CURRICULUM VITAE

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Personal Data and Education

Birth: 16. August 1949, in Basel (Switzerland); Citizenship: Swiss
Martial Status: Married with Franziska Margaretha
Children: Chantal Iris Johanna (3.4.1985) and Etienne Ambros Francois (7.12.1987)

Schools

1956-1963	Elementary School in Zürich
1963-1969	Gymnasium (Literargymnasium der Kantonsschule Zürich)
1969	Maturität (Typus A)

University Education

1969-1978	Chemistry at the University of Zürich
1977-1978	Diploma thesis in Physical Chemistry
1980	Diploma for Gymnasium teaching in Chemistry (Diplom für das höhere Lehramt des Kantons Zürich)
1978-1983	Doctoral Studies at the Swiss Federal Institute of Technology Zürich (ETHZ) performed at the Swiss Federal Institute for Water Resources and Water Pollution Control (EAWAG), advised by Prof. J. Hoigné and Prof. W. Stumm, in cooperation with Prof. R. Bühler of the Laboratory of Physical Chemistry at ETHZ
Title:	Ozonzerfall in Wasser: Kinetik der Initiierung durch OH^--Ionen und H_2O_2 sowie der Folgereaktionen durch $OH^\cdot$ und $^\cdot O_2^-$-Radikale (ozone decomposition in water)

Employments

1976-1982	Teacher in Chemistry at the Kant. Maturitätsschule für Erwachsene des Kt. Zürich (part time employment)
Sept. 1982-July 1983	Contract of the Office of Environment, Forest and Landscape (BUWAL) at EAWAG, advised by Prof. W. Giger (EAWAG) and Dr. H. Hosbach (BUWAL), dealing with the risk of groundwater pollution by pesticides
Aug.1983-Juli1984	Visiting-Fellowship at the CIRES-Institute (Cooperative Institute for Research in Environmental Sciences) in Boulder, CO, USA: Computer simulations of the possible changes in tropospheric chemistry after a nuclear war (advised by Prof. J. Birks) and measurements of organic pollutants in the ambient air of Denver (advised by Prof. R. E. Sievers)
Sept.1984-Sept.1985	Research Institute for Agriculture at Wädenswil (FAW): Assessment of environmental risks of pesticides (funded by the Office of Environment, Forest and Landscape (BUWAL))
Oct. 1985-Apr.1988	Ciba-Geigy AG in Basel (Postdoc, Central Research, Department of Analytical Research and Coordination): Calibration and testing of a completely automated instrument for measurement of highly volatile hydrocarbons in ambient air and measurements at a rural site (Schönenbuch, BL)
15. April 1988	ETHZ (Laboratoirum für Atmosphärenphysik (LAPETH), as research group leader
Nov. 15., 2001	Promotion to a Professor ("Titularprofessor") by the ETH-Rat
Febr. 2011-2014	50% employment for SPARC-Office
End August 2014	Retirement

Teaching at ETH

WS92/93-WS99/00	Introduction in atmospheric chemistry, for Environmental Engineers, (Dept. VIII)
WS 94/95- WS 99/00	Dynamics of Pollutants in Water, Soil and Air (together with F.W. Funk, W. Giger und H.P. Kohler), Dept. for Environmental Sciences (Dept. XB)
SS 97, 98, 99	Atmospheric Chemistry, Dept. for Environmental Sciences (Dept. XB)
2000-2005	Tropospheric Chemistry, Dept. for Environmental Sciences (Dept. XB)
SS 2001- 2011	Co-teacher of the Praktikum Umwelt-System Atmosphäre (Dept. XB)
WS 01/02	Fallstudie Montreal Protokoll (together with T. Peter)
2002-2005	Anthropogogenic Pollutants (together with W. Giger, H.P. Kohler and B. Novak), Dept. for Environmental Sciences (Dept. XB)
WS 2005/06-2012	Atmospheric chemistry together with T. Peter in the Bachelor currciculum, Dept. for Environmental Sciences (Dept. XB)
SS 2007-2013	Tropospheric Chemsitry together with A.S.H. Prevot in the Master course in Atmospheric Sciences of ETHZ

Scientific Awards

Apr. 1981	Certificate of Appreciation for the most outstanding Paper in its Category for a presentation at the 5. Ozonweltkongress in Berlin, awarded by the International Ozone Association, together with J. Hoigné
1984	Silver Medaille of the Swiss Federal Institute of Technolgy for an excellent PhD thesis
1984	Jean Hallopeau-award 1983/1984 for an excellent PhD thesis sponsored by the European Section of the International Ozone Association

Research Activities at ETHZ

Stratospheric ozone including long-term trend analysis. The longest total ozone series was started in 1926 at Arosa in the Swiss Alps. We needed to homogenize the measurements for reliable long-term trend analysis for which purpose we used statistical models based on simultaneous measurements and historical documents. Related to stratospheric ozone trend analysis we have contributed to the analysis of ground-based UVB-measurements. The analysis of the total ozone series of Arosa and the ozone balloon measurements of Payerne (located in the Swiss plateau) revealed that in addition to the increasing concentration of ozone depleting substances the hemispheric changes in dynamics (as connected with the North Atlantic Oscillation and as described by the tropopause pressure) have significantly contributed to the stratospheric ozone winter downward trends over Europe which were observed between the beginning of the 1970s and the middle of the 1990s. In these projects we have collaborated with C. Appenzeller (presently at MeteoSwiss) and with W. Stahel from the Seminar for Statistics of ETHZ for the further development of statistical models. We also used trajectory analysis to improve our understanding of the relation between stratospheric ozone and climate variability. In our contribution to the EU-project CANDIDOZ (Chemical and Dynamical Influences on Decadal Ozone Change) we also worked with satellite ozone measurements attempting to separate the influence of chemical ozone depletion and long-term climate variability. More recently the recovery of the ozone layer was an important focus. Our studies provided important information in the context of the evaluation of the effectiveness of the Montreal Protocol (and its amendments) to protect the ozone layer. We recently applied extreme value theory to assist the interpretation of time series analysis of total ozone measurements.

Chemistry at tropopause altitude and evaluation of global troposperhic numerical simulations. Nitrogen oxides play a key role in the formation of ozone in the free troposphere and ozone acts as strong greenhouse gas in particular at the tropopause altitude. We have permanently installed (for one year) a highly sensitive and completely automated instrument for measurements of nitrogen oxides (NO, NO_2) and ozone in a B747 of Swissair (project NOXAR: Nitrogen OXides and ozone along Air Routes). The instrument was flown from Zürich to destinations in USA, Beijing and over Bombay to Hong Kong providing an extensive data set of these key species. The measurements were continued in the EU-project POLINAT-2 (Pollution from Aircraft Emissions in the North Atlantic Flight Corridor). Our analysis revealed large horizontal gradients of nitrogen oxides at tropopause altitude. In the "lightning tracing method" we used information of trajectories and of ground based measurements of lightning flashes which allowed to provide evidence that these large scale NO_x plumes can be explained by nitrogen production in lightning strokes. We continued our research activities in chemistry at the tropopause region by measurements of NO (NO_x), NO_y and O_3 in the German project SPURT (SPURenstofftransport in der Tropopausenregion). In this project a large number stratospherically and tropospherically relevant trace components were measured using a Lear jet as measuring platform.

The unique NOXAR data set was also important in our contribution to the EU-project TRADEOFF (Aircraft emissions: Contributions of various climate compounds to changes in composition and radiative forcing - TRADEOFF to reduce atmospheric impact), in which the results of numerical simulations are compared with a variety of measurements at the tropopause. Such numerical simulations are used to predict e.g. the influence of the globally increasing air traffic on climate. These activites were extended within the EU-Projects RETRO (REanalysis of TROpospheric chemical composition over the past 40 years) and QUANTIFY (QUANTIFYing the climate impact of global and European transport Systems).

Photooxidants, other air pollutants and tropospheric ozone long-term trends. Based on careful evaluation of historical measurements (mainly from Arosa, going back to 1930) and present measurements we were able to show that tropospheric ozone at surface has increased by more than a factor of two in the rural and Alpine air all over the European continent between World War II and 1990, when anthropogenic emissions of ozone precursors increased rapidly. However, the increase in ozone background concentration commonly observed in Europe during the 1990s is more difficult to explain since ozone precursor emission significantly decreased in Europe and North America in this period. For this period we found (in an analysis in collaboration with PSI) a strong correlation between ozone at high European mountain sites and ozone in the lowermost stratosphere (deduced from ozone sonde measurements). Because ozone in the lowermost stratosphere strongly increased after the Pinatubo disturbance in northern extratropics the strong correlations in anomalies of high mountain sites and the lowermost stratosphere suggest that this background tropospheric ozone increase was (partially) caused by an increased ozone flux from the stratosphere, a process, which is difficult to describe in current global numerical simulations.

We have investigated summer smog air pollution by surface measurements (nitrogen oxides, ozone and volatile organic compounds (VOC)) and its interpretations. In the Swiss project POLLUMET (POLLution and METeorology) campaigns took place in Alpine valleys and in the Swiss plateau. We were among the first to document the large air pollution originating from the capital of Milan in Northern Italy which affects the air quality of the Southern part of Switzerland. Subsequently the photooxidant formation in Northern Italy was investigated in the EUROTRAC-subproject LOOP (Limitation Of Oxidant Production), which showed again ozone concentrations in the boundary layer approaching 200 ppb. We were able to demonstrate by field measurements that indicator variables can be used to provide valuable information on the limitation regime, i.e. the question whether ozone production in an air mass is limited by the emissions of nitrogen oxides or VOCs.

More recently we were primarily interested on tropospheric chemistry on larger spatial scales also because of the impact of ozone on climate. We have performed extensive measurements of a variety of species at Arosa, from which we learned more about the regional, European, and hemispheric contributions to photooxidants and its precursors. Recently we contributed to trace gas measurements at the high Alpine site Jungfraujoch (Switzerland) (in particular by extended measurements of PAN (Peroxy Acetyl Nitrate)) in order to study intercontinental transport events and the impact of stratospheric intrusions on tropopspheric ozone. In these analyses (which were performed in collaboration with EMPA) we include information of trajectories, local meteorology and the chemical composition of the air mass.

Also longterm evolution of surface ozone in Switzerland after 1990 was studied. The small decrease in high ozone values in the polluted planetary boundary leayer needs further attention keeping in mind the large reduction of ozone precursors.

Evaluation of emission models. The knowledge of anthropgenic emissions is very crucial in atmospheric chemistry including air pollution abatement. Current road traffic emission models are based on dynamomtetric test measurements. However, they need to be validated by other measurements e.g. by measurements of road tunnels ("real world emissions"). Within the EUROTRAC-project GENEMIS I was the scientific coordinator of a large tunnel study in the

Gubrist tunnel (close to Zürich) in which the road traffic emissions of nitrogen oxides, sulfur dioxide and 58 gaseous organic compounds were measured. The results showed reasonable agreement between the tunnel measurements and the road traffic emission model except for the emissions of nitrogen emissions of heavy duty (diesel) vehicles. The emission model underestimated the tunnel measurements by approximately a factor of two. Further tunnel studies of Germany and Austria also confirmed this type of difference. The NO_x emission of (heavy duty) diesel vehicles was also an important topic in the EU-project ARTEMIS (Assessment of road Transport Emission Models and Inventory Systems) in which we contributed by the calculation of emission factors from new tunnel studies by statistical modeling and the comparison of the results of the tunnel studies with a road traffic emission model. The revised traffic emission model for Swiss, Germany and Austria (Handbook for emission factors) shows good agreement with the temporal evolution of road traffic emissions as derived from measurements of the Gubrist tunnel available since the early 1990s.
The Seminar for Statistics at ETHZ developed (in collaboration with us) an advanced statistical model which allows to estimate the contributions of different emission sources to ambient air concentrations based on the analysis of extended monitoring measurements. With this model we were able to show that the Swiss emission inventory most probably significantly underestimates the VOC emissions originating from road traffic sources while other sources such as solvent emissions are probably overestimated.
Scavenging of air pollutants by precipitation. Our group significantly contributed to the field experiment winter precipitation at Rigi, in which polluted precipitation was investigated. The project was part of the interdisciplinary ETH-project WaBoLu (Wasser, Boden, Luft). Our contribution showed that cloud physics (e.g. riming) plays a key role in the transfer mechanism of the pollution of inorganic species (in the form of gaseous compounds or as part of aerosols) from the atmosphere into the precipitation. These activities were also part of the EUROTRC-Subproject ALPTRAC (High Alpine Aerosol and Snow Chemistry Study). Some measurements were also performed at the Jungfraujoch. The activities were terminated by numerical simulations.
Value and history of longterm Swiss ozone measurements (LKO history project). Since retirement from ETHZ a study was started to review and evaluate the value of Swiss ozone longterm measurements for the international atmospheric science community. These activities led to several review papers and continued until end of 2019 (2020). Pierre Viatte (former coworker of MeteoSwiss) and I worked on a report on the history of the Light Climatic Obsrevaory (LKO) at Arosa (published as short version as paper (Staehelin et al., 2018) and as a Report of MeteoSwiss and IACETH. The results were connected to the prodcution of the book "Licht, Luft, Ozone" written (in German) for the public by Matin Läubli (2019). The book is translated to English.

Consulting

I was a consultant of **MeteoSwiss for questions concerning atmospheric ozone**. The related work included: Development of concepts for data quality control of the long-term ozone measurements of MeteoSwiss (at Arosa: total ozone measurements, simultaneously performed by two Dobson spectrometers and three Brewer spectrophotometers and Umkehr measurements), data quality check of the ozone balloon sondes of Payerne and trend analysis of the long-term Swiss ozone measurements.

Membership in Commissions, Steering Groups and International Assessments

Commissions and steering groups

1989-2001	Member of the *Commission of Atmosphere and Climate* (CCA) of the Swiss Academy of Natural Sciences (SANW)
1991-1995	Member of the steering group of the Swiss program *POLLUMET* (Pollution and Meteorology), 1992 as chair
1992-2000	Member of the *International Ozone Commission* (IO3C) of the International Association of Atmospheric Sciences (IAMAS)
1997-2002	Member of the steering group of *GENEMIS-2* (Generation and Evaluation of Emission Data), a subprojekt of *EUROTRAC-2* (European Experiment on the Transport and Transformation of Environmentally Relevant Trace Constituents in the Troposphere over Europe)
1997-2014	Member of the steering group of GAW-CH (Swiss contribution of the Global Atmosphere Watch Porgramm of WMO)
2002-2013	Member of the *Commission of Atmospheric Chemistry and Physics (ACP)* of the Swiss Academy of Natural Sciences (SANW) (acting as vice chairman 2002-2010)
2004-2013	Scientific Advisory Group (SAG) on Ozone of the Global Atmosphere Watch (GAW) project of the World Meteorological Organization (WMO), 2005-2013 as chairperson
2005-2010	Member of the Environmental Physics groups of the Euroepan Enviromental Physics Association
2009-2015	Member of the IO_3C/WMO-GAW Expert Team on Absorption Cross Sections of Ozone (ACSO)
Febr. 2011-2014	SPARC-Office: 50% employmenent (as SPARC-Office drector: Febr. 2011- Febr. 2014) – SPARC (Stratosphere-troposphere Processes And their Role on Climate) is a core Project of WCRP (World Climate Research Programme)
2014-2019(2020)	Study of history of ozone measurements of Light Climatic Observatory at Arosa (LKO) and Swiss ozone research (together with Pierre Viatte, MeteoSwiss (retired) and Martin Läubli

International Assessments

Since 1991	*Scientific Assessments of Ozone Depletion of World Meteorological Organization* (WMO) *and United Nations Environment Programme* (UNEP). Contributions as chapter co-author in 1991, 1994 and 2006, as contributing author in 2010 and as reviewer in 1998, 2002 and 2013.
1996, 2000, 2006	Rewiever or contributing author of the Second, Third and Fourth Assessment Report of IPCC (International Panel for Climate Change)-report, Working Group 1.
1996	Contributing author to the "Assessment of trends in the vertical Distribution of Ozone" (under the auspices of the programs "Stratospheric Processes and their role in Climate" (SPARC), IOC and WMO)
2000/2001	Contributing author to the "Second Assessment of European Research on the Stratosphere", Chap. 4 (Understanding of mid-latitude and tropical ozone trends)

2002/2003 Contributing author of the Scientific Assessment "Ozone-climate interactions", Chapt. 2 (the effect of stratospheric ozone changes on climate), and Chapt. 3 (the effect of changes in climate on stratospheric ozone).

Publication List

Papers in reviewed Journals

Ozone Decay in Water (water treatment processes)

1. J. Staehelin and J. Hoigné: Decomposition of ozone in water: Rate of initiation by Hydroxide Ions and Hydrogen Peroxide, *Environ. Sci. Techn.*, 16, 676-681 (1982).
2. J. Staehelin and J. Hoigné: Reaktionsmechanismus und Kinetik des Ozonzerfalls in Wasser in Gegenwart organischer Stoffe, *Vom Wasser*, 61, 337-348 (1983).
3. R. E. Bühler, J. Staehelin, and J. Hoigné: Ozone decomposition in water studied by Pulse Radiolysis: 1. HO_2/O_2^- and HO_3/O_3^- as intermediates, *J. Phys. Chem.*, 88, 2560-2564 (1984).
4. J. Staehelin, R. E. Bühler, and J. Hoigné: Ozone decomposition in water studied by Pulse Radiolysis: 2. OH and HO_4 as chain intermediates, *J. Phys. Chem.*, 88, 5999-6004 (1984).
5. J. Staehelin and J. Hoigné: Decomposition of ozone in water in presence of solutes acting as promotors and inhibitors of radical chain reactions, *Environ. Sci. Techn.*, 19, 1206-1213 (1985).
6. J. Hoigné, H. Bader, W. Haag, and J. Staehelin: Rate constants of reactions of ozone with organic and inorganic compounds in water - III Inorganic compounds and radicals, *Water Res.,* 19, 993-1004 (1985).

Scavenging of Air Pollutants by Precipitation

7. J. L. Collett, A. S. H. Prévôt, J. Staehelin, and A. Waldvogel: Physical factors influencing winter precipitation chemistry, *Environ. Sci. Techn.*, 25, 782-788 (1991).
8. B. Oberholzer, J. L. Collett, Jr., J. Staehelin, and A. Waldvogel: In-cloud scavenging of gases and aerosols at a mountain site in Central Switzerland, *J. Atmos. Chem*., 14, 61-71 (1992).
9. J. Staehelin, A. Waldvogel, J.L. Collett, Jr., R. Dixon, R. Heimgartner, W. Henrich, C. Hsu, L. Li,, L. Mosimann, B. Oberholzer, A.S.H. Prévôt, W. Schmid, T. Schumann, M. Steiner, M. Volken, and B. Zinder: Scientific goals and performed experiments of the project "winter precipitation at Mount Rigi": An overview, *Water, Air Soil Pollut*., 68, 1-14 (1993).
10. J. L. Collett, Jr., B. Oberholzer, L. Mosimann, J. Staehelin, and A. Waldvogel: Contributions of cloud processes to precipitation chemistry in mixed phase clouds, *Water, Air Soil Pollut.*, 68, 43-57 (1993).
11. B. Oberholzer, M. Volken, J.L. Collett, Jr., J. Staehelin, and A. Waldvogel: Pollutant concentrations and below-cloud scavenging of selected N (-III) species along a mountain slope, *Water, Air Soil Pollut.,* 68, 59-73 (1993).
12. J. L. Collett, Jr., B. Oberholzer, and J. Staehelin: Cloud chemistry at Mt. Rigi, Switzerland: Dependence on drop size and relationship to precipitation chemistry, *Atmos. Environ.*, 27A, 33-42 (1993).
13. R. W. Dixon, L. Mosimann, B. Oberholzer, J. Staehelin, A. Waldvogel, and J.L.Collett, Jr: The effect of riming on the ion concentrations of winter precipitation, 1., A quantitative analysis of field measurements, *J. Geophys. Res.*, 100, 11,517-11,527 (1995).
14. O. Poulida, M. Schwikowski, U. Baltensperger, J. Staehelin, and H.W. Gäggeler: Scavenging of atmospheric constituents in mixed phase clouds at the High-Alpine site Jungfraujoch: Part II: Influence of riming on scavenging of particulate and gaseous chemical species, *Atmos. Environ.,* 32, 3985-4000 (1998).

Stratospheric ozone (and water vapour) and long-term ozone trend analysis

15. H. U. Dütsch and J. Staehelin: Discussion of the 60 year total ozone record at Arosa based on measurements of the vertical distribution and a meteorological parameter, *Plan. Space Sci.*, 37, 1587-1599 (1989).
16. J. Staehelin and W. Schmid: Trend analysis of tropospheric ozone concentrations utilizing the 20 year data set of ozone balloon soundings over Payerne (Switzerland), *Atmos. Environ.*, 25A, 1739-1749 (1991).
17. H.U. Dütsch, J. Bader, and J. Staehelin: Separation of solar effects on ozone from anthropogenically produced trends, *J. Geomagn. and Geoelectr.*, 43, Suppl. 657-665 (1991).
18. H.U. Dütsch and J. Staehelin: Results of the new and old Umkehr algorithm compared with ozone soundings, *J. Atmos. Terr. Phys*., 54, 557-569 (1992).

19. B. Hoegger, G. Levrat, H. Schill, J. Staehelin, and P. Ribordy: Recent developments of the Light Climatic Observatory - Ozone measuring station of the Swiss Meteorological Institute (LKO) at Arosa, *J. Atmos. Terr. Phys*, 54, 497-505 (1992).
20. J. Staehelin, J. Thudium, R. Bühler, A. Volz-Thomas, and W. Graber: Surface ozone trends at Arosa (Switzerland), *Atmos. Environ.*, 28, 75-87 (1994).
21. M. Huber, M. Blumthaler, W. Ambach and J. Staehelin: Total atmospheric ozone determined from spectral measurements of direct UV irradiance, *Geophys. Res.Lett*., 22, 53-56 (1995).
22. P. van der Gathen, M. Rex, N.R.P. Harris, D. Lucic, B.M. Knudsen, G.O. Braathen, H. De Backer, R. Fabian, H. Fast, M. Gil, E. Kyro, I.S. Mikkelsen, M. Rummukainen, J. Staehelin, and C. Varotsos: Observational evidence for chemical ozone depletion over the Arctic in winter 1991-92, *Nature*, 375, 131-134 (1995).
23. C.L. Mateer, H.U. Dütsch, J. Staehelin, and J.J. DeLuisi: Influence of the priori profiles on trend calculations from Umkehr data, *J. Geophys. Res.*, 101, 16,779-16,787 (1996).
24. N.R.P. Harris, G. Ancellet, L. Bishop, D. J. Hofman, J. B. Kerr, R. D. McPeters, M. Prendez, W.J. Randel, J. Staehelin, B. H. Subbaraya, A. Volz-Thomas, J. Zawodny, and C.S. Zerefos: Trends in stratospheric and free tropospheric ozone, *J. Geophys. Res.,* 102, 1571-1590 (1997).
25. M. Rex, P. von der Gathen, N.R.P. Harris, D. Lucic, B.M. Knudsen, G.O. Braathen, S.J. Reid, H. De Backer, H. Claude, R. Fabian, H. Fast, M. Gil, E. Kyrö, I.S. Mikkelsen, M. Rummukainen, H.G. Smit, J. Stähelin, C. Varotsos, and I. Zaitcev: In situ measurements of stratospheric ozone depletion rates in the Arctic winter 1991/1992: A Lagrangian approach, *J. Geophys. Res*., 103, 5843-5853 (1998).
26. J. Staehelin, A. Renaud, J. Bader, R. McPeters, P. Viatte, B. Högger, V. Bugnion, M. Giroud, and H. Schill: Total ozone series of Arosa (Switzerland). Homogenization and data comparison, *J. Geophys. Res*., 103, 5827-5841 (1998).
27. J. Staehelin, R. Kegel, and N. R.P. Harris: Trend analysis of the homogenized total ozone series of Arosa (Switzerland), 1926-1996, *J. Geophys. Res.,* 103, 8389-8399 (1998).
28. J.A. Logan, I.A. Megretskaia, A.J. Miller, G.C. Tia, D. Choi, L. Zhang, R.S. Stolarski, G.J. Labow, S.M. Hollandsworth, G.E. Bodecker, H. Claude, D. DeMuer, J.B. Kerr, D.W. Tarasick, S.J. Oltmans, B. Johnson, F. Schmidlin, J. Staehelin, P. Viatte, and O. Uchino: Trends in the vertical distribution of ozone: A comparison of two analyses of ozonesonde data*, J. Geophys. Res*., 104, 26,373-26,399 (1999).
29. C. Appenzeller, A.K. Weiss, and J. Staehelin: North Atlantic Oscillation modulates total ozone winter trends, *Geophys. Res. Lett*., 27, 1131-1134 (2000).
30. S. Brönnimann, J. Luterbacher, C. Schmutz, H. Wanner and J. Staehelin: Variability of total ozone at Arosa, Switzerland, since 1931 related to atmospheric circulation indices, *Geophys. Res. Lett*., 27, 2213-2216 (2000).
31. J.-C. Lambert, M. Van Roozendael, P.C. Simon, J.-P. Pommereau, F. Goutail, J.F. Gleason, S.B. Andersen, D.W. Arlander, N.A. Bui Van, H. Claude, J. de La Noe, M. De Mazière, V. Dorokhov, P. Eriksen, A. Green, K. Karlsen Tornkvist, B.A. Kastad Hoiskar, E. Kyro, J. Leveau, M.-F. Merienne, G. Milinevsky, H.K. Roscoe, A. Sarkissian, J.D. Shanklin, J. Stähelin, C. Wahlstrom Tellefsen, and G. Vaughan: Combined characterisation of GOME and TOMS total ozone measurements from space using ground-based observations from the NDSC, *Adv. Space Res*., 26, 1931-1940 (2000).
32. C. Appenzeller, A.K. Weiss and J. Staehelin: Natürliche Variabilität oder anthropogener Trend *? Spektr. Wissensch*., März 2001, p. 12-14.
33. A. K. Weiss, J. Staehelin, C. Appenzeller, and N.R.P. Harris: Chemical and dynamical contributions to ozone profile trends of the Payerne (Switzerland) balloon soundings, *J. Geophys. Res*., 106, 22,685-22,694 (2001).
34. J. Staehelin and A.K. Weiss: Swiss history of atmospheric ozone research and results of long-term Swiss ozone measurements, *Ozone: Science and Engineer.,* 23, 461-466 (2001).
35. J. Staehelin, A. J. Mäder, K. Weiss, and C. Appenzeller: Causes of northern mid-latitude stratospheric ozone trends, *Phys. and Chem. Earth,* 27**,** 461-469 (2002).
36. G Koch, H. Wernli, J. Staehelin, and T. Peter: A Lagrangian analysis of stratospheric ozone variability and long-term trends above Payerne (Switzerland) during 1970-2001, *J. Geophys. Res*., 107(D19), 4373, doi:10.1029/2001JD001550 (2002).
37. M. Naja, H. Akimoto, and J. Staehelin: Ozone background and photochemically aged air over central Europe: Analysis of long-term ozone sonde data from Hohenpeissenberg and Payerne, *J. Geophys. Res*., 108(D2), 4063, doi:10.1029/2002JD002477 (2003).
38. S. Brönnimann, J. Staehelin, S.F.G. Farmer, J. Cain, T. Svendby, and T. Svenoe: Total ozone observations prior to the International Geophysical Year (IGY) 1957: A history, *Quart. J. Roy. Met. Soc*,, 129, 2797-2817 (2003).
39. S. Brönnimann, J. Cain, J. Staehelin, S.F.G. Farmer: Measurements of total ozone prior to the International Geophysical Year (IGY) 1957: Data and quality, *Quart. J. Roy. Met. Soc*., 129, 2819-2843 (2003).

40. S. Brönnimann, J. Luterbacher, J. Staehelin and T. Svendby: An extreme anomaly in stratospheric ozone over Europe in 1940-1942, *Geophys. Res. Lett*., 31, L08101, doi:10.1029/2004GL019611 (2004).
41. Y. Baldinini, H. Tappeiner, T. Peter und J. Staehelin: Ozonzerstörung und Klimawandel in schweizerischen Massenmedien, *Gaia*, 13, 197-205 (2004).
42. S. Brönnimann, J. Luterbacher, J. Staehelin, T.M. Svendby, G. Hansen, and T. Svenoe: Extreme Climate of the Global Tropopsphere and Stratosphere 1940-1942 related to El Nino, *Nature*, 431, 971-974 (2004).
43. G. Koch, H. Wernli, C. Schwierz, J. Staehelin, and T. Peter: A composite study of ozone miniholes and minihighs over Central Europe and their formation mechanisms, *Geophys. Res. Lett*., 32, L12810, doi:10.1029/2004GL022062(2005).
44. C. Ordóñez, H. Mathis, M. Furger, S. Henne, C. Hüglin, J. Staehelin, A. S.H. Prévôt: Changes of daily surface ozone maxima in Switzerland in all seasons from 1992 to 2002 and discussion of summer 2003. *Atmos. Chem. Phys.*, 5, 1187-1203 (2005).
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