Newsletter No. 23, 10/2017

SHADOZ Notes

Southern Hemisphere ADditional OZonesondes

A NASA/Goddard Space Flight Center public archive of tropical and remote ozonesonde profile data

SHADOZ is a NASA project to augment and archive balloon-borne ozonesonde launches and to archive data from tropical and remote operational sites. The project was initiated in 1998 by NASA/Goddard Space Flight Center with other US and international co-investigators. There are currently thirteen stations launching ozonesondes in the SHADOZ network. The collective data set provides the first climatology of tropical ozone in the equatorial region, enhances validation studies aimed at improving satellite remote sensing techniques for tropical ozone estimations, and serves as an educational tool to students, especially in participating countries.

SHADOZ Sites: https://tropo.gsfc.nasa.gov/shadoz

SHADOZ Site	Principal Investigator (PI), Station Chiefs and Operators
Ascension, U.K.	Anne Thompson (PI; anne.m.thompson@nasa.gov; NASA/GSFC), Andrew Avery, Peter Crane & Patrick Benjamin (US Air Force AFSPC E-ROS/Wolf Creek)
Costa Rica (multiple sites)	Henry Selkirk (PI; henry.b.selkirk@nasa.gov; NASA/USRA), Holger Vömel (NCAR), Jorge Andres Diaz & Ernesto Corrales (UCR)
Hanoi, Vietnam	Shin-Ya Ogino (PI; ogino-sy@jamstec.go.jp; JAMSTEC), Masato Shiotani (Kyoto U.), T. H. Anh Nguyen (AMO)
Hilo, HI, USA	Bryan Johnson (PI; bryan.johnson@nasa.gov; NOAA/GMD), David Nardini & Darryl Kuniyuki (NOAA/MLO)
Irene, South Africa	Gert J. R. Coetzee (PI; gerrie.coetzee@weathersa.co.za; SAWS), Tshidi Machinini (SAWS)
Kuala Lumpur, Malaysia	Maznorizan Mohamad (PI; maz@met.gov.my), Zamuna Zainal, Nur Aleesha Abdullah, & Ab Rahman Buang (MMD)
La Reunion, France	Françoise Posny (PI; francoise.posny@univ-reunion.fr), Jean-Marc Metzger (U. Reunion)
Nairobi, Kenya	Christian Félix (PI; christian.felix@meteoswiss.ch), Réné Stübi & Gonzague Romanens (Meteoswiss), Kennedy Thiongo (KMD)
Natal, Brazil	Francisco R. da Silva & Tercio L. B. Penha (INPE)
Paramaribo, Surinam	Ankie Piters (PI; ankie.piters@knmi.nl) & Marc Allart (KNMI), S. Mitro & G. Paiman (MDS)
Pago Pago, Am. Samoa	Bryan Johnson (PI; NOAA/GMD), LTJG Diane M. Perry (NOAA/ASO)
San Cristobal, Ecuador	Bryan Johnson (PI; NOAA/GMD), Manuel Carvajal & Jimmy Paredes (INAMHI)
Suva, Fiji	Bryan Johnson (PI; NOAA/GMD), Matakite Maata, Francis Mani, and Miriama Vuiyasawa (USP)

❖The Joint JOSIE-SHADOZ Campaign❖

The overall objective of JOSIE (Jülich Ozone Sonde Intercomparison Experiment) is to establish quality assurance guidance for the global ozonesonde community. To assess the performance of the various ozonesonde instrument types the environments simulation chamber at the Forschungszentrum Jülich was established as the World Calibration Center for Ozone Sondes (WCCOS) in 1996. The chamber simulates flight conditions of ozonesonde soundings up to 35 km. This controlled environment allows for accurate comparisons of ozonesonde profiles to the reference UV-photometer.

Campaign	Objective
JOSIE-1996 **GAW Report #130**	• Operating Procedures • Profiling Capabilities • Intercomparison sonde types (ECC, BM, Meisei)
JOSIE-1998 **GAW Report #57**	• Manufacturing ECC sondes (SPC, ENSCI)

JOSIE-2000
GAW Report #158
(Smit et al., 2007)
	• Operating Procedures
	• Focus on ECC sonde
	  ○ Different sensing solution types
	  ○ Different manufacturers (SPC, ENSCI)

BESOS-2004
(Deshler et al., 2008)
	• Operating Procedures under flight conditions
	• Focus on ECC sonde
	  ○ Different sensing solution types
	  ○ Different manufacturers (SPC, ENSCI)

ASOPOS 2002-2012 **GAW Report #201**	• Define and establish Standard Operating Procedures for ECC sondes
JOSIE-2009	• Manufacturers (SPC, ENSCI)
JOSIE-2010	• Refurbished sondes
O3S-DQA Guidelines Report-2012	• Homogenization and Uncertainties
JOSIE-SHADOZ-2017	• Operating procedures • Tropical simulations • Different sensing solution types • Different manufacturers (SPC, ENSCI)

Objective/Goals

JOSIE-SHADOZ 2017 is the most recent ozonesonde intercomparison campaign, with a focus on tropical profiles. SHADOZ operators representing 9 stations participated in the October/November 2017 campaign. The major objectives are to evaluate:

• Current preparation and operating procedures at each SHADOZ station.

• Changes in ENSCI ECC sensor performance in the past 7 years.

• New sensing solution types that may resolve discrepancies in the UT/LS and stoichiometry.

JOSIE-SHADOZ Participants

Participating Operators

Name	Affiliation	Country
Ernesto Corrales	University of Costa Rica	Costa Rica
Tshidi Machinini	South African Weather Service	South Africa
Nguyen Thi Hoang Anh	National Hydro-Meteorological Service of S.R. Vietnam	Vietnam
George Paiman	Meteorological Service of Suriname	Surinam
Françoise Posny	Université La Réunion, Météo-France, CNRS	France
Francisco R. da Silva	Brazilian Space Agency	Brazil
Kennedy Thiongo	Kenyan Meteorology Department	Nairobi
Zamuna Zainel	Malaysian Meteorological Department	Malaysia
George Brothers	NASA/Wallops Flight Facility	USA
Katherine Wolff	NASA/Wallops Flight Facility	USA
Ryan Stauffer	NASA/Goddard Space Flight Center	USA

Coaches

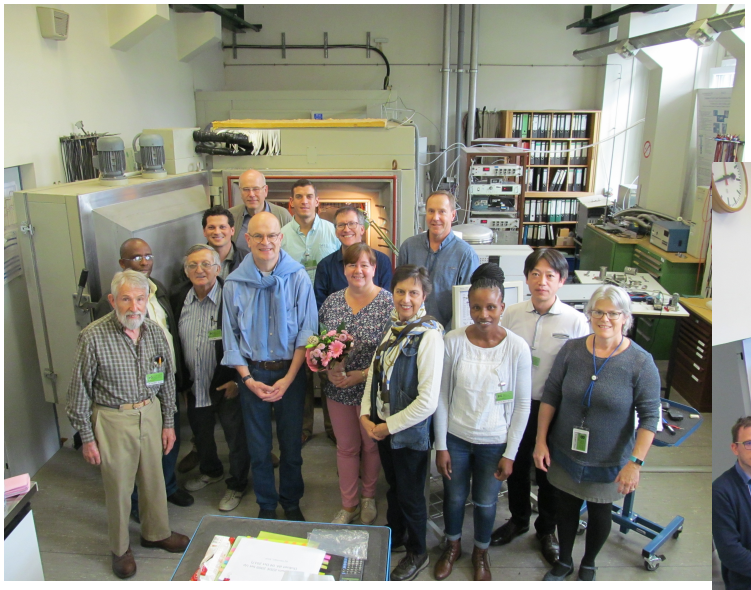
Name	Affiliation	Country
Marc Allaart	Royal Netherlands Meteorological Institute	Netherlands
Patrick Cullis	NOAA/Global Monitoring Division	USA
Bryan Johnson	NOAA/Global Monitoring Division	USA
Gary Morris	St. Edward's University	USA
Anne Thompson	NASA/Goddard Space Flight Center	USA

Referees

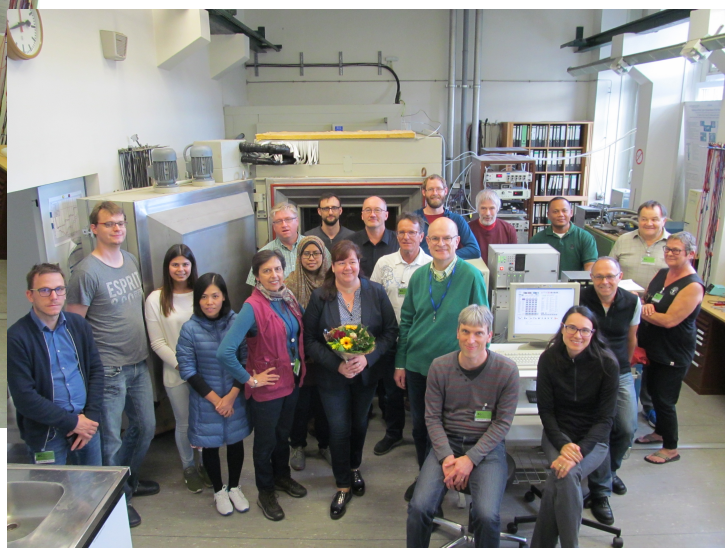
Name	Affiliation	Country
Jonathan Davies	Environment and Climate Change Canada	Canada
Peter van der Gathan	Alfred Wegener Institute	Germany
Roeland van Malderan	Royal Meteorological Institute of Belgium	Belgium

Observers

Name	Affiliation	Country
Rene Stübi	Federal Office of Meteorology and Climatology MeteoSwiss	Switzerland
Gilbert Levrat		
Gonzague Romanens		
Greg Kok	ENSCI	USA
Rigel Kivi	Finnish Meteorological Institute	Finland
Nakano Tatsumi	Japan Meteorological Agency	Japan
Jacquelyn Witte	NASA/Goddard Space Flight Center	USA



Participants in Team 1 in front of WCCOS



Participants in Team 2

Paramaribo, Suriname operator George Paiman

Kuala Lumpur operator Zamuna Zainel with SHADOZ PI A. M. Thompson

L-R: K. Wolff (WFF), F. da Silva (Natal Operator), G. Brothers (WFF), and Tshidi Machinini (Irene, S. Africa)

❖SHADOZ Website Face-lift❖

SHADOZ has undergone a slight face-lift to conform to other NASA project websites, such as, the NASA Ozone Watch (https://ozonewatch.gsfc.nasa.gov/)

https://tropo.gsfc.nasa.gov/shadoz

National Aeronautics and Space Administration
Goddard Space Flight Center

SHADOZ *-- Southern Hemisphere ADditional OZonesondes*
An Archive of sub/tropical and remote ozonesonde data

HOME | PI CONTACTS | DATA ARCHIVE | NEWSLETTER | PAPERS

Principal Investigator: Dr. Anne M. Thompson (NASA/Goddard Space Flight Center)

A number of ozonesonde stations are operating in the tropics, subtropics, and the southern hemisphere in general, but with differing frequency and reporting procedures. **SHADOZ (Southern Hemisphere ADditional OZonesondes)** is designed to remedy this data discrepancy, by coordinating launches, supplying additional sondes in some cases, and by providing a central archive location. Since 1998, ozonesonde data have been collected and made available through this website.

Click on the **DATA ARCHIVE** link in the banner above too access the ozonesonde data.

Questions regarding sonde data from specific stations should be directed to the stations' principal investigator. A list of PI contact information can be found on the **PI CONTACTS** link in the banner above.

We would like to keep a running list of papers that use SHADOZ data. Please email a reference of your manuscript to the archiver: Jacquelyn.Witte@nasa.gov

Publications using SHADOZ data should include at least one of the following references:

- Witte, J.C., et al. (2017), First reprocessing of Southern Hemisphere ADditional OZonesondes (SHADOZ) profile records (1998-2015): 1. Methodology and evaluation, J. Geophys. Res. Atmos., 122, 6611-6636, doi:10.1002/2016JD026403.
- Thompson, A.M., et al. (2007), Southern Hemisphere Additional Ozonesondes (SHADOZ) 1998-2004 tropical ozone climatology: 3. Instrumentation, station-to-station variability, and evaluation with simulated flight profiles, J. Geophys. Res., 112, D03304, doi:10.1029/2005JD007042.
- Thompson, A.M., et al. (2003), Southern Hemisphere Additional Ozonesondes (SHADOZ) 1998-2000 tropical ozone climatology 2. Tropospheric variability and the zonal wave-one, J. Geophys. Res., 108, 8241, doi:10.1029/2002JD002241.
- Thompson, A.M., et al. (2003), Southern Hemisphere Additional Ozonesondes (SHADOZ) 1998-2000 tropical ozone climatology 1. Comparison with Total Ozone Mapping Spectrometer (TOMS) and ground-based measurements, J. Geophys. Res., 108, 8238, doi:10.1029/2001JD000967.

Data Disclaimer and Guidelines:

The data on this website are subject to revision and reprocessing. Check dates of creation to download the most current version. Contact the co-investigators for questions concerning data techniques and quality.

Access to these data is free to the public. Whenever substantial use is made of their data, you accept that an offer of co-authorship will be made through personal contact. In all cases, an acknowledgement must be made to the data co-investigators and SHADOZ when these data are used in publication. Click here for a list of contact information on the SHADOZ station PI's

SHADOZ reserves the right to limit access to the Data Archive and to alter or change the layout and content of the website.

Goddard SPACE FLIGHT CENTER

- NASA Official: Anne M. Thompson
- Curator: Jacquelyn C. Witte (SSAI)
- Page Last Updated: 2017-10-11

- Privacy Policy & Important Notices
- Disclaimers

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Meeting Announcements:

- **NDACC (Network for the Detection of Atmospheric Composition Change) - Steering Committee,** 6-10, November, 2017 - Boulder, USA. http://www.ndsc.ncep.noaa.gov/
- **Montreal Protocol – Meeting of the parties**, 18-24, November, 2017, Montreal, Canada http://conf.montreal-protocol.org/SitePages/Home.aspx
- **2017 Fall AGU Meeting,** 11-15 December, 2017, New Orleans, USA. https://fallmeeting.agu.org/2017/
- **SPARC UTLS Workshop** "Current status and emerging challenges", 5 - 8 February 2018, Mainz, Germany. https://converia.uni-mainz.de/frontend/index.php?sub=59

Noteworthy publications on ozonesonde reprocessing activities:

Witte, J. C., A. M. Thompson, H. G. J. Smit, H. Vömel, R. Stübi, and F. Posny (2017), First Reprocessing of Southern Hemisphere ADditional OZonesondes (SHADOZ) Profile Records. 3. Uncertainty in Ozone Profile and Total Column, J. Geophys. Res., doi:10.1002/2017JD027791, *under review*.

Thompson, A. M. et al. (2017), First Reprocessing of Southern Hemisphere Additional Ozonesondes (SHADOZ) Ozone Profiles (1998-2016). 2. Comparisons with Satellites and Ground-based Instruments, J. Geophys. Res., doi: 10.1002/2017jd027406, *in press*.

Witte, J. C., A. M. Thompson, H. G. J. Smit, M. Fujiwara, F. Posny, G. J. R. Coetzee, E. T. Northam, B. J. Johnson, C. W. Sterling, M. Mohamad, S.-Y. Ogino, A. Jordan, and F. R. da Silva (2017), First reprocessing of Southern Hemisphere ADditional OZonesondes (SHADOZ) profile records (1998-2015) 1: Methodology and evaluation, J. Geophys. Res., 122, 6611–6636, doi:10.1002/2016JD026403. http://onlinelibrary.wiley.com/doi/10.1002/2016JD026403/full

Tarasick, D. W., J. Davies, H. G. Smit, and S. J. Oltmans (2016), A re-evaluated Canadian ozonesonde record: measurements of the vertical distribution of ozone over Canada from 1966 to 2013, Atmos. Meas. Tech., 9(1), 195-214, doi:10.5194/amt-9-195-2016. http://www.atmos-meas-tech.net/9/195/2016/amt-9-195-2016.html

Van Malderen, R., Allaart, M. A. F., De Backer, H., Smit, H. G. J., and De Muer, D. (2016), On instrumental errors and related correction strategies of ozonesondes: possible effect on calculated ozone trends for the nearby sites Uccle and De Bilt, Atmos. Meas. Tech., 9, 3793-3816, doi:10.5194/amt-9-3793-2016. https://doi.org/10.5194/amt-9-3793-2016

Deshler, T., Rene Stübi, F. J. Schmidlin, J. L. Mercer, H. G. J. Smit, B. J. Johnson, R. Kivi, and B. Nardi (2017), Methods to homogenize ECC ozonesonde measurements across changes in sensing solution concentration or ozonesonde manufacturer, Atmos. Meas. Tech., 10, 2021–2043, doi:10.5194/amt-10-2021-2017. https://doi.org/10.5194/amt-10-2021-2017

Sterling, C. W., S. J. Oltmans, B. J. Johnson, H. G. J. Smit, A. Jordan, P. Cullis, E. Hall, J. Windell, A. M. Thompson, and J. C. Witte (2017), Homogenizing and estimating the uncertainty in NOAA's long term vertical ozone profile records measured with the electrochemical concentration cell ozonesonde, Atmos. Meas. Tech., *manuscript in preparation*.