



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 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, URL=<http://croc.gsfc.nasa.gov/shadoz>

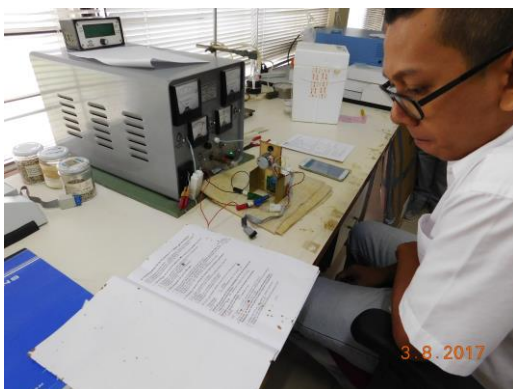


SHADOZ Site	Principal Investigator (PI), Station Chiefs and Operators
Ascension, U.K.	Anne Thompson (PI; anne.m.thompson@nasa.gov ; NASA/ GSFC), Andrew Avery, Bill Clark, Peter Crane, & Patrick Benjamin (US Air Force AFSPC E-ROS/ Wolf Creek)
Costa Rica (multiple sites)	Henry Selkirk (PI; henry.b.selkirk@nasa.gov ; NASA/ USRA), Holger Vömel (NCAR), Jorge Andres Diaz (UCR); Gary Morris (St Edwards U.)
Hanoi, Vietnam	Shin-Ya Ogino (PI; ogino-sy@jamstec.go.jp ; JAMSTEC), Masato Shiotani (Kyoto U.), Hoang Gia Hiep (AMO)
Hilo, HI, USA	Bryan Johnson (PI; bryan.johnson@nasa.gov ; NOAA/ GMD), David Nardini & Darryl Kuniyuko (NOAA/ MLO)
Irene, South Africa	Gert J. R. Coetzee (PI; gerrie.coetzee@weathersa.co.za ; SAWS)
Kuala Lumpur, Malaysia	Maznorizan Mohamad (PI; maz@met.gov.my), Zamuna Zainal, Nur Aleesha Abdullah, & A. Ismail (MMD)
La Reunion, France	Francoise Posny (PI; francoise.posny@univ-reunion.fr), Jean-Marc Metzger (U. Réunion)
Nairobi, Kenya	Bertrand Calpini (PI; bertrand.calpini@meteoswiss.ch), Rene Stuebi, Gilbert Levrat & Gonzague Romanens (Meteoswiss), Charles Mutai & Zablon Shilenje (KMD)
Natal, Brazil	Maria Paulete (PI; maria.paulete@inpe.br), Francisco R. da Silva & Tercio L. B. Penha (INPE)
Paramaribo, Surinam	Ankie Piters (PI; ankie.piters@knmi.nl) & Marc Allaart (KNMI), Sukarni Sallons (MDS)
Pago Pago, Am. Samoa	Bryan Johnson (PI; NOAA/ GMD), LTJG Diane M. Perry (NOAA/ ASO)
San Cristobal, Ecuador	J. Olmedo (INAMHI); B. Johnson (Data PI), Manuel Carvajal & Jimmy Paredes (INAMHI)
Suva, Fiji	Bryan Johnson (PI; NOAA/ GMD), Matakite Maata, Francis Mani, and Miriama Vuiyasawa (USP)

❖ Paramaribo, Surinam, Visit – 7-9 March, 2017 ❖

The Paramaribo SHADOZ station (5.8N, 55.2W) has data available since 1999. Operated as a collaboration between KNMI (Royal Dutch Meteorological Institute) and Meteorological Services of Suriname (MDS), Paramaribo is important as one of the first northern tropical stations in SHADOZ. The MDS site is also an NDACC (Network for the Detection of Atmospheric Composition Change, ndacc.org) station, operating a Brewer instrument. NASA's Anne Thompson and NASA/Goddard Post-doc Ryan Stauffer joined KNMI's Drs. Ankie Piters and Arnoud Apituley for a site visit to MDS, Paramaribo, 7-9 March 2017. A meeting held on 7 March began discussion of the value of Paramaribo observations in the global ozone observational network. On 8 March the visitors observed preparation and calibration of the weekly sonde and a launch that measured ozone to 34 km. On 9 March, Thompson visited the Deputy Ambassador G. Webster and staff at the US Embassy in Suriname; this is the first time a NASA scientist visited Paramaribo. Thompson delivered a lecture on 9 March to 75 students and faculty of the Anton de Kom University on "Environmental Success Stories: A View from Space."

Paramaribo, Surinam (5.8N,55.2W)



Operator preparing a Science Pump (SPC) ozonesonde for a scheduled day of launch. The Paramaribo station uses a Vaisala RS92 radiosonde/ozonesonde System.

Launches are supervised and operated by Meteorological Service of Suriname (MDS) personnel. KNMI scientists Ankie Piters and Marc Allaart provide sonde payload, ongoing training, and technical support. Launch times are coordinated with NASA Aura satellite overpass times.



MDS has a Brewer that dates from 1999, coincident with the start of ozonesonde launches.

(L-R) Sukarni Sallons (MDS Station Chief) Anne M. Thompson (SHADOZ PI), Ryan Stauffer (NPP Post-doc), Ankie Piters (KNMI, Paramaribo station PI).

Paramaribo MDS core station personnel with Ankie Piters (KNMI; leftmost).

Photos courtesy Anne Thompson & Ryan Stauffer (upper) and Arnoud Apituley (KNMI, lower).

❖ Quito, Ecuador, PI Visit – 13-14 March 2017 ❖

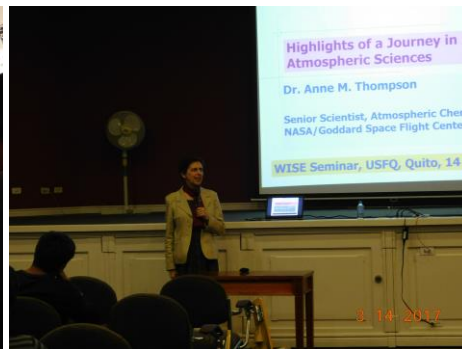


San Cristobal Island in the Galapagos, Ecuador, has been a SHADOZ launch site since 1998. Until 2008, INAMHI (Instituto Nacional de Meteorologia E Hidrologia) personnel launched sondes with the NOAA/Strato system using Vaisala RS80 non-GPS radiosondes configured with EN-SCI ozonesondes. In 2012, launches resumed with a Vaisala radiosonde/ozonesonde system using RS-92 GPS radiosondes paired with an EN-SCI ECC. On 14 March 2017 SHADOZ PI Anne M. Thompson met with the INAMHI Executive Jose Olmedo and several members of his staff at INAMHI headquarters in Quito. In the upper left photo below, Olmedo is third from left; far left is Olmedo's Deputy next to the INAMHI Research Director Monica Delgado. The main topic of discussion at INAMHI was resumption of SHADOZ launches that were interrupted in early 2016. INAMHI is committed to fulfilling obligations of global ozone monitoring as set forth by international protocols; in addition, INAMHI operates a Brewer north of Quito. Stay tuned for San Cristobal news at the SHADOZ website.

PI Thompson's Ecuador visit was also hosted by Prof. Maria del Carmen Cazorla who was a Penn State Meteorology PhD and a NASA/Goddard post-doc. Prof. Cazorla, a senior Professor at the Univ of San Francisco – Quito (USFQ), and Anne Thompson gave lectures at an annual Regional Air Quality Conference (CAMCA, at USFQ) on 16 March. Thompson also lectured to ~80 students and faculty in a Women and Science and Engineering (WISE) Symposium on 14 March.



Anne Thompson meeting with the INAMHI Director J. Olmedo, third from left. Engineer M. Ayabaca is at the far right next to Prof. M. Cazorla.



Anne Thompson gives a Women in Science & Engineering (WISE) talk at USFQ on 14 March.



Anne Thompson and host Prof. Maria Cazorla (USFQ) in front of the TEI surface ozone instrument.



USFQ Student working on software development in rooftop atmospheric lab at USFQ.



Anne Thompson with USFQ students at CAMCA Air Quality Conference Poster, 13 March.

Meeting Announcement:

- **Ozone Regional Managers (ORM) Meeting:** Geneva, Switzerland; 28-30 March, 2017.
<http://conf.montreal-protocol.org/meeting/orm/10orm/SitePages/Home.aspx>
- **NOAA/ESRL/Global Monitoring Annual Conference:** Boulder, CO, USA; 23-24 May, 2017. Abstracts deadline is 07 April, 2017.
<https://www.esrl.noaa.gov/gmd/annualconference/index.html>

Noteworthy publications on ozonesonde reprocessing activities:

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., H. De Backer, A. Delcloo, and M. Allaart (2015), Identifying the origin of anomalous high tropospheric ozone in the ozonesonde data at Uccle by comparison with nearby De Bilt, *Atmosphere-Ocean*, 53(1), doi:10.1080/07055900.2014.886552.
<http://www.tandfonline.com/doi/abs/10.1080/07055900.2014.886552>

Witte, J. C., A. M. Thompson, H. G. J. Smit, M. Fujiwara, F. Posny, G. J. R. Coetsee, 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.*, 2016JD026403, under review.

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. Discuss.*, doi:10.5194/amt-2016-415, under review. <http://www.atmos-meas-tech-discuss.net/amt-2016-415/>

Smit, H. G. J., D. W. Tarasick, A. M. Thompson, G. A. Morris, et al., (2017), Improving ECC ozonesonde data quality: Assessment of current methods and outstanding issues, *Atmos. Meas. Tech.*, manuscript in preparation.

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

Thompson, A. M., J. C. Witte et al., Southern Hemisphere Additional Ozonesondes (SHADOZ) Ozone Profiles Re-processed. 2. Comparisons with satellites and station-to-station variability, *J. Geophys. Res.*, manuscript in preparation.