009-present **Guest Professor**, Institute of Earth Environment, *Chinese Academy of Sciences (CAS)*, Xian, China, 2012-present **Lecturer**, Department of Geography, *Universität Zürich*, Zurich, Switzerland, 2006-present
Approved Projects	Tree growth-rings as early indicators of volcanic activity on Mt. Etna (2012-2016) 235'000 SFr. funded by SNF (PI).
Supervision students	Main supervisor of PhD-student Ruedi Seiler, co-supervisor of 34 PhD, 40 Master and 5 Post-Doc students

Teaching	**Lecturer** at the **Universität Zürich** (2006-present): GEO818 Class "Dendro-Ecology", Master course GEO351.2 Class "Geochronologie I" Bachelor course GEO399/599 "Toskana Exkursion" **Visiting Professor**, Università degli Studi di Milano, Milano, Italy (2010, 2015), **Guest Lecturer** Albert-Ludwigs-Universität Freiburg, Freiburg i.B., Germany (2013, 2014, 2015), **Visiting Professor**, Università di Sassari, Sassari, Italy (2012), **Member** of Board, Doctorate School in Agriculture, Università degli Studi di Pisa (2015-...). Over 100 lectures at graduate or undergraduate courses in many countries all over the word (e.g., Europe, Israel, Russia, China, Japan, Canada, U.S.A., Argentina).
Memberships in Panels, Boards	**Editor in Chief**, *Dendrochronologia*, 2003-present **Editor**, *iForest*, 2004-present **Member Editorial Board** of *Journal of Vegetation Science*, 2007-present **Member Editorial Review Board** of *Tree Physiology*, 2014-present **Member Editorial Board** of *Journal of Forest Planning* 2018- present **Associate Editor**, *Tree-Ring Research*, 2002-2011 **Associate Editor**, *Canadian Journal Forest Research*, 2011-2018 **Member Editorial Board** of *Geochronometria*, 2007-2018 **Member Editorial Board** of *Scientifica*, 2012-2012 **Member Editorial Board** of *Scientific Reports*, 2017-2017 Swiss national representative, **International Long Term Ecological Research** (ILTER) (1998-2002)
Scientific Organizations	British Ecological Society (BES) (1999-...), Tree-Ring Society (1997-...), Società Italiana di Selvicoltura ed Ecologia Forestale (SISEF) (1997-...), Asian Dendrochronological Association ADA (2015-...), Accademia Italiana Scienze Forestali
Organization of Meetings	Tree Rings and People (Davos, September 2001) (242 attendees from 43 countries) Several workshops, schools, seminars, conferences and sessions as main or co- organizer
Awards	"Premier's Award, Innovation 2005/06 Finalists" (Victoria, British Columbia, Canada). "2007 Peace Nobel Prize" recipient, as Invited Expert Reviewer, Intergovernmental Panel on Climate Change (IPCC)
Publications	264 scientific publications, 156 of them published in ISI international scholarly journals h-index=30, sum of the times cited: 3243 (according to ISI Web of Science, March 29th, 2018)

Major scientific achievements

Paolo Cherubini's research interests lie within physiology, ecology, and evolution, with relevance to the knowledge and sustainable management of natural resources and nature conservation. He strives to understand the key processes behind tree growth, to gain a thorough understanding of the influence of environmental stress on tree physiological processes, with particular focus on the impact of environmental stress on wood formation. Linking dendroecology with ecophysiology (Cherubini et al. 2003, 2013) is currently the main aim of his research. In the last five years, three highlights of Paolo Cherubini's research can be summarised as follows.

1) Thanks to the experience achieved in the past two decades by himself and coauthors in the identification and interpretation of Mediterranean tree rings and intra-annual density fluctuations (Cherubini et al. 2003; De Micco et al. 2007, 2012, 2014, 2016, 2017; Campelo et al. 2009, 2015; Copenheaven et al. 2010; Nicolini et al. 2010; Battipaglia et al. 2010, 2014, 2016, 2017; Gea-Izquierdo et al. 2011, 2012, 2013; Moreno-Gutierrez et al. 2012, 2015; Maselli et al. 2014; Nabais et al. 2014; Rossi et al. 2014; Altieri et al. 2015; Rita et al. 2015; Petrucco et al. 2017), he contributed to the solution of the enigmatic dating of the Minoan eruption of Thera (Santorini). The date of the Thera Minoan volcanic eruption is of major importance for understanding the relationships between the Late Bronze Age civilisations of Egypt, the Near East and the Aegean world. The contention that a charred olive tree branch was alive when buried in tephra during the Santorini eruption and had recognisable tree-rings allowed Friedrich *et al*. (*Science*, 2006) to date that eruption to 1627–1600 BC. If correct, this would have implied major changes in our understanding of developments in the Late Bronze Age civilisations of the Aegean and the Eastern Mediterranean. Olive wood tree-rings are, however, very problematic in nature, and a dendrochronological analysis of olive trees currently growing on Santorini (Cherubini et al. 2013) showed that it is impossible to determine the number of tree-rings. Accordingly, caution should be applied to the radiocarbon dating offered by Friedrich *et al.* and their proposal cannot be used to discount the date range of 1525–1490 BC proposed for the eruption from numerous other radiocarbon studies (Cherubini et al. 2014; Cherubini and Lev-Yadun 2014).

2) On Mt. Etna (Italy), an enhanced Normalized Difference in Vegetation Index (NDVI) signature was detected in the summers of 2001 and 2002 along a distinct line where, in November 2002, a flank eruption subsequently occurred (Houlié et al. 2006). These observations suggest that pre-eruptive volcanic activity may have enhanced photosynthesis along the future eruptive fissure. If a direct relation between NDVI and future volcanic eruptions could be established, it would provide a straightforward and low-cost method for early detection of upcoming eruptions. However, it is unclear if, or to what extent, the observed enhancement of NDVI can be attributed to volcanic activity prior to the subsequent eruption. A study conducted by Ruedi Seiler (PhD student funded by a SNF project) and Paolo Cherubini aimed at determining whether an increase in ambient temperature or additional water availability owing to the rise of magma and degassing of water vapour prior to the eruption could have increased photosynthesis of Mt. Etna's trees. Using dendro-climatic analyses they quantified the sensitivity of tree ring widths to

temperature and precipitation at high elevation stands on Mt. Etna. Their findings suggest that tree growth at high elevation on Mt. Etna is weakly influenced by climate, and that neither an increase in water availability nor an increase in temperature induced by pre-eruptive activity is a plausible mechanism for enhanced photosynthesis before the flank eruption (Seiler et al. 2017). Other factors are causes of the pre-eruption enhancement of NDVI on Mt. Etna. In a later study, together with coauthors, they found a reduction in $\delta^{18}O$ in tree rings in immediate proximity to the eruption fissure, and conclude that it is likely that the 2002/2003 volcanic eruption impacted trees during and after the effusive eruption phase. A plausible explanation for the reduced $\delta^{18}O$ in the tree rings is the uptake of volcanic water during pre-eruption degassing. Additionally, the reduced radiocarbon values during two consecutive years exactly coinciding with the increased NDVI signal before the 2002/2003 eruption suggests that trees near the eruptive fissure may have taken up fossil CO_2 degassed during pre-eruption volcanic activity. These results illustrate the potential impact of volcanic eruptions on stable isotope ratios in tree rings, establish photosynthetic response to pre-eruption CO_2 degassing as a possible explanation for local increases in NDVI before the 2002/2003 Mt. Etna flank eruption, and show the potentiality of using tree-rings to reconstruct past volcanic eruptions.

3) Paolo Cherubini's research focus has been the study of the impact of air pollution, i.e., vehicles' exhausts and tropospheric ozone on tree-ring formation and physiology (Saurer et al. 2004; Novak et al. 2007; Guerrieri et al. 2009; Battipaglia et al. 2010; Pollastrini et al. 2010; Leonelli et al. 2011, 2012; Cocozza et al. 2016). Studying the literature and through own experiences, he hypothesised that the chemical composition of tree-ring wood can be used for monitoring spatio-temporal variability of air pollutants and fine particles, to extend air quality data back in time, because particles enter into the wood through the leaves faster than through the roots. The concentration of chemical elements in tree rings has been studied using a combination of dendrochronological and chemical methods. However, uncertainty surrounds the use of dendrochemistry to monitor air pollution impacts and its temporal resolution scale. Moreover, the effect of particulate pollution on plants is still largely unknown and in trees almost unexplored. Cherubini analysed tree rings formed in different years and close to different pollution sources, using tree-ring stable isotopic (^{13}C, ^{18}O, ^{15}N) analyses, radiocarbon analyses (^{14}C), chemical analysis using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), and computer-tomography imaging and chemical microanalysis at the synchrotron. He found changes in the chemical composition of tree-ring wood related to changes in air quality and air pollution episodes and trends (Liu et al. 2018; Perone et al. 2018). Moreover, he performed a greenhouse experiment and provided evidence that nanoparticles deposited on tree leaves are taken up through stomata and transported through the phloem into the xylem of trees faster than throught the roots (Cocozza et al. in prep.). This discovery opens new research avenues. He strives to understand the fate of nanoparticles in trees and the physiological processes involved.

All cited references are coauthored by Cherubini and therefore can be found at::
https://www.wsl.ch/de/mitarbeitende/cherubin.html#tabelement1-tab2