COSTA RICA

OBSERVATIONAL ACTIVITIES

The Laboratorio de Análisis Ambiental, Escuela de Ciencias Ambientales (EDECA), Facultad de Tierra y Mar, Universidad Nacional (UNA) is the main institution in scientific research and monitoring of ozone in Costa Rica. The Laboratorio de Análisis Ambiental-UNA works in collaboration with other National Institutions: Instituto Meteorológico Nacional (IMN), Centro Nacional de Alta Tecnología (CENAT) and Universidad de Costa Rica (UCR). The Department de Physics, Universidad Nacional and the Universidad de Costa Rica (UCR) perform UV measurements.

Column measurements of ozone and other gases/variables relevant to ozone loss
Not available.

Profile measurements of ozone and other gases/variables relevant to ozone loss
Balloon-borne measurements take place at Alajuela, Costa Rica (10.0°N, 84.13°W, 908 m a.s.l).

Ozonosondes
Since 2005, the Alajuela ozonesonde station was officially accepted into the Southern Hemisphere Additional OZonesondes (SHADOZ) network. Weekly ozonesonde soundings have been conducted on a weekly basis, using ECC ozonesondes. Ozonosondes launches are a collaboration between CIRES-University of Colorado/NASA/NOAA and the Laboratorio de Análisis Ambiental-UNA/IMN/CENAT.

Water Vapour Measurements
Since 2005, together with ozone soundings also water vapour soundings have been taken place. Monthly or biweekly soundings have been conducted, using cryogenic chilled-mirror hygrometers that are flown in combination with ozonesondes. Water vapour soundings are a collaboration between CIRES-University of Colorado/NASA/NOAA and the Laboratorio de Análisis Ambiental-UNA/IMN/CENAT.

Radiosondes
Since 2004, radiosondes have been launched on a daily basis. These include sensors of temperature, relative humidity; direction and wind speed. Radiosondes are performed by the UCR in collaboration with the IMN.

UV measurements
The UV measurements are performed by the UNA and UCR.

Broadband measurements
These measurements take at Heredia, Costa Rica (10° 02´N, 84° 09´W; 1050 m). Data has been collected since ~10 years ago by the Departamento de Física of UNA. Global solar radiation is measured with an Eppley piranometer of spectral precision, model PSP, effective measurement range: 0.295 µm to 2.8 µm. Infrared radiation of the atmosphere is measured with an Eppley pirgeometer of spectral precision, model PIR, with effective range: 4 µm to 50 µm.

Narrowband filter instruments
Davis Weather station, Vantage Pro2 Plus is used to measure UV. The UV Sensor measures the sunburning portion of the UV spectrum (290nm - 390 nm). Its spectral response matches very closely the Erythema Action Spectrum (EAS), and was adopted by the Commission Internationale de l’Eclairage (C.I.E.) as the standard representation of the human skin’s sensitivity to UV radiation. This equipment is property of the UCR. Measurements have been taken since 3 years ago though data is not yet been analysed.
RESULTS FROM OBSERVATIONS AND ANALYSIS

- Validation of Ozone Measurements from HIRDLS (Nardi et al., 2007).
- Validation of Aura/MLS Water vapour (Vömel et al., 2007).
- Solar radiation maps from Costa Rica (Wright, 2002).
- Influence of volcanic emissions on ozone data.

THEORY, MODELLING, AND OTHER RESEARCH

Spectral modelling of the direct, diffuse and global solar radiation (Wright, 2005)

DISSEMINATION OF RESULTS

Data reporting
The ozone profile data collected in Costa Rica is sent to NOAA in Boulder, Colorado. The data from there is then transferred to the SHADOZ (Southern Hemispheric Additional Ozonesondes) archives: http://croc.gsfc.nasa.gov/shadoz/.

Information to the public
Vertical ozone profile data is made available after every launch on the SHADOZ website for the scientific community.

Relevant scientific papers


PROJECTS AND COLLABORATION

The major international collaboration is with CIRES-University of Colorado-NOAA/NASA. Through this project we launch regularly ozone and water vapour sondes. The UNA has participated in a series of projects:

- Southern Hemisphere ADditional OZonosondes, SHADOZ, Financed by NASA, from: 01.09.2005- not defined.
- Ticosonde Veranillo 2006, financed by CIRES-University of Colorado/NOAA/NASA, from: 01.07.2006 to 07.08.2006.

At La Selva Biological Station flux measurements of CO₂ are taking place in the frame of the CARBONO project, more information at http://www.fiu.edu/~carbono/.

FUTURE PLANS

The following activities are planned for the future:

- Continue monitoring vertical ozone profiles under the SHADOZ programme.
- Ozone Climatology.
- Continue monitoring water vapour profiles. This station has the highest frequency of measurements in the tropics.
- Start continuous UV-B monitoring programme at SHADOZ station; this will depend on the help of the Oficina Técnica del ozono.
- Perform Surface ozone measurements.
- Continue with the NASA agreement to include Costa Rica in the MPLNET and AERONET networks.
- Improve the dissemination of data to the public by establishing a webpage.
- The Department of Physics of the UNA and IMN will start measuring UV-B radiation with a Kipp & Zonen radiometer donated by the Oficina Técnica del Ozono.

NEEDS AND RECOMMENDATIONS

We need two computers one for surface ozone measurements and another one to work the ozone and water vapour data and also a better program such as IDL and financial support to travel to meetings, congresses, seminars and workshops abroad. We recommend starting with an UV network in Costa Rica and help with the calibration and maintenance of these equipments.

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