ANDREAS RIGLING PROF. DR.

Head Research Unit FOREST DYNAMICS
Member Board of Directors of WSL
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Web	https://www.wsl.ch/en/about-wsl/research-units/forest-dynamics
Date of birth	25.6.1964
Civil state	Married, two children

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PERSONAL RESEARCH FOCUS - KEYWORDS

Dendroecology; disturbance regimes; ecosystem services; forest dynamics: germination, growth and mortality of trees; forest management; forest biodiversity; interdisciplinarity; mountain forests; site ecology; transdisciplinarity; mortality ecology.

ACADEMIC EDUCATION

1987-1993 Study of Forest Sciences, ETH Federal Institute of Technology, Zurich
- Focus on mountain forest ecology
- Practice in Switzerland (FR, VS – 11 months) and Canada (BC – 4 months)

1996-2000 Dissertation, University of Basel, Institute of Botany, Basel
„Wood anatomical characteristics as indicators of biotic and abiotic stress factors – a dendroecological study in the Scots pine forest-steppe ecotone of Europe and Siberia“
(Examination committee: Prof. Dr. F.H. Schweingruber, Dr. O.U. Bräker, Prof. Dr. C. Körner)

1998-1999 Diploma in applied statistics, ETH Federal Institute of Technology, Zurich
- Post-graduate diploma course in applied statistics

PROFESSIONAL EXPERIENCE

since 2016 Adjunct Professor ETH Federal Institute of Technology, Zurich

since 2009 Member of the Board of Directors, Swiss Federal Research Institute WSL

since 2006 Head Research Unit Forest Dynamics, Swiss Federal Research Institute WSL
- Leader of inter- and transdisciplinary research projects on mountain areas and climate change

2000-2006 Project leader, Swiss Federal Research Institute WSL
Leader of interdisciplinary research projects on forest ecology
- Member co-ordinating group of the research program „Forest Dynamics“

1993-2000 Scientist, Swiss Federal Research Institute WSL
- Soil monitoring in long-term forest ecosystem research
- Dendroecology

1984-1987 High-school (second educational pathway, KME, Zürich, Switzerland)

1980-1983 Apprenticeship as forester (Forstwart), Forest Service Schaffhausen

LANGUAGE SKILLS

German: *native* ; English: *proficient/fluent* (C2); French: *advanced (C1)*

RESEARCH ACTIVITIES

I am heading the research unit Forest Dynamics consisting of 4 research groups with currently around 80 collaborators. The research groups are: 1. Disturbance Ecology; 2. Ecosystem Ecology; 3. Ecophysiology; and 4. Dendrosciences. The unit studies the dynamics of forest ecosystems as affected by abiotic and biotic factors and its impacts on forest management. The main focus lies on ecosystems' resistance against and resilience after environmental changes with a special focus on aspects of functional biodiversity.

The research unit is operating i) several long-term monitoring gradients on forest growth, functioning and biodiversity, reforestation after blowdown and fire, ii) the Swiss level I and II monitoring networks, iii) several large-scale field experiments such as irrigation, drainage with rainshelters and fertilization, and iv) laboratories on tree-ring analyses, wood anatomy, ecophysiology, and stable isotopes.

System analyses in forest ecosystem research are never a single-disciplinary question since it requires **integrative approaches** combining the advantages of different research concepts, e.g. by linking environmental monitoring, experimental ecology and modeling approaches to build up powerful **analytical chains**. We aim at bridging natural sciences with socio-economy and integrate stakeholder knowledge into research concepts. **Inter- and transdisciplinary research** is challenging and effortful but solving nowadays problems in the context of environmental change requires **holistic initiatives**.

Besides heading the research unit, I am **experienced in leading and co-ordinating *inter- and transdisciplinary* research projects**:

- Scots pine decline Valais (funded by BAFU, Velux Foundation, canton Valais): 2001-2005, 30 scientific collaborators from 9 WSL-Departments worked on 15 projects
- Treeline upward shift Ural (funded by EU-INTAS): 2002-2005, 40 scientific collaborators from 6 research institutions from Switzerland, Germany and Russia
- Scots pine decline Switzerland-Italy (funded by EU-INTERREG, Regions Valais, Aosta, Piedmont): 2004-2007, 15 scientific collaborators from 3 research institutions from Switzerland and Italy
- MOUNTLAND 1 – Climate change impacts on mountain ecosystems and implication on socio-economy and land-use policy (funded by the Competence Center for Environment and Sustainability CCES, ETH domain): 2008-2012, 50 scientific collaborators from 9 research groups from WSL, ETH and EPFL
- MOUNTLAND 2 – Prioritization for adaption to climate and socio-economic changes – Backcasting tolerable future states to match supply and demand for ecosystem services in mountainous areas. (funded by the Competence Center for Environment and Sustainability CCES, ETH domain): 2013-2016, 40 scientific collaborators from 8 research groups from WSL, ETH and EPFL

INTERNATIONAL EXPEDITIONS

Since 1993 I am regularly contributing to and leading field campaigns on international, interdisciplinary expeditions:

- Altai and Sajan, RU: North-hemispheric tree-ring network. F.H. Schweingruber (PI), A. Rigling (PhD student) (July 1996)
- Baikal, RU: North-hemispheric tree-ring network. F.H. Schweingruber (PI), A. Rigling (PhD student) (July 1998)
- South Ural, RU: Early response areas for climate change in Eurasia. A. Rigling (PI) (July 2002)
- South Ural, RU: Early response areas for climate change in Eurasia. A. Rigling (PI) (July 2004)
- Polar Ural, Salekhard, RU: Early response areas for climate change in Eurasia. A. Rigling (PI) (July 2010)
- Soria, E: Truffle monitoring and tree growth response, U. Büntgen (PI), A. Rigling (Co-PI) (April 2012)
- North-East Siberia, Bilibino, RU: Vulcano Anyui – fossil wood and treeline dynamics. U. Büntgen (PI), A. Rigling (Co-PI) (Aug. 2019)

FUNDRAISING

Since 2000, I got 45 research proposals funded by different national and international organizations such as EU-INTAS, EU-COST, EU-INTERREG, ERANET, SNF, SCIEX, ETH, CCES, Federal Offices, Foundations, Cantons, and WSL-internal - in total more than CHF 6'490'000.- as PI and additional CHF 2'520'000.- as co-applicant.

GUEST-SCIENTISTS HOSTED IN THE FRAME OF MY OWN RESEARCH ACTIVITIES

- Bataarbileg Nachin, National University of Mongolia, Ulan Bataar, Mongolia
- Pavel Moiseev, Institute of Plant and Animal Ecology, Russian Academy of Sciences, Ekaterinburg, Russia
- Pjeder Gjerdrum, Norwegian Forest Research Institute, Fana, Norway
- Alexander Kirdyanov, Institute of Forest, Russian Academy of Sciences, Krasnoyarsk, Russia
- Nadia Devy, Institute of Plant and Animal Ecology, Russian Academy of Sciences, Ekaterinburg, Russia
- Giorgio Vacchiano, University of Turin, Italy
- Asier Herrero, University of Granada, Spain
- Raul Sanchez-Salguero, University of Seville, Spain

REVIEWER FOR SCIENTIFIC JOURNALS AND INSTITUTIONS

- AFJZ; Annals of Forest Science; Arctic, Antarctic and Alpine Research; Canadien Journal of Forest Research; Dendrochronologia; Ecology Letters; Ecosystem Services; Environmental and Experimental Botany; European Journal of Forest Research; Forest Ecology and Management; Forestry; Global Change Biology; Global Ecology and Biogeography; IAWA Journal; Journal of Ecology; Journal of Vegetation Science; WSL-LFI; Nature Climate Change; New Phytologist; Oecologia; Ornitologischer Beobachter; Plant Ecology; Silva Fennica; Tree Physiology; Forum für Wissen;
- Agence Nationale de la Recherche France; Aktion D. Swarovski & Co.; Association for Tree-Ring Research; Czech Science Foundation; Deutsche Bundesstiftung Umwelt; Kuratorium Forstliche Forschung – Bayerische Landesanstalt für Wald und Forstwirtschaft; Laboratoire d'Excellence LABEX Arbre; Flamish Science Foundation, Swiss National Science Foundation; Israel Science Foundation, U.S. Department of Energy; Centre National de la Propriété Forestière France (CNPF).

SCIENTIFIC ORGANIZATIONS AND NETWORKS

- Forest Research Institute FVA, Freiburg, D – Member advisory board (Kuratorium): http://www.fva-bw.de/indexjs.html?http://www.fva-bw.de/fva/abt_dirkurat.html
- Daylight Academy – Founding member: https://daylight.academy/
- Forest Research Partnership NFZ Nancy-Freiburg-Zürich – chairman (2014-16): http://www.nfz-forestnet.eu/
- Bern University of Applied Sciences, Member advisory board of the Division of Forest sciences. https://www.hafl.bfh.ch/forschung-dienstleistungen/waldwissenschaften.html
- Swiss Academy of Sciences SCNAT, ICAS Swiss Alpine Studies – member steering board: http://icas.akademien-schweiz.ch/
- Waldwissen.net - member steering board: http://www.waldwissen.net/
- European Forest Institute EFI, Central European Regional Office EFICENT- member advisory board: http://www.eficent.efi.int/portal/
- Board of directors of the Forest Research Organizations of Germany, Austria and Switzerland – representative of WSL
- International Union of Forest Research Organizations IUFRO – member International Council, representative of Switzerland (2010-2014; 2020 ongoing): http://www.iufro.org/iufro/
- Swiss Forestry Society – member: http://www.forstverein.ch/
- The Botanical Society of Zurich – member: http://www.zbg.ch/
- Association for Tree-Ring Research (ATR) – member: http://www.tree-ring.org/

ORGANISATION OF CONFERENCES/SUMMER SCHOOLS

- International Webinar "How to balance forestry and biodiversity conservation – a view across Europe (2020) Initiator and member Congress Organizing Committee COC. Jointly organized by WSL and the European Forest Institute EFI Bonn Office and supported by the Federal Office for the Environment Switzerland FOEN, the German Federal Ministry for Food and Agriculture BMEL, the Cantons of both Basel and the Integrate Network; >700 participants.
- International IUFRO Congress "Interconnecting Forests, Science and People" (2017) Member Congress Organizing Committee COC. Freiburg iB D; 2200 participants.
- International Summer School "FORESCALE - Climate change impacts on forest ecosystems: Disciplinary and interdisciplinary challenges across spatial scales" (2015) Main organizer, supported by WSL, CCES, ETH, PSI, Uni Freiburg D, INRA Nancy F. 20 participants.
- International Conference "Climate Change and Tree Responses in central European Forests" CLIMTREE (2013) Member Congress Organizing Committee COC, Zürich CH, 250 participants.
- International Dendroecological Fieldweek (2001-2004), Main organizer, supported by WSL. 30 participants.

TEACHING

- Lecturer in „Growth of Trees and Forests – from Germination to Tree Death ", ETH-Zurich, Dep. Environmental Systems Sciences (since 2020)
- Lecturer in „Dendroecology", ETH-Zurich, Dep. Environmental Systems Sciences (2007-2019)
- Lecturer in „Mountain Forest Ecology", ETH-Zurich, Dep. Environmental Sciences (2007-2011; since 2018)
- Lecturer in „Dendroecology", University of Bern, Institute of Plant Sciences (2001-2005)
- Lectures in "Applied Dendroecology for Foresters", Center of Forest Formation Maienfeld (Bildungszentrum Wald) (2001, 2003, 2006)
- Lectures on "Dendroecology" and "Tree-line dynamics", ETH-Zurich, Dep. Forest Sciences (2001, 2002, 2003)

TEACHING EVALUATION ETH

Evaluation of the lecture „Dendroecology", given by three lecturers. Score range: 0 (bad) to 5 (excellent). Evaluation focused on the *lecture* (2010, 12) or the *lecturer* (2008, 11, 13, 14, 18, 21):

- 2021: Lecturer Rigling - **Mean score: 4.3** (explanation of the subject: 4.4; learning objectives: 4.3; status of the lecture: 4.4; motivation to active participation: 4.1; Script, hand-out, teaching material: 4.5)
- 2018: Lecturer Rigling - **Mean score: 4.5** (explanation of the subject: 4.8; learning objectives: 4.1; status of the lecture: 4.6; motivation to active participation: 4.6; Script, hand-out, teaching material: 4.5)
- 2014: Lecturer Rigling - **Mean score: 4.4** (explanation of the subject: 4.8; learning objectives: 4.3; status of the lecture: 4.4; motivation to active participation: 4.3; Script, hand-out, teaching material: 4.4)
- 2013: Lecturer Rigling - **Mean score: 4.0** (explanation of the subject: 4.0; learning objectives: 4.0; status of the lecture: 4.0; motivation to active participation: 4.0; Script, hand-out, teaching material: 4.3)
- 2012: Lecture - **Mean score: 4.6** (mean entire master program: 4.0)
- 2011: Lecturer Rigling - **No mean score** (teaching dedication &commitment: 4.9; clarity of explanations 4.9; command of language: 4.3; overall impression of the lecture: 4.6)
- 2010: Lecture - **Mean score: 4.3** (mean entire master program: 3.9)
- 2008: Lecturer Rigling - **No mean score** (teaching dedication &commitment: 4.8; clarity of explanations 4.5; command of language: 5.0; overall impression of the lecture: 4.4)

SUPERVISION OF PHD (10), MASTER AND DIPLOMA (28) AND BACHELOR THESES (6):

Brozova Natalie (in prep.) Hazard mapping in forested terrain after natural disturbances. - PhD thesis ETH Zürich. Supervisors: Dr. P. Bebi; Prof. A. Rigling (both WSL).

Ringenbach Adrian (in prep.) Rockfall-Forest interactions - For a better Determination of the Insurance Value of EcoSystems (DIVES). - PhD thesis ETH Zürich. Supervisors: Dr. P. Bebi; Dr. P. Bartelt; Prof. A. Rigling; Prof. M. Li, (all WSL)

Wang Ao (in prep.) The physiological interactions between mistletoe and host in a changing world. - PhD thesis ETH Zürich. Supervisors: Prof. A. Rigling; Prof. M. Li, (both WSL)

Nussbaumer Anita (2020) Mast fruiting of European tree species – patterns and processes- PhD thesis ETH Zürich. Supervisors: Prof. A. Rigling; Prof. A. Gessler, (both WSL), Prof. H. Bugmann (ETH).

Schönbeck Leonie (2020) Physiological coupling mechanisms of carbon and nutrient dynamics underlying the drought-induced decline of Scots pine. PhD thesis Uni Basel. Supervisors: Prof. M. Li, Prof. A. Gessler, Prof. A. Rigling (all WSL), Prof. A. Kamen (Uni Basel).

Giuggiola Arnaud (2015) Impact of forest management on the drought resistance of dry pine forests. PhD thesis ETH Zürich. Supervisors: Dr. A. Rigling (WSL), Prof. H. Bugmann (ETH) S.

Feichtinger Linda (2014) Irrigation effect on diversity, growth and survival of forests in a dry environment. PhD thesis ETH Zürich. Supervisors: Dr. A. Rigling (WSL), Prof. N. Buchmann (ETH) S.

Lévesque Mathieu (2013) The effect of extreme drought events on growth and recovery of endemic and exotic tree species. PhD thesis ETH Zürich. Supervisors: Dr. A. Rigling, Dr. P. Brang (both WSL), Prof. H. Bugmann (ETH) S.

Eilmann Britta (2009) Drought and tree growth: Impact of extreme drought years on tree growth and survival strategy of Scots pine and downy oak on sensitive dry sites in the Valais, Switzerland. PhD thesis ETH Zürich. Supervisors: Dr. A. Rigling (WSL), Prof. N. Buchmann, Prof. H. Bugmann (both ETH) 97 S.

Weber Pascale (2005) Inter- and intraspecific competition in mixed *Pinus sylvestris*- and *Quercus pubescens*-stands – modeling future dynamics based on tree-ring analysis. PhD thesis ETH Zürich. Supervisors: Dr. A. Rigling (WSL), Prof. H. Bugmann (ETH) 137 S.

Anja Trachsel (2016) Zustand und Entwicklung von Totholz in ausgewählten Eichenwaldreservaten des Kt. AG. Master thesis, ETH Zürich (Supervisors: WSL, Dr. T. Lachat, Prof. A. Rigling) 80 S.

Daniela Gurtner (2015) Distribution and ecology of *Ailanthus altissima*. Master thesis, ETH Zürich (Supervisors: WSL, Dr. J. Wunder, Dr. M. Conedera, Dr. A. Rigling) 82 S.

Crest Simeon (2015) Impact of drought on resin production of Scots pine. Master thesis, ETH Zürich (Supervisors: WSL, Dr. B. Wermelinger, Dr. O. Jakoby, Dr. A. Rigling) 38 S.

Simon Knüsel (2014) Dendroecological analysis of fast growing invasive trees in southern Switzerland. Master thesis, ETH Zürich (Supervisors: WSL, Dr. J. Wunder, Dr. M. Conedera, Dr. A. Rigling) 88 S.

Andreas Käser (2014) Erkennung von Trockenstress bei Föhren-Sämlingen mittels Wärmebildern. Master thesis ETH Zürich (Supervisors: Dr. T. Wohlgemuth, Dr. A. Rigling) 65 S.

Christina Zumbrunn (2013) Klima-Wachstumsbeziehungen von Buche, Lärche und Tanne entlang von Höhengradienten im Kanton Graubünden. Master thesis, ETH Zürich (Supervisors: WSL, Dr. A. Rigling, Dr. D. Frank) 87 S.

Maxime Pattaroni (2012) Survival and growth strategy of Scots pine in the Valais, Switzerland. Master thesis, ETH Zürich (Supervisors: ETH, Dr. C. Bigler; WSL, Dr. A. Rigling) 73 S.

Antoine Schuttel (2012) Rajeunissement de la surface forestière après un incendie dans le canton du Valais. Master thesis ETH Zürich (Supervisors: WSL, Dr. T. Wohlgemuth, Dr. A. Rigling) 69 S.

Grundmann Nicole (2011) Die Rolle von Trockenheit für die Wachstumsdynamik der Waldföhre in der Region Chur. Master thesis,

UNI Zürich (Supervisors: ETH, Dr. C. Bigler; WSL, Dr. A. Rigling) 66 S.

Tschopp Tobias (2011) Geschichte der exotischen Baumarten in der Schweiz. Master thesis ETH Zürich (Supervisors: WSL, Dr. U. Gimmi, Dr. A. Rigling) 73 S.

Caminada Martina (2010) Einfluss von Bestandes- und Strukturparametern in Buchenwäldern auf die Artenvielfalt von xylobionten Käferarten. Master thesis ETH Zürich (Supervisors: WSL, Dr. A. Rigling, Dr. T. Lachat, Dr. B. Wermelinger) 71 S.

Keiser Angela (2010) Verjüngungs- und Bestandesdynamik im Pfynwald – Analyse eines 40-jährigen Durchforstungsexperimentes. Master thesis ETH Zürich (Supervisors: WSL, Dr. A. Rigling, Dr. B. Eilmann) 73 S.

Lutz Gregor (2010) Wachstumsreaktion von einheimischen und exotischen Nadelbaumarten auf Trockenheit. Master thesis ETH Zürich (Supervisors: WSL, Dr. A. Rigling, Dr. B. Eilmann) 47 S.

Hobi Martina (2008) Effekte von Feuer auf Baumwachstum und Mortalität. Master thesis ETH Zürich (Supervisors: ETH, Prof. H. Bugmann, Dr. C. Bigler; WSL, Dr. A. Rigling) 74 S.

Schell Claudia (2007) Besiedlungsdynamik von Krautpflanzen in den Gletschervorfeldern von Stein- und Steinlimigletscher. Diploma thesis UNI Bern (Supervisors: UNI Be, Prof. B. Ammann; WSL, Dr. T. Wohlgemuth, Dr. A. Rigling) 86 S.

Burger Maria (2006) Das intra-annuelle Wachstum von Waldföhre und Flaumeiche im Pfynwald (Wallis). (Teilarbeit Waldföhre) Diploma thesis ETH Zürich (Supervisors: ETH, Prof. H. Bugmann; WSL Dr. A. Rigling, B. Eilmann) 59 S.

Truniger **Patrizia** (2006) Das intra-annuelle Wachstum von Waldföhre und Flaumeiche im Pfynwald (Wallis). (Teilarbeit Flaumeiche) Diploma thesis ETH Zürich (Supervisors: ETH, Prof. H. Bugmann; WSL, Dr. A. Rigling, B. Eilmann) 59 S.

Elsener Stefan (2006) Wiederbewaldungsdynamik von Arve (Pinus cembra L.) und Lärche (Larix decidua Mill.) im Vorfeld des Morteratsch-Gletschers). Diploma thesis UNI Zürich (Supervisors: UNI ZH, Prof. C. Burga; WSL, Dr. B. Krüsi, Dr. A. Rigling) 133 S.

Schaffner Sonja (2005) Struktur und Dynamik von kanarischen Wachholderbeständen (*Juniperus turbinate* ssp. *Canariensis* Guy.) auf Teneriffa und La Gomera. Diploma thesis ETH Zürich (Supervisors: WSL, Dr. B. Krüsi, Dr. A. Rigling; ULL Dr. R. Otto, Prof. J. M. F. Palacios) 87 S.

Meuwly Pascal (2005) Struktur und Dynamik von kanarischen Wachholderbeständen (*Juniperus turbinate* ssp. *Canariensis* Guy.) auf Teneriffa und La Gomera. Diploma thesis ETH Zürich (Supervisors: WSL, Dr. B. Krüsi, Dr. A. Rigling; ULL Dr. R. Otto, Prof. J. M. F. Palacios) 87 S.

Ziefle Michael (2005) Untersuchung der Vegetationsverteilung im Gletschervorfeld Morteratsch (Schweiz). Diploma thesis UNI Zürich (Supervisors: UNI ZH, Prof. C. Burga; WSL, Dr. B. Krüsi, Dr. A. Rigling).

Bianchi Remo (2005) Wie klimaxnah sind die ältesten Sukzessionsstadien im Vorfeld des Morteratsch-Gletschers? Diploma thesis ETH Zürich (Supervisors: WSL, Dr. B. Krüsi, Dr. A. Rigling; UNI ZH, Prof. C. Burga;).

Hilber Ivo (2005) Vorhersage der stressbedingten Mortalität der Fichte basierend auf Jahrring- und Inventurdaten. Diploma thesis ETH Zürich (Supervisors: ETH, Prof. H. Bugmann; WSL Dr. A. Rigling) 45 S.

Eilmann Britta (2004) Wachstumsreaktion der Waldföhre (*Pinus sylvestris*) und der Flaumeiche (*Quercus pubescens*) auf klimatische Extremjahre – eine holzanatomische Studie. Diploma thesis UNI Hamburg (Supervisors: UNI Hb, Prof. D. Eckstein; WSL Dr. P. Weber, Dr. A. Rigling).

Bolli Jacqueline (2004) Die Wiederbewaldungsdynamik an der oberen Waldgrenze im Vorderrheintal. Diploma thesis ETH Zürich (Supervisors: ETH, Prof. H. Bugmann; WSL Dr. A. Rigling).

Hitz Oliver (2003) Boden- und Dendroökologische Untersuchungen zum Vegetationsmosaik auf Karstflächen in den Kurfirsten. Diploma thesis ETH Zürich (Supervisors: ETH, Prof. H. Bugmann; WSL Dr. A. Rigling).

Van der Meer Markus (2002) Dynamik des natürlichen alpinen Waldgrenzanstiegs im

südlichen Ural (RUS): Dendroökologische Einwanderungsdynamik und chronologische Entwicklung des Humuskörpers. Diploma thesis UNI Basel (Supervisors: UNI Ba, Prof. H. Leser; WSL Prof. F.H. Schweingruber, Dr. A. Rigling).

Heiri Caroline (2002) Dynamik und Wachstum von Lärchen-Fichten Beständen entlang eines Höhengradienten in Davos. Diploma thesis ETH Zürich (Supervisors: ETH, Prof. H. Bugmann; WSL Dr. A. Rigling) 103 S.

Piatti Gioele (2020) Ansiedlung neophytischer Gehölze in einem gestörten Wald. Bachelor thesis ETH (Supervisors WSL Dr. Marco Conedera; Dr. Boris Pezzatti; Prof. A. Rigling) 34 S.

Probst Tamara (2020) Prüfung der Wirksamkeit des «Konzept Wildhaber» zur Verbesserung der Stabilität der Robinie**.** Bachelor thesis ETH (Supervisors WSL Dr. Marco Conedera; Dr. Boris Pezzatti; Prof. A. Rigling) 46 S.

Häfelfinger Thomas (2013) Growth response to climate of beech trees (*Fagus sylvatica*) in the Grisons. Bachelor thesis ETH (Supervisors WSL Dr. D. Frank, Dr. A. Rigling) 46 S.

Pahlmann Sophie (2002) Dendroökologische Untersuchung zur Dynamik und zur Mortalität eines Waldföhren-Bestandes (*Pinus sylvestris* L.) im Wallis, Schweiz. (Teilarbeit Dynamik) Bachelor thesis FH Eberswalde (Supervisors: FH Ew, Prof. H. Schill; WSL Dr. A. Rigling) 103 S.

Lock Susi (2002) Dendroökologische Untersuchung zur Dynamik und zur Mortalität eines Waldföhren-Bestandes (*Pinus sylvestris* L.) im Wallis, Schweiz. (Teilarbeit Mortalität) Bachelor thesis FH Eberswalde (Supervisors: FH Ew, Prof. H. Schill; WSL Dr. A. Rigling) 103 S.

Brühlhart Harald (1999) Einfluss der Bewässerung auf das Jahrringwachstum von Kiefern - Eine dendroökologische Studie entlang einer stillgelegten Wasserleitung (Bisse) im Wallis. Bachelor thesis FH Biel (SH-Holz) (Supervisors: FH B, Dr. A. Hurst; WSL Prof. F.H. Schweingruber, A. Rigling) 103 S.

OUTREACH

Implementation of the research findings to stakeholders and the public is crucial and it decides on the impact on society. It results in numerous oral presentations on national and international conferences, excursions, field courses and publications in journals relevant for the public. Furthermore, my research activities are regularly in the focus of public media. The following list gives a *selected* overview:

TV

- SFDRS, 10vor10, Juni 2020: Fakecheck – Behauptungen zu G5
- 3sat, NANO, August 2018: Verfrühter Herbst wegen Trockenheit.
- SFDRS, Schweiz Aktuell, August 2018: Der Wald leidet unter der Trockenheit.
- SFDRS, Tagesschau, August 2018: Trockenheit 2018 – Was bedeutet das für den Wald?
- SFDRS, Tagesschau, August 2015: Waldbericht 2015.
- Arte, June 2011: Und ewig sterben die Wälder
- Arte, Xenius, August 2009: Wald und Klimawandel
- SFDRS, EINSTEIN, November 2008: Versteppung im Wallis
- SFDRS, MTW, November 2004: Ansteigende Waldgrenze im Ural
- 3sat, NANO, November 2004: Rettet uns die Tundra vor der Klimaerwärmung?
- SFDRS, MTW, April 2002: Bioindikator Wald (Waldföhrensterben im Wallis)
- 3sat, NANO, April 2002: Bioindikator Wald (Waldföhrensterben im Wallis)
- SFDRS, Schweiz Aktuell, June 2001: Waldföhrenwälder im Wallis

Radio

- SRF 1, 2020: Echo der Zeit: Aufforsten braucht Zeit – Es wäre sinnvoller nicht abzuholzen statt aufzuforsten.
- SRF 1, 2019: Wissenschaftsmagazin: Folge des Trockensommers – den Buchen geht es schlecht.

- RTR, 2019: Novitads: Die Auswirkungen der Trockenheit auf den Wald und die Folgen für den Menschen.
- SRF 1, 2018: Heute morgen: Wie geht es dem Wald bei dieser Trockenheit?
- SRF1, 2015: Tagesgespräche: Der Waldbericht 2015.
- SRF1, 2013: Tagesgespräch: Die Zukunft der Wälder in der Schweiz
- Radio de la Suisse Romande, 2001: Le dépérissement des pinèdes en Valais
- DRS1, ECHO der Zeit, 1998: Jahrringforschung

Internet

- Bluewin.ch, 2020: Die Borkenkäfer-Schäden sind auf einem Rekord» – hat unser Wald Zukunft?
- Bluewin.ch, 2019: Schweizer Alpen – Hitzesommer gefährdet den Lawinenschutz.
- Nau.ch, 2018: Die Bäume leiden unter der grossen Trockenheit.

Newspaper

- Aargauer Zeitung, Luzerner Zeitung, St. Galler Tagblatt etc. Juni 2020: Wie das Klima den Wald verändert.
- Schweiz am Wochenende, Juni 2019: Der Wald stirbt nicht, aber es sterben Bäume.
- Südostschweiz, Juni 2019: Die Bäume spüren die Folgen des Hitzesommers.
- Neue Zürcher Zeitung NZZ, August 2018: Der Wald ächzt unter Trockenheit.
- Limmattaler Zeitung, November 2015: Der Tagesablauf eines Baumes.
- Vivai, August 2015: Ein Recht auf Wald. Interview.
- Beobachter, June 2015: Klima und Wald – Man wird in den Wald flüchten. Interview.
- Walliser Bote, May 2015: Eine bäumige Woche – Schulprojekt "Wier sii d'Böüm"
- Neue Zürcher Zeitung NZZ, October 2014: Trockenheit in Tieflagen – Bündner Wälder rauschen anders.
- Die Südostschweiz, October 2014: Weniger Föhren, mehr Eichen – der Wald verändert sich.
- Schweiz am Sonntag, August 2014: Waldsterben: Umweltpolitik mit Panikmache
- Neue Zürcher Zeitung NZZ, March 2008: Den Waldföhren wird es im Wallis zu trocken.
- Neue Zürcher Zeitung NZZ, July 2008: Der Borkenkäfer gewinnt Land.
- SonntagsZeitung, April 2007: Die Schweiz leidet unter der Frühjahrshitze
- WOZ, May 2007: Wüste Wallis?
- Walliser Bote, September 2007: Das seltsame Föhrensterben im Wallis.
- Walliser Bote, January 2006: Eichen statt Föhren
- Die Weltwoche, January 2006: Das Waldsterben lebt.
- Le Nouvelliste, April 2006: Des remèdes pour des aiguilles stressées.
- Walliser Bote, April 2006: Die Trockenheit tötet die Föhren.
- Tages Anzeiger, April 2006: Die Föhrenwälder verdursten wegen der Klimaerwärmung
- Journal Suisse du Bois 2005: Les pinèdes du Valais.
- Journal de Sierre, August 2003: A l'écoute des pinèdes – mortes ou vives?
- NZZ am Sonntag, October 2003: Stiller Tod der Waldföhren.
- Walliser Bote, April 2002: Theorien für das Föhrensterben.
- Der Bund, May 2001: Rätselhaftes Waldföhrensterben im Wallis.
- Neue Zürcher Zeitung NZZ, September 2001: Rettung von Föhrenwäldern.
- Le Nouvelliste, September 2001: Nos pinèdes vont mal.

SCIENCE MEETS ARTS:

An interesting and relevant component of transdisciplinarity research and outreach is the interface between science and arts. Since 2011 several projects were conducted together with the Zurich University of Arts ZHdK:

2011: Residency of the artist *Christina Della Giustina* at WSL. In the frame of the program Artists in Labs AiL she cooperated during ten months in the research unit forest dynamics, the tree-ring lab and the long-term forest ecosystem monitoring LWF, bridging science and arts. http://www.dg-c.org

2013: Museum "zu Allerheiligen" in Schaffhausen, Switzerland - Art exhibition "you are variations – plop". Artistic visualization and musical interpretation of WSL long-term forest monitoring data by *Christina Della Giustina*.

2013: MONTREUX Jazz Festival, Switzerland - "You are variations - Tune of trees at lake Leman – four songs from inside a tree": Performance of art and science culminating in a concert at the Jazz Festival. Artistic concept: *Christina Della Giustina*, Scientific framing: A. Rigling, Musical interpretation: D. Senn (Cello), D. Zimmermann (Cello), D. Buchwalder (Marimba), C. Moser (Oud), R. Linder (Shakuhachi) http://www.dg-c.org/index_projects.htm

2015: Primary school Leuk-Susten, Valais, Switzerland. "Wier si d'Böüm" (we are the trees) Integrative study week Art-Science with 24 pupils from the 4th class. Under the guidance of the artist *Christina Della Giustina*, professional musicians and Andreas Rigling and other researchers from WSL the pupils

learned about climate change and forest ecosystems. They translated physiological monitoring data on soils, trees and the atmosphere into paintings and music, culminating in a public concert on the four seasons of tree functioning. The project was funded by the SNF-AGORA program and the Mercator Foundation. http://www.artistsinlabs.ch/events

2015: MONTREUX Jazz Festival, Switzerland - "You are variations - We are the trees": Concert and presentation on art and science. Artistic concept: *Christina Della Giustina*, Scientific framing: *A. Rigling*, Musical interpretation: children of the 4th class of the primary school Leuk-Susten, Musicians: D. Senn (Cello), D. Buchwalder (Percussion), R. Thie (Electronica), B. Meichtry (Flute), J. Metry (Guitar) http://www.montreuxjazzfestival.com/de/artist/you-are-variations

2015: Russian-Swiss Residency Exchange. In the frame of the program Artists in Labs AiL a residency takes place for 3 months (Sept.-Nov.) of the Russian artist collective "Urban Fauna" in the research group phytopathology and the research unit forest dynamics at WSL. The topic of the residency will be: Invasive species – good or bad? The residency is supported by the Institute for Cultural Studies in the Arts (ICS) and the Arts Council Pro Helvetia Zurich. http://www.artistsinlabs.ch/residency_programs

2015: COP21: United Nations Framework Convention on Climate Change, 21st Conference of the Parties. Official artistic contribution of Switzerland: (in)visible transitions. Acoustic and visual interpretation of the water cycles in trees growing in four different climate zones. Artistic concept: *Christina Della Giustina*, Scientific framing: *A. Rigling*. Botanical Garden of the University of Zurich. https://www.zhdk.ch/index.php?id=105290

2018: Museum of Electronic Arts HeK. Basel, Switzerland (2018) Forest Talks - What does the forest say? And what do philosophy, science and art have to say about it? Keynote lectures and podium discussion with Emanuele Coccia (Philosopher and author) and Andreas Rigling. Moderator: Yvonne Volkhart, Co-curator of the exhibition Eco-Visionaries and PI of the SNSF research project Ecodata - Ecomedia - Eco-Aesthetics.

2020: Online symposium "Techniques Matter. Researching More-than-Human Worlds" (2018), organized by Yvonne Volkart from the Institute of Aesthetic Practice and Theory IAeP, Academy of Art and Design, FHNW Basel. Keynote on "Climate change impacts on Swiss forests – long-term monitoring and field experiments to analyze the role of extreme drought in ecosystem dynamics". The symposium was part of the SNF project Ecodata - Ecomedia - Eco-Aesthetics.

AWARDS:

2020: **Scientific Image Competition of the Swiss National Science Foundation (SNSF)**: Distinction in the category "Locations and instruments" for the photograph "Siberian trees witness 1000 years of climate change" taken on an expedition to North-Eastern Siberia in Summer 2019.

2013: **td-award of the Swiss Academies of Arts and Sciences** for outstanding inter- and transdisciplinary research for the project MOUNTLAND - A. Rigling (PI) et al. Price money Fr. 50'000.-

2011: **Honorary professor**; Chinese Academy of Sciences

1993: **ETH medal** for outstanding diploma thesis

AWARDED STUDENTS:

2011: ATR-Award for outstanding PhD thesis of Britta Eilmann (main advisor A. Rigling)

2010: ETH medal for outstanding master thesis of Angela Keiser (main advisor A. Rigling)

2010: Eilmann et al. (2006) among the 3 most cited papers between 2006-2010 of the journal *Dendrochronologia* (co-author A. Rigling)

2009: Award by proQuercus for outstanding PhD thesis of Pascale Weber (main advisor A. Rigling)

2007: Weber et al. (2007) among the top 5 papers of the *Journal of Vegetation Science* in the year 2007 (co-author A. Rigling)

EDITORIAL WORK:

2021: **Guest Editor** in a special issue of the *Swiss Forestry Journal* SZF on "Douglas fir – risks and chances in Swiss forestry" (in German). In prep.

2020: **Guest Editor** in a special issue of the *Swiss Forestry Journal* SZF on "Drought 2018 in Swiss Forests" (in German).

2020: Krumm F, Schuck A, **Rigling A** (Eds) (2020) How to balance forestry and biodiversity conservation – A view across Europe. European Forest Institute (EFI), Joenssu, Finland and Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Birmensdorf. Pages 644. (In English).

Since 2018: **Associate Editor** of "Forest Growth." A specialty section of *Frontiers in Forests and Global Change.* https://www.frontiersin.org/journals/forests-and-global-change#

2018: **Guest Editor** in a special issue in the international journal *Frontiers in Plant Sciences* "Multiscale Approach to Assess Forest Vulnerability"

2013-2016: **Editor** for the topic "Climate Change" in the International Journal *Forestry*

http://forestry.oxfordjournals.org/

2018: **Guest Editor** in a special issue of the *Swiss Forestry Journal* SZF on "Forest dynamics at lower altitudes in the Valais" (in German)

2015: **Rigling A**, Schaffer HP (Eds) (2015) Forest Report 2015. Condition and use of Swiss forests Federal Federal Office for the Environment (FOEN), Bern, Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Birmensdorf. pages 143. (In German, French, Italian, English).

2014: Wohlgemuth T, **Rigling A** (Red.) (2014) Kurz- und langfristige Auswirkungen des Klimas auf die Wälder im Churer Rheintal. Schlussbericht Projekt Bündner Wald im Klimawandel. WSL Ber. 17: 85S.

2013: **Guest Editor** in a special feature of the international journal *Ecology & Society* on "Sustainable land-use practices in mountain regions: Integrative analysis of ecosystem dynamics under global change, socio-economic impacts and policy implications" (in English)

2012: **Guest Editor** in a special issue of the *Swiss Forestry Journal* SZF on "Interdisciplinary Research for the Mountain Forests" (in German)

2008: **Guest Editor** in a special issue of the *Swiss Forestry Journal* SZF on "Climate Change and Consequences for Forest Management" (in German)

FIVE MOST IMPORTANT PUBLICATIONS

Krumm F, Schuck A, **Rigling A** (Eds) (2020) How to balance forestry and biodiversity conservation – A view across Europe. European Forest Institute EFI, Swiss Federal Research Institute WSL, 650 pp.

Bose AK, Gessler A, Bolte A, Bottero A, Buras A, Cailleret M, Camarero JJ, Häni M, Hereş A-M, Hevia A, Lévesque M, Linares JC, Martinez-Vilalta J, Matías L, Menzel A, Sánchez-Salguero R, Sanders T, Saurer M, Vennetier M, Ziche D, **Rigling A** (2020) Growth and resilience responses of *Pinus sylvestris* L. to extreme droughts: How do they vary across a 2800 km latitudinal gradient in Europe? *Global Change Biology,* 26: 4521-4537.

Rigling A, Landolt D, Manser R (2015) Forests in change – Synthesis of the Swiss forest report 2015. In Rigling A, Schaffer HP (Eds) Forest report 2015. Condition and use of Swiss forests. Federal Office for the Environment (FOEN), Bern, Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Birmensdorf. pages 143. (In German, French, Italian, English).

Rigling A, Bigler C, Eilmann B, Mayer P, Ginzler C, Vacchiano G, Weber P, Wohlgemuth T, Zweifel R, Dobbertin M (2013) Driving factors of a vegetation shift from Scots pine to pubescent oak in dry Alpine forests. *Global Change Biology*. 19: 229-240

Allen CD, Macalady A, Chenchouni H, Bachelet D, McDowell N, Vennetier M, Gonzales P, Hogg T, **Rigling A,** Breshears DD, Fensham R, Zhang Z, Kitzberger T, Lim J-H, Castro J, Allard G, Running SW, Semerci A, Cobb N (2010) Drought-Induced Forest Mortality: A Global Overview Reveals Emerging Climate Change Risks. *Forest Ecology and Management* 259: 660-684

ALL PUBLICATIONS, MAY 2021

Total *(incl. accepted): 232 →* ***WoS:*** *111;* ***peer-reviewed (not WoS):*** *31;* ***book chapters:*** *23;* ***Transfer:*** *68*
Web of Science (WoS), *Researcher ID: B-9665-2013; core collection****: H-index 42****, citations 8'008; search "tree growth and drought": 7'918 papers in database – A. Rigling ranked No. 4 of all authors.*
Scopus: *Papers 119, H-index 43, citations 8'485*
Google Scholar: *Papers 656, H-index 50; citations 12'883; i10-index 102*
ORCID ID: *0000-0003-1944-4042*

Peer-reviewed publications marked with [P]

Original studies [P] *(peer-reviewed incl. WoS)*

Bottero A, Forrester DI, Cailleret M, Kohnle U, Gessler A, Michel D, Bose AK, Bauhus J, Bugmann H, Cuntz M, Gillerot L, Hanewinkel M, Lévesque M, Ryder J, Sainte-Marie J, Schwarz J, Yousefpour R, Zamora JC, **Rigling A** (2021) Growth resistance and resilience of mixed silver fir and Norway spruce forests in central Europe – contrasting responses to mild and severe droughts. *Global Change Biology, accepted.*

Bose AK, Scherrer D, Camarero CC, Ziche D, Babst F, Bigler C, Bolte A, Dorado-Linan I, Etzold S, Fonti P, Forrester DI, Gavinet J, Gazol A, González de Andrés E, Karger DN, Lebourgeois F, Lévesque M, Martinez-Sancho E, Menzel A, Neuwirth B, Manuel N, Sanders TGM, Scharnweber T, Schröder J, Zweifel R, Gessler A, **Rigling A** (2021) Climate sensitivity and drought seasonality determine post-drought growth recovery of Quercus petraea and Quercus robur in Europe. S*TOTEN, accepted*.

Eberle J, Husemann M, Doerfler I, Ulrich W, Müller J, Bouget C, Brin A, Gossner MM, Heilmann-Clausen J, Isacsson G, Krištín A, Lachat T, Larrieu L, **Rigling A**, Schmidl J, Seibold S, Vandekerkhove K, Habel JC (2021) Molecular biogeography of the fungus-dwelling saproxylic beetle Bolitophagus reticulatus indicates rapid expansion from glacial refugia. *Biological Journal of the Linnean Society*, accepted.

Rissanen K, Hölttä T, Bäck J, **Rigling A,** Wermelinger B, Gessler A (2021) Drought effects on carbon allocation to resin defences and on resin dynamics in old-grown Scots pine. *Environmental and* Experimental Botany, accepted.

Wermelinger B, **Rigling A,** Schneider Mathis D, Kenis M, Gossner M (2021) Climate change effects on tritrophic interactions of bark beetles in inner Alpine Scots pine forests. *Forests*, 12: 136. https://doi.org/10.3390/f12020136.

Tikkanen O-P, Kilpeläinen J, Mellado A, Hämäläinen A, Hodar JA, Jaroszewicz B, Luoto M, Repo T, **Rigling A**, Wang A, Li M-H, Lehto T (2020) Freezing tolerance of seeds explains differences in distribution of two widespread mistletoe subspecies in Europe. *Forest Ecology and Management*, 482: 10.1016/j.foreco.2020.118806.

Battlori E, Lloret F, Aakala T, Anderegg W, Aynekulu E, Bendixen D, Bentouati A, Bigler C, Burk J, Camarero JJ, Colangelo M, Coop J, Fensham R, Floyd L, Galiano L, Ganey J, Gonzalez P, Jacobsen A, Kane J, Kitzberger T, Linares JC , Marchetti S, Matusick G, Michaelian M, Navarro-Cerrillo R, Pratt RB, Redmond M, **Rigling A**, Ripullone F, Sangüesa-Barreda G, Sasal Y, Saura-Mas S, Suárez ML, Veblen T, Vilà-Cabrera A, Vincke C, Zeeman B (2020) Forest and woodland replacement patterns following drought-related mortality. *PNAS,* www.pnas.org/cgi/doi/10.1073/pnas.2002314117.

Schönbeck L, Li M-H, Lehmann MM, **Rigling A**, Schaub M, Kahmen A, Hoch G, Gessler A (2020) Soil nutrient availability alters tree carbon allocation dynamics during drought. *Tree Physiology*, https://doi.org/10.1093/treephys/tpaa139.

Hereş A-M, Polanco-Martínez J M, Petritan I C, Petritan A M, Curtu A L, **Rigling A,** Bigler C, Yuste J C (2020) Large-scale species-specific decline and mortality of native and non-native conifers in the Carpathians. *STOTEN*, 751: 141851.

Wang A, Siegwolf RTW, Saurer M, Joseph J, Gessler A, **Rigling A,** Schaub M, Li M, Lehmann M (2020) Effects of soil moisture, needle age, and leaf morphology on C and O uptake, incorporation, and allocation: A dual labelling approach with 13CO2 and H218O in foliage of a coniferous forest. *Tree Physiology*, doi.org/10.1093/treephys/tpaa114.

Joseph J, Decai G, Backes B, Bloch C, Brunner I, Gleixner G, Haeni M, Hartmann H, Hoch G, Hug C, Kahmen A, Lehmann MM, Li M-H, Luster J, Peter M, Poll C, **Rigling A,** Rissanen KA, Ruehr N, Saurer M, Schaub M, Schönbeck L, Stern B, Thomas FM, Werner RA, Werner W, Wohlgemuth T, Hagedorn F, Gessler A (2020) Rhizosphere activity in an old-growth forest reacts rapidly to changes in soil moisture and shapes whole-tree carbon allocation. *PNAS, 117: 24885-24892*.

Klesse S, von Arx G, Gossner M, Hug C, **Rigling A**, Queloz V (2020) Amplifying feedback loop between growth and wood anatomical characteristics of *Fraxinus excelsior* explains size-related susceptibility to ash dieback. *Tree Physiology*, doi:10.1093/treephys/tpaa091.

Timofeeva G, Treydte K, Bugmann H, Salmon Y, **Rigling A**, Schaub M, Siegwolf R, Saurer M (2020) How does varying water supply affect oxygen isotope

variations in needles and tree rings of Scots pine? *Tree Physiology*, 40: 1366-1380.

Bose AK, Gessler A, Bolte A, Bottero A, Buras A, Cailleret M, Camarero JJ, Häni M, Hereş A-M, Hevia A, Lévesque M, Linares JC, Martinez-Vilalta J, Matías L, Menzel A, Sánchez-Salguero R, Sanders T, Saurer M, Vennetier M, Ziche D, **Rigling A** (2020) Growth and resilience responses of *Pinus sylvestris* L. to extreme droughts: How do they vary across a 2800 km latitudinal gradient in Europe? *Global Change Biology,* 26: 4521-4537.

Schuldt B, Buras A, Hauck M, Vitasse Y, Arend M, Hajek P, Hartmann H, Hoch G, Lübbe T, Rammig A, Rose L, Rühr N, Wohlgemuth T, Zang C, **Rigling A**, Kahmen A (2020) Impact of extreme 2018 summer drought on central European forests - a first assessment. *Basic and Applied Ecology*, 45: 86-103.

Zweifel R, Etzold S, Sterck F, Gessler A, Anfodillo T, Mencuccini M, von Arx G, Lazzarin M, Haeni M, Feichtinger L, Meusburger K, Knüsel S, Walthert L, Salmon Y, Bose A, Schönbeck L, Hug C, De Girardi N, Giuggiola A, Schaub M, **Rigling A** (2020) Determinants of legacy effects in pine trees - implications from an irrigation-stop experiment, *New Phytologist*, 227: 1081-.1096

Gillerot L, Forrester DI, Bottero A, **Rigling A**, Bugmann H, Lévesque M (2020) Age, size, and neighbourhood effects on drought resilience of central European tree species. Ecosystems, https://doi.org/10.1007/s10021-020-00501-y.

Nussbaumer A, Meusburger K, Schmidt-Oehler M, Waldner P, **Rigling A**, Brunner I, Thimonier A (2020) Extreme summer heat and drought leads to early fruit abortion in European beech. *Scientific Reports,* 10:5334 | https://doi.org/10.1038/s41598-020-62073-0.

Bose AK, Moser B, **Rigling A**, Lehmann M, Milcu A, Peter M, Rellstab C, Wohlgemuth T, Gessler A (2020) Memory of environmental conditions across generations affects the acclimation potential of Scots pine. *Plant, Cell and Environment*, *DOI: 10.1111/pce.13729*.

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Schönbeck L, Gessler A, Schaub M, **Rigling A,** Hoch G, Kamen A, Li M-H (2020) Soil nutrients and lowered source:sink ratio mitigate effects of mild but not of extreme drought in trees *Environmental and Experimental Botany*, 169: 103905.

Zang CS, Buras A, Esquivel-Muelbert A, Jump A, **Rigling A,** Rammig A (2019) Standardised drought indices in ecological research: why one size does not fit all. *Global Change Biology*, 26:322–324.

Vitasse Y, Bottero A, Cailleret M, Bigler C, Fonti P, Gessler A, Levesque M, Rohner B, Weber P, **Rigling A,** Wohlgemuth T (2019) Contrasting resistance and resilience to extreme drought and late spring frost in five major European tree species. *Global Change Biology*, 25:3781–3792.

He P, Fontana S, Gessler A, Wang A, Song H, Liu H, Wang X, Schaub M, **Rigling A,** Jiang Y, Li M (2019) The biogeochemical niche shifts of Pinus sylvestris var. mongolica along an environmental gradient. *Environmental and Experimental Botany*, 167:103825.

Steffen H, Huber MO, Bont Z, **Rigling A,** Wunder J (2019) Decay detection in Norway spruce (Picea abies) with the Rotfinder instrument. *ForEcolMan*, 448:549-558.

Fabian Y, Bollmann K, Brang P, Heiri C, Olschewski R, **Rigling A**, Stofer S, Holderegger R (2019) How to close the science-practice gap in nature conservation? *Biological Conservation*, 19:93-101.

Etzold S, Ziemińska K, Rohner B, Bottero A, Bose AK, Rühr NK, Zingg A, **Rigling A** (2019) One century of forest monitoring data in Switzerland reveals species- and site-specific trends of climate-induced tree mortality. *Frontiers in Plant Science*, 10: 307 pp. https://doi.org/10.3389/fpls.2019.00307

He P, Fontana S, Sui X, Gessler A, Schaub M, **Rigling A**, Jiang Y, Li M (2018) Scale dependent responses of pine reproductive traits to experimental and natural precipitation gradients. *Environmental and Experimental Botany*, 156: 62-73.

Caspersen J, Thuerig E, **Rigling A**, Zimmermann NE (2018) Complementary of gymnosperms and angiosperms along an altitudinal temperature gradient. *Oikos*, 127: 1787-1799. doi: 10.1111/oik.05360.

Schönbeck L, Gessler A, Hoch G, McDowell N, **Rigling A**, Schaub M, Li M-H (2018) Homeostatic maintenance of non-structural carbohydrates after 13 years of drought and irrigation in Pinus sylvestris L., *New Phytologist*, doi: 10.1111/nph.15224.

Gessler A, Cailleret M, Joseph J, Schönbeck L, Schaub M, Lehmann M, Treydte K, **Rigling A,** Timofeeva G, Saurer M (2018) Drought induced tree mortality – a tree-ring isotope based conceptual model to assess mechanisms and predispositions. *New Phytologist*, 219: 485–490.

Pflug E, Buchmann N, Siegwolf RTW, Schaub M, **Rigling A**, Arend M (2018) Resilient leaf physiological response of European beech (*Fagus sylvatica* L.) to summer drought and drought release. *Frontiers in Plant Sciences*, 187: 11pp. doi: 10.3389/fpls.2018.00187

Cailleret M, Ferretti M, Gessler A, **Rigling A**, Schaub M (2018) Ozone effects on European forest growth –

towards an integrative approach. Journal of Ecology, 106:1377–1389.

Bose AK, Nelson AS, Kane M, **Rigling A** (2018) Testing density manipulation treatments to increase C assimilation in loblolly pine (Pinus taeda L.) based on the dual isotope approach, *Annals of Forest Science*, doi.org/10.1007/s13595-017-0687-1.

Giuggiola A, Zweifel R, Feichtinger L, Vollenweider P, Haeni M, Bugmann H, **Rigling A** (2018) Competition for water in a xeric forest ecosystem - Effects of understory removal on soil micro-climate, growth and physiology of dominant Scots pine trees. *Forest Ecology and Management*. 409: 241–249.

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Von Arx G, Arzac A, Fonti P, Frank D, Zweifel R, **Rigling A**, Galiano L, Gessler A, Olano JM (2017) Dynamics of sapwood ray parenchyma and non-structural carbohydrates (NSC) of Pinus sylvestris in response to drought and long-term irrigation. *Functional Ecology*. doi: 10.1111/1365-2435.12860

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Invited lecture, keynotes, moderations:

Institute of Aesthetic Practice and Theory IAeP, Basel, Switzerland (2020) online symposium - Invited keynote on “Climate change impacts on Swiss forests – long-term monitoring and field experiments to analyze the role of extreme drought in ecosystem dynamics”.

Jagd Aargau, Bezirk Kulm, Zetzwil, Switzerland (2020) Invited keynote on «Impact of Climate Change and extreme summer drought 2018 on the Swiss forests“. (in German).

Waldeigentümerverband beider Appenzell, Gais, Switzerland (2019) Invited keynote on «Impact of summer drought 2018 on the Swiss forests“. (in German).

Weiterbildung Wald Aargau, Villigen, Switzerland (2019) Invited keynote on «Consequences of summer drought 2018 on the Swiss forests”. (in German).

Waldbaureferententagung Österreich, Hiitisau, Austria (2019) Invited keynote on «Swiss Forests in Climate Change – Trends, Measures“. (in German).

Waldeigentümerverband Aargau, Beinwil, Switzerland (2019) Invited keynote on «Swiss Forests in Climate Change – Consequences for Forest Management“. (in German).

Forum für Wissen, Davos, Switzerland (2019) Invited lecture on «How much drought do our forests endure - Lessons from extreme dry years». (in German).

Österreichische Forsttagung, Seckau, Austria (2019) Invited keynote on «Forest production - Fit for climate change?». (in German).

Scoping Meeting «CH2018 Impacts, Bern, Switzerland (2019) Invited keynote on “Weather extremes - drivers of future forest development». (in German).

International conference TRACE, Caserta, Italy (2019) Invited opening-keynote on «Growth responses of Swiss forests to environmental change – Hotspots, Extremes, Trends, Measures“. (in English).

Waldeigentümerverband beider Basel, Laufen, Switzerland (2019) Invited keynote on «Swiss Forests in Climate Change – Trends, Measures“. (in German).

Gebirgswaldtagung Vorarlberg, Tschagguns, Austria (2019) Invited keynote (Festvortrag) on «Swiss Forests in Climate Change – Trends, Measures“. (in German).

Waldeigentümerverband Wallis, Martigny, Switzerland (2019) Invited keynote on «20 years of Scots pine decline – a review“. (in French).

Waldeigentümerverband Wallis, Visp, Switzerland (2019) Invited keynote on «20 years of Scots pine decline – a review“.(in German).

Thurn & Taxis Price for Forest Sciences 2018, Regensburg, Germany (2018) Invited keynote (Festvortrag) on «Swiss Forests in Climate Change – Hotspots, Extremes, Trends, Measures“. (in German).

Montagskolloquium für die Praxis. ETH Zürich, Switzerland (2018). Invited keynote on «Climate extremes, forest dynamics, silviculture - overview and results from current research projects“. (in German).

Int. conference “Strengthening the Adaptive Potential of Hyrcanian Forests”. Baku, Azerbaidschan (2018) Invited keynote on Swiss Experiences in Studying and developing Forest Management Strategies. (in English).

Int. conference “Position and Perspectives of Forestry and Wood Technology in the 21st Century”, Zagreb, Croatia (2018) Invited keynote on Impacts of Climate Change on Forest Ecosystems and their Management - a Swiss Perspective. (in English).

CIMAS Int. conference, Granada, Spain (2018) Invited keynote on Growth and mortality analyses in Alpine forest ecosystems based on long-term monitoring, gradient studies and field experiments. (in English).

Museum of Electronic Arts HeK. Basel, Switzerland (2018) Invited keynote and podium discussion. (in German).

Swiss Forestry Society, Workshops of working group “forest and game”, Maienfeld, Switzerland (2018) Keynote on “forests and climate change”. (in German).

Swiss Forestry Society, Workshops of working group “forest and game”, Zollikofen, Switzerland (2018) Keynote on “forests and climate change”. (in German).

Forest enterprise Schovenhorst Netherlands, Research seminar on “Relevance of exotic tree species for the forests of the Netherlands” (2017) Invited keynote on “ The role of non-native species in view of climate change and its possible impact on forestry in Europe. (in English).

European Forest Institute EFI, Annual Conference, Oslo, Norway (2017) Invited on podium for panel discussion on “Opportunities and challenges for forest management in the 21st century”. (in English).

Kanton Thurgau, Training for foresters, Ermatingen, Switzerland (2017) Invited keynote on “Opportunities and risks of Scots pine”. (in German).

INTEGRATE Network, International Symposium, Bonn, Germany (2017) Moderator conference session. (in English).

INTEGRATE International Conference, Prague, Czech Republic (2016) Moderator round table discussion. (in English).

Summer School NNEXT, Zagreb, Croatia (2016) Invited lecture on “Climate change and non-native tree species”. (in English).

Natural Sciences Society Canton Grisons, Chur CH (2015) Invited lecture on “Forest vegetation of the Alps in climate change – Current research in the Grisons”. (in German).

Forum Alpinum 2014, Boario Therme I (2014) Invited keynote on “Future paths of mountain regions – lessons from the MOUNTLAND project”. (in English).

Nature Parc Pfyn-Finges, Science Day, Leuk, Switzerland (2013) Invited lecture on “Forests and drought – Experimental research in the region of Pfynwald”. (in German).

Montreux Jazz Festival, Montreux, Switzerland (2013) Invited lecture, performance and concert in the context of the Artists in Labs program ail, together with Christina della Giustina (artist), Andreas Rigling (scientist) and 5 musiciens. (in English).

Technical University Munich & University of Applied Sciences, Freising, Germany (2013) Invited lecture on “Temperate tree species at the dry-hot distribution limit” Weihenstephan Campus. (in English).

EcoSummit 2012 - Ecological Sustainability. Restoring the Planet's Ecosystem Services, Columbus USA (2012) Invited lecture on “Sustainable land-use practices in the European Alps under global change - ecosystem dynamics, socio-economic impacts and policy implications”. (in English).

European Ecological Society EES, 12th congress, Avila, Spain (2011) Invited keynote on “Drought effects on Scots pine dieback in the European Alps - an integrative ecosystem analysis across multiple disciplines and scales”. (in English).

Association of Forest Site Ecology and Geobotany AfSV, Goldrain, Italy (2011) Invited lecture on “Drought as trigger of mortality processes in inner-Alpine Scots pine forests – System analysis across multiple scales”. (in German).

Natural Sciences Society Canton Grisons, Chur, Switzerland (2011) Invited lecture on “Forests of the earth – varying forms and systems”. (in German).

Community of Hedingen, Hedingen, Switzerland (2011) Invited lecture on “Forests of the earth: forests in change – driving factots and key-processes”. (in German).

Chinese Academy of Sciences, Shenjang, China (2011) Invited lecture on ““Scots pine decline in inner-Alpine valleys - system analysis and management options“. (in English).

School of Architecture, Civil and Environmental Engineering ENAC, EPFL, Lausanne, Switzerland (2010) Invited lecture on “Climate Change impacts on forest ecosystems – what are the consequences for the Swiss forests and their management?“ (in English).

Conference of the federal councilors of forest (Forstdirektorenkonferenz), Bern, Switzerland (2010) Invited lecture on “Climate Change and forest development – consequences for forestry?“ (in German).

Working group “Vegetation and Soil” of the Swiss Forestry Society, Olten, Switzerland (2010) Invited lecture on “Climate Change and tree species selection in forest management“. (in German).

Workshop of the project ADVANCE, University of Poznan, Poznan, Poland (2010) Invited lecture on “Scots pine decline in inner-Alpine valleys - system analysis and management options“. (in English).

Summerschool “Impacts of Climate Change on Growth and Mortality of Forests in Europe”, Freiburg i.B., Germany (2010) Invited lecture on “Direct and indirect effects of drought on growth and survival of trees“. (in English). (in English).

Swiss working group forest protection, Landquart, Switzerland (2009) Invited lecture on “The forests of the Grisons under Climate Change”. (in German).

OcCC Public symposia “Adaptation on Climate Change: Need for action in research and practice”, Bern, Switzerland (2009) Invited lecture on “Climate Change and forest development – Necessities and adaptation measures in forestry”. (in English).

Forest service canton Freiburg, Villars sur Glane, Switzerland (2009) Invited lecture “Forest development and Climate Change – Need for action for forestry”. (in German).

ICAS-workshop “Interdisciplinarity in mountain research”, Brig, Switzerland (2008) Invited lecture on “Sustainable land use in mountain regions: Intergrative analysis of ecosystem dynamics under Global Change and implications on socio-economy and policy”. (in English).

Conference of the heads of the cantonal forest services KoK, Aubonne, Switzerland (2008) Invited lecture on “Climate Change as touch stone for forest management in the 21st century”. (in German).

Workshop on “Global Change in mountain Natural Protected Areas “, University of Granada, Granada, Spain (2008) Invited lecture on “The role of drought in Alpine pine dieback”. (in English).

Assembly at municipal level (Burgergemeinde), Visp, Switzerland (2007) Invited lecture on “Scots pine decline in the region of Visp”. (in German).

Training course for mountain foresters GWG, Interlaken, Switzerland (2007) Invited lecture on “Scots pine decline in inner-Alpine valleys – a synthesis”. (in German).

Summerschool “Innovative approaches for sustainable management of forest ecosystems under a changing environment (FORCE)”, Freiburg i.B., Germany (2007) Invited lecture on “Scots pine decline in inner-Alpine valleys - system analysis and management options“University of Basel, Department Environmental Sciences, Basel CH (2011) Invited lecture on “Drought impact on dry inner-Alpine forests - Historical water channels as long-term field experiments”. (in English).

Forest service canton Zurich, Eglisau, Switzerland (2007) Invited lecture on “Climate change and silviculture” Conference of the heads of the cantonal forest services KoK, Brig CH (2006) Invited lecture on “Forest research in Switzerland”. (in German).

Lamont-Doherty Observatory, workshop on “Holocene History of the Northern Treelines”, New York, USA (2006) Invited lecture on “Upper treeline dynamics in the Ural mountains”. (in English).

Basler Botanische Tagung, Basel, Switzerland (2004) Invited lecture on “Scots pine decline in Valais”. (in German).