



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, the NOAA/Global Monitoring Division, 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>



❖ Ozonesonde Quality Experts Meet Virtually ❖

From 18-20 March 2020, Bryan Johnson (NOAA) remotely hosted an ASOPOS (Assessment of Standard Operating Procedures for OzoneSondes) 2.0 meeting co-chaired by Anne Thompson and Herman Smit. The goal of ASOPOS is the preparation of a new WMO Report on ozonesonde principles and best practices. Attendees (**at right**) presented updates of Standard Operating Procedures (SOPs) and lab tests. Manufacturers from EnSci, Science Pump and Vaisala participated. R. Stauffer presented total column ozone dropoffs from some SHADOZ stations from *Stauffer et al. (2020; page 2)* and D. Kollonige showed responses from recent SHADOZ station surveys on ozonesonde preparation. Since March, the ASOPOS team has met monthly. The Draft Report will be peer-reviewed July-Sept., then sent to WMO.

ASOPOS 2.0 Meeting Attendees: David Tarasick & Jonathan Davies (ECCC), Debra Kollonige (SHADOZ Archiver; NASA), Bryan Johnson & Patrick Cullis (SHADOZ Co-I; NOAA), Anne Thompson (SHADOZ PI; NASA), Peter VonDerGathen (AWI Germany), Holger Vömel (SHADOZ Costa Rica; NCAR), René Stübi, (SHADOZ Nairobi; Meteoswiss), Ankie Piters & Marc Allaart (SHADOZ Paramaribo; KNMI), Herman Smit (Jülich), Ryan Stauffer (SHADOZ; NASA), Roeland Van Malderen (RMI), Gary Morris (St. Edwards Univ.), Herman Smit (FZ-Juelich).

❖ COVID-19 Impacts on Stations ❖

Station Name	COVID-affected	Jan-20	Feb-20	Mar-20	Apr-20	May-20
Ascension Island, UK	N/A					
Costa Rica	No	X	X	X	X	X
Hanoi, Vietnam	No	X	X	X	X	X
Hilo, Hawaii, USA	No	X	X	X	X	X
Irene, South Africa *	Yes			COVID	COVID	COVID
Kuala Lumpur, Malaysia	No	X	X	X	X	X
La Reunion Island *	Yes	X	X	COVID	COVID	COVID
Nairobi, Kenya *	Yes	X	X	X	X	X
Natal, Brazil *	Yes	X	X	COVID	COVID	COVID
Pago Pago, American Samoa	No	X	X	X	X	X
Paramaribo, Suriname	No	X	X	X	X	X
Suva, Fiji *	Yes	X	X	COVID	COVID	X

X = Station is operational
 * = Five stations have either reduced or interrupted operations due to COVID-19 shutdowns.

With the unprecedented events surrounding the COVID-19 outbreak, all of the SHADOZ stations and their staff went to great lengths to maintain their ozonesonde launch schedules after March. The table (**left**) shows the list of stations impacted with either reduced or interrupted operations due to COVID-19 shutdowns globally. We heard several success stories in keeping launches going in some capacity where possible. **Great effort by everyone!**

❖ SHADOZ at Recent Virtual Meetings & New Publications ❖

In addition to SHADOZ presence at the ASOPOS virtual meetings (**page 1**), recent meetings organized remotely also had SHADOZ updates:

(1) Long-term Ozone Trends and Uncertainties in the Stratosphere (LOTUS) workshop in May: R. Stauffer presented results from **Stauffer et al. (2020) (listed below)** on the observed Total Column Ozone (TCO) dropoff in ozonesonde data and the impacts on stratospheric data at some SHADOZ & Canadian stations.

(2) European Ozonesonde Network (EON) meeting on 1 July: R. Stauffer and D. Kollonige gave presentations titled "A Post-2013 Drop-off in Total Ozone at a Third of Global Ozonesonde Stations: what about Europe?" and "The Global Ozonesonde Station Survey as a Tool for Identifying the TCO Drop-off" respectively.

Other new publications (**listed below**) using SHADOZ data include: **(1) Hubert et al. (2020)** that validates a new tropospheric column product from the Sentinel-5P TROPOMI satellite instrument; **(2) Vömel et al. (2020)** that uses Costa Rica data to demonstrate a new ozonesonde time response data correction.

❖ Recent noteworthy ozonesonde publications ❖

Hubert, D., Heue, K.-P., Lambert, J.-C., Verhoelst, T., Allaart, M., Compennolle, S., Cullis, P. D., Dehn, A., Félix, C., Johnson, B. J., Keppens, A., Kollonige, D. E., Lerot, C., Loyola, D., Maata, M., Mitro, S., Mohamad, M., PETERS, A., Romahn, F., Selkirk, H. B., da Silva, F. R., Stauffer, R. M., Thompson, A. M., Veeffkind, J. P., Vömel, H., Witte, J. C., and Zehner, C.: TROPOMI tropospheric ozone column data: Geophysical assessment and comparison to ozonesondes, GOME-2B and OMI, *Atmos. Meas. Tech. Dis.*, <https://doi.org/10.5194/amt-2020-123>, in review, 2020.

Vömel, H., Smit, H. G. J., Tarasick, D., Johnson, B., Oltmans, S. J., Selkirk, H., Thompson, A. M., Stauffer, R. M., Witte, J. C., Davies, J., van Malderen, R., Morris, G. A., Nakano, T., and Stübi, R.: A new method to correct the ECC ozone sonde time response and its implications for "background current" and pump efficiency, *AMTD*, <https://doi.org/10.5194/amt-2020-62>, in review, 2020.

Stauffer, R. M., Thompson, A. M., Kollonige, D. E., Witte, J. C., Tarasick, D. W., Davies, J., et al. (2020). A post-2013 dropoff in total ozone at a third of global ozonesonde stations: Electrochemical concentration cell instrument artifacts? *Geophys. Res. Lett.*, 47, e2019GL086791, <https://doi.org/10.1029/2019GL086791>.

Stauffer, R. M., A. M. Thompson, L. D. Oman, and S. E. Strahan (2019). The effects of a 1998 observing system change on MERRA-2-based ozone profile simulations. *J. Geophys. Res.*, 124. <https://doi.org/10.1029/2019JD030257>

Thompson, A. M., et al. (2019). Ozonesonde Quality Assurance: The JOSIE-SHADOZ (2017) Experience. *Bull. Amer. Meteor. Soc.* <https://doi.org/10.1175/BAMS-D-17-0311.1>

Sterling, C. W., et al. (2018). Homogenizing and estimating the uncertainty in NOAA's long term vertical ozone profile records measured with the electrochemical concentration cell ozonesonde. *Atmos. Meas. Tech.* <https://doi.org/10.5194/amt-2017-397>

Witte, J. C., A. M. Thompson, H. G. J. Smit, H. Vömel, R. Stübi, and F. Posny (2018). First Reprocessing of Southern Hemisphere ADditional OZonesondes (SHADOZ) Profile Records. 3. Uncertainty in Ozone Profile and Total Column. *J. Geophys. Res.*, 123. <https://doi.org/10.1002/2017JD027791>

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.*, 122. <https://doi.org/10.1002/2017JD027406>

Witte, J. C., A. M. Thompson, et al. (2017). First reprocessing of Southern Hemisphere ADditional OZonesondes (SHADOZ) profile records (1998-2015) 1: Methodology and evaluation. *J. Geophys. Res.*, 122. <https://doi.org/10.1002/2016JD026403>

❖ Upcoming Relevant Meetings ❖

SHADOZ will be represented at the following:

17 July 2020:

NOAA Global Monitoring Laboratory
Virtual Global Monitoring Annual Conference (eGMAC)

4-6 Nov. 2020:

NDACC Steering Committee Meeting

10-14 Jan. 2021:

American Meteorological Society Meeting

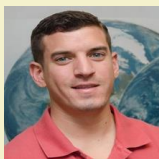
Attention Data Users:

- Questions about SHADOZ should be directed to PI, Anne Thompson. SHADOZ data sets are products of evolving research by the site Co-Investigators (Co-Is) and ongoing community collaboration.
- The SHADOZ homepage gives technical and contact information for each station and their Co-Is responsible for the original data processing. Co-Is should be consulted for details of their methods & appropriate references to their work.
- Questions about the final data and any news updates should be directed to the Archiver: Debra Kollonige.

▶ SHADOZ Network Science Team ◀



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SHADOZ Site	Principal Investigator (PI), Station Chiefs and Operators
Ascension Is., U.K.	Anne Thompson (PI; anne.m.thompson@nasa.gov) & Ryan Stauffer (NASA/GSFC) Peter Crane & Patrick Benjamin, Leroy Hudson, Iona Yon (US Air Force AFSPC E-ROS/Wolf Creek)
San Pedro, Costa Rica	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), Nguyen Thi Hoang Anh, Tran Thu Huang & Lai Thanh Nga (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	Mohan Kumar Sammathuria (PI; mohan@met.gov.my), Mohd Firdaus Bin Jayaha, Nur Aleesha Abdullah & Ab Rahman Buang (MMD)
La Réunion Is., France	Françoise Posny (PI; francoise.posny@univ-reunion.fr), Jean-Marc Metzger (U. Réunion)
Nairobi, Kenya	Christian Félix (PI; christian.felix@meteoswiss.ch), René 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), Sukarni Mitro & George Paiman (MDS)
Pago Pago, Am. Samoa	Bryan Johnson (PI; NOAA/GMD), LTJG Diane M. Perry (NOAA/ASO)
San Cristóbal, Ecuador	Bryan Johnson (PI; NOAA/GMD), INAMHI
Suva, Fiji	Bryan Johnson (PI; NOAA/GMD), Matakite Maata, Francis Mani & Miriama Vuiyasawa (USP)