



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>



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, Amy Hill & James Bates (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	Maznorizan Mohamad (PI; maz@met.gov.my), Zamuna Zainal, 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 & Maria Paulete (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), Manuel Carvajal, (INAMHI), Maria Cazorla (USFQ)
Suva, Fiji	Bryan Johnson (PI; NOAA/GMD), Matakite Maata, Francis Mani & Miriama Vuiyasawa (USP)

❖ San Pedro, Costa Rica ❖

During the week of March 18, 2019, Drs. Anne Thompson, Ryan Stauffer and Rennie Selkirk (NASA/Goddard Space Flight Center) visited the SHADOZ Costa Rican site in San Pedro. Rennie is the Principal Investigator of the Ticosonde project <<https://acd-ext.gsfc.nasa.gov/Projects/Ticosonde>> that has supported ozone, water vapor, and SO₂ sonde launches since 2005. The week was full of activities.

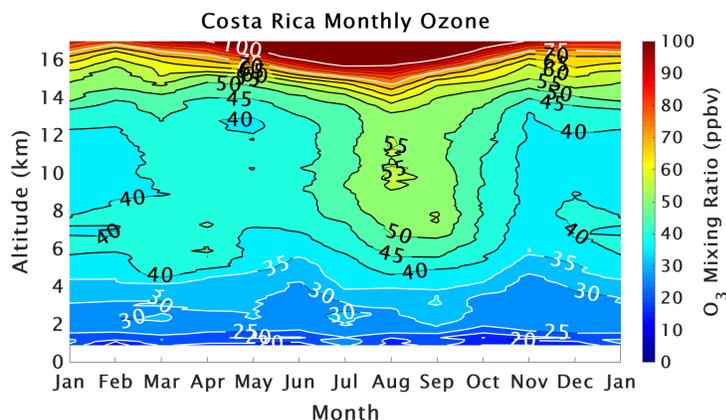
The Ticosonde project visits San Pedro annually, working with Professor Jorge Andres Diaz at the University of Costa Rica (UCR) and his staff and students. The group carries out lab testing, dual launches and hosts a workshop. SHADOZ joined the Ticosonde workshop for the first time this year. Nine presentations were given (SHADOZ/Ticosonde group photo below).



Anne Thompson gave the SHADOZ overview and Ryan Stauffer discussed the unique ozone climatology of the 2005-2018 Costa Rica profiles. Megan Damon, the webmaster/outreach coordinator for Ticosonde gave an interesting talk about promoting Ticosonde through Instagram during the 2018 Fall AGU. March 22nd was a CFH (Cryogenic frost-point hygrometer) water vapor launch along with IMN (Costa Rican Meteorological Services) (see photo gallery, pg 3). Also that day, Anne Thompson gave a UCR colloquia on NASA environmental success stories seen from satellites. Anne's talk was held at the UCR planetarium.

The SHADOZ/Ticosonde contingent had the opportunity to highlight our work during this visit. One activity was a visit to the US Embassy in San José where we were hosted by the officer who oversees environmental matters, Tim Huson. The second activity was participation in the signing of a joint declaration between NASA and SICA (Central American Integration System) on March 20th. SICA is an NGO consisting of seven central American countries and the Dominican Republic. The declaration is an agreement to use NASA satellite observations to support scientific policy needs for a region subject to extreme weather and volcanic activity. The keynote address was given by the acting head of NASA Headquarters Earth Science Division, Sandra Alba Cauffman who is a Costa Rican trained engineer. The signing was well attend with roughly 70 people that included representatives from all the SICA countries. When the NASA representatives were asked for examples of Central American collaboration – the SHADOZ/Ticosonde projects were showcased as a successful example of long-term scientific collaboration with significant capacity-building.

Costa Rica (various sites) ~ (10N,84W)

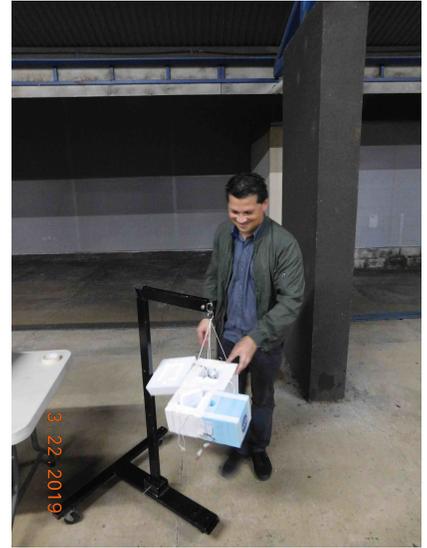


Costa Rica joined SHADOZ in July 2005 (over 630 ozonesonde profiles in the archive) and has one of the most consistent records. Launches includes monthly cryogenic frost-point hygrometer (CFH) sondes for measuring stratospheric water vapor.

❖ San Pedro, Costa Rica Photo Gallery ❖



3. 22. 2019



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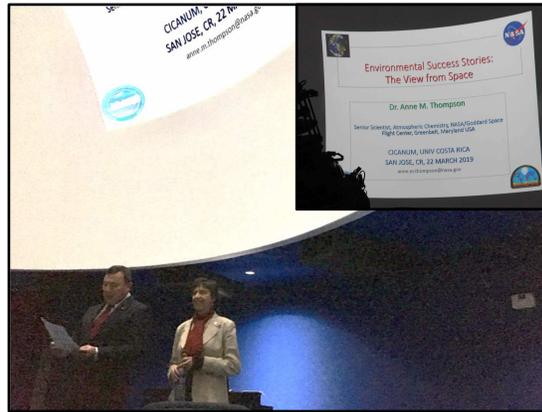
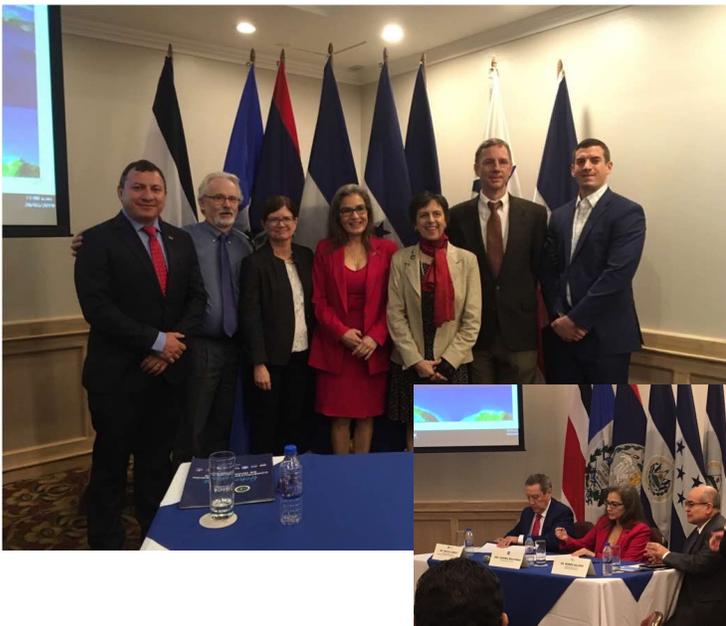


3. 22. 2019

UCR staff preparing a CFH (cryogenic frost-point hygrometer) water vapor sonde for a 5am launch to reduce sunlight interference. The precise temperatures at which water condensates on a small mirror with altitude are maintained by a heater coil and cooled with cryogen (photo above).



3. 23



Anne Thompson gave an ozone/pollution presentation to the general UCR audience hosted at their planetarium.

NASA Central American Integration System (SICA) meeting for capacity-building in Central America was held, in which the SHADOZ and Ticosonde groups serve as an example of successful NASA/Central America collaboration. L to R: Jorge Andres Diaz (UCR), Rennie Selkirk (Ticosonde PI), Nancy Searby (Program Manager at NASA Applied Sciences), Sandra Cauffman (Acting NASA Earth Science Division Director), Anne Thompson (SHADOZ PI), Holger Vömel (NCAR), Ryan Stauffer (NASA/GSFC).

At the planetarium, awards were presented to the UCR Ticosonde and SHADOZ team (Ernesto Corrales far right) for their commitment to high quality ozonesonde and water vapor sonde launches.



3. 22. 2019

❖ SHADOZ Farewell ❖



Sadly, this will be my last newsletter as editor of SHADOZ Notes and archiver. After almost 20 years of working with the SHADOZ project since the very beginning I bid farewell to move on to a new position at NCAR (National Center for Atmospheric Research) and new challenges. Being a part of the SHADOZ team has been so exciting and rewarding with visits to a number of SHADOZ sites, the fostering of great work relationships with the PI's, data managers, and technicians from around the SHADOZ world, and memorable experiences during ozonesonde campaigns (SAFARI-2K, JOSIE, and BESOS, to name a few). My thanks and gratitude go out to everyone in the ozonesonde community whose friendship and commitment to SHADOZ has made this experience among the most rewarding of my career.

Jacquie invited to write the first draft of the GRUAN ozonesonde technical document at Bodeker Scientific, Alexandria, New Zealand.

With sincere thanks, Jacquie Witte

- SHADOZ welcomes Dr. Ryan Stauffer <ryan.m.stauffer@nasa.gov> to the team! Ryan will be helping with SHADOZ archiving and other duties.

Recent noteworthy ozonesonde publications

Witte, J. C., Thompson, et al. (2019). The NASA Wallops Flight Facility digital ozonesonde record: Reprocessing, uncertainties, and dual launches. *Journal of Geophysical Research: Atmospheres*, 124.

<https://doi.org/10.1029/2018JD030098>

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>

Tarasick et al. (2019). Quantifying stratosphere-troposphere transport of ozone using balloon-borne ozonesondes, radar windprofilers and trajectory models, *Atmospheric Environment*, 198,

<https://doi.org/10.1016/j.atmosenv.2018.10.040>

Stauffer, R. M., Thompson, A. M. & Witte, J. C. (2018). Characterizing Global Ozonesonde Profile Variability from Surface to the UT/LS with a Clustering Technique and MERRA-2 Reanalysis. *J. Geophys. Res.*, 123.

<https://doi.org/10.1029/2018JD028465>

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>