

COLOMBIA

1. UV MEASUREMENTS

Each station has UV Biospherical Spectroradiometers GUV 511, available with multi-channel filter which provides information on region of the spectrum 290-700 nm, for UV-B, UV-A and Photosynthetically Active Radiation (PAR) wavelengths. The instruments measure in fractions of seconds for each region of measurement and integrate them in intervals of a minute. The data is available since 1998 for each one of the following stations and parameters:

<i>Station</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Height</i>
Riohacha	11° 32' N	72° 56' W	4 m
Santa Fe Bogotá	04° 42' N	74° 09' W	2546 m
Pasto	01° 11' N	77° 18' W	2580 m
Leticia	04° 33' SUR	69° 23' W	84 m
San Andrés Isla	12° 35' N	81° 42' W	2 m

Parameters:

UV-B 305 nm

UV-B 320 nm

UV-A 340 nm

UV-A 380 nm

Photosynthetically Active Radiation PAR

Integrated UV-B 290-320 nm

Integrated UB-A 320-380 nm

2. OZONE MEASUREMENTS

In Colombia, regular measurements for ozone vertical profiles have been since November of 1998 in ELDORADO-Bogota meteorological station with ozonesondes. Measurements of total ozone are derived from the integrated ozone obtained to ozonosondes and satellite information or derived data from the UV radiation.

2.1 Ozonesonde

The ozonesonde corresponds to the electrochemical concentration cells category (ECC) produced by Vaisala and called ozonesonda OR. On this ozonesonda the sensor is comprised of ozone, the interface of the sensor of ozone and the radiosonde. The ozone sensor unit is a Model 6A ECC

- Ozone vertical profile

The monitoring program is the next:

Frequency: monthly

Day: the last Thursday of the month

Hour: 12:00 local hour

Station: ELDORADO-Bogotá

Parameters: Pressure, Ozone, Height, Temperature, Relative Humidity, Virtual temperature, Dew Point, L Rate and Ascensional Rate.

- Total column ozone

The monitoring program is the next:

Frequency: monthly

Day: the last Thursday of the month
Hour: 12:00 local hour
Station: ELDORADO-Bogotá
Parameters: Integrated Ozone, Residual Ozone and Total Ozone.

2.2 Total ozone

In absence of spectral photometer, the total ozone measurements are obtained by means of two methods: data derived from UV measurements and satellite-based measurements.

- Total ozone derived uv measurements

Station: Bogotá, Leticia, Riohacha, Gaviotas y San Andrés
Monitoring Program: Hourly
Methods of measurement: Total ozone based on the measurement of UV at 305 and 320 manometers.
Physical Model: Lambert-Beer

- satellite-based measurements

With the information TOMS/SBUV satellite instruments of the NASA, has been possible to obtain daily information of total ozone for grid points in Colombia for spatial grid 1°X1.25° latitude/longitude, since November of 1978.

3. INVESTIGATION

3.1. UV index

Based on the UV spectral range of 305-340 nm measured, UV index were determined to express the degree of danger to the solar exposition around the noon.

3.2. Models to calculate total ozone based on UV measurements

In absence of spectral photometer to measure total ozone concentration in the atmosphere, the physical-mathematical model of Lamber-Beer Law and tropical multilineal relationships applied to atmosphere of the McClatchey model, are used.

3.3. Models to calculate the aerosol quantity in the atmosphere upon Bogota

Model to obtain the aerosol quantity in the atmosphere as a measured of global solar radiation received by an horizontal surface for clear days, is based on the model suggested by Angstrom known as "turbidity coefficient β " which calculate suspended aerosols in the atmospheric column.

3.4. Ozone variability and trends on Colombia

Studies of the ozone variability and trends based on satellite data set. The atmospheric variations are classified in four categories: a) short time, related to the diurnal variations, variations in the ultraviolet radiation, dynamic variations and weather systems; b) seasonal or annual cycle; c) interannual related to the Quasi Biennial Oscillation (QBO) and El Niño-Southern Oscillation (ENSO) cycle and d) decadal, dependent of the 11-year solar cycle.

FUTURE ACTIVITIES

4.1 Monitoring

To carry out campaigns of measurements of the vertical profile of the ozone in other Colombian zones.

4.2 Investigation

The investigations will be oriented to develop a model of forecast national UV index and to improve the knowledge of the stratospheric processes and the roll on the climate change.

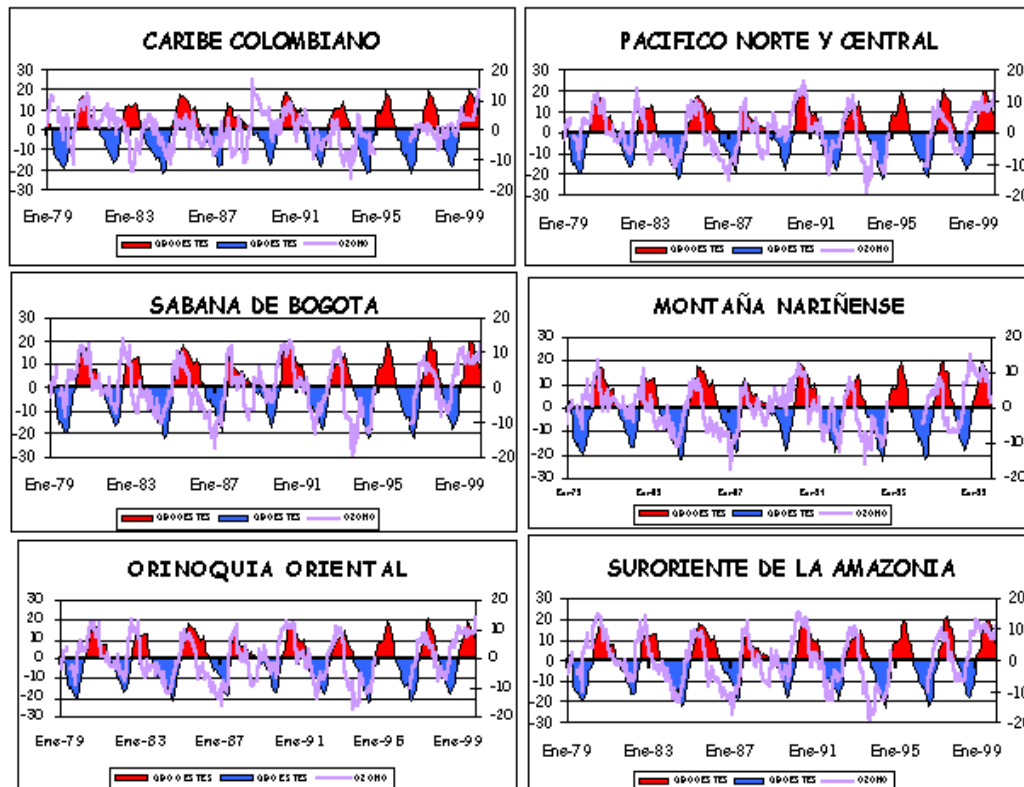


Fig. 1. Interannual variation of total column ozone of the mean regions of Colombia, obtained from satellite measurements with Total Ozone Mapping Spectrometer (/TOMS NASA) and zonal wind anomalies at 30 hPa.

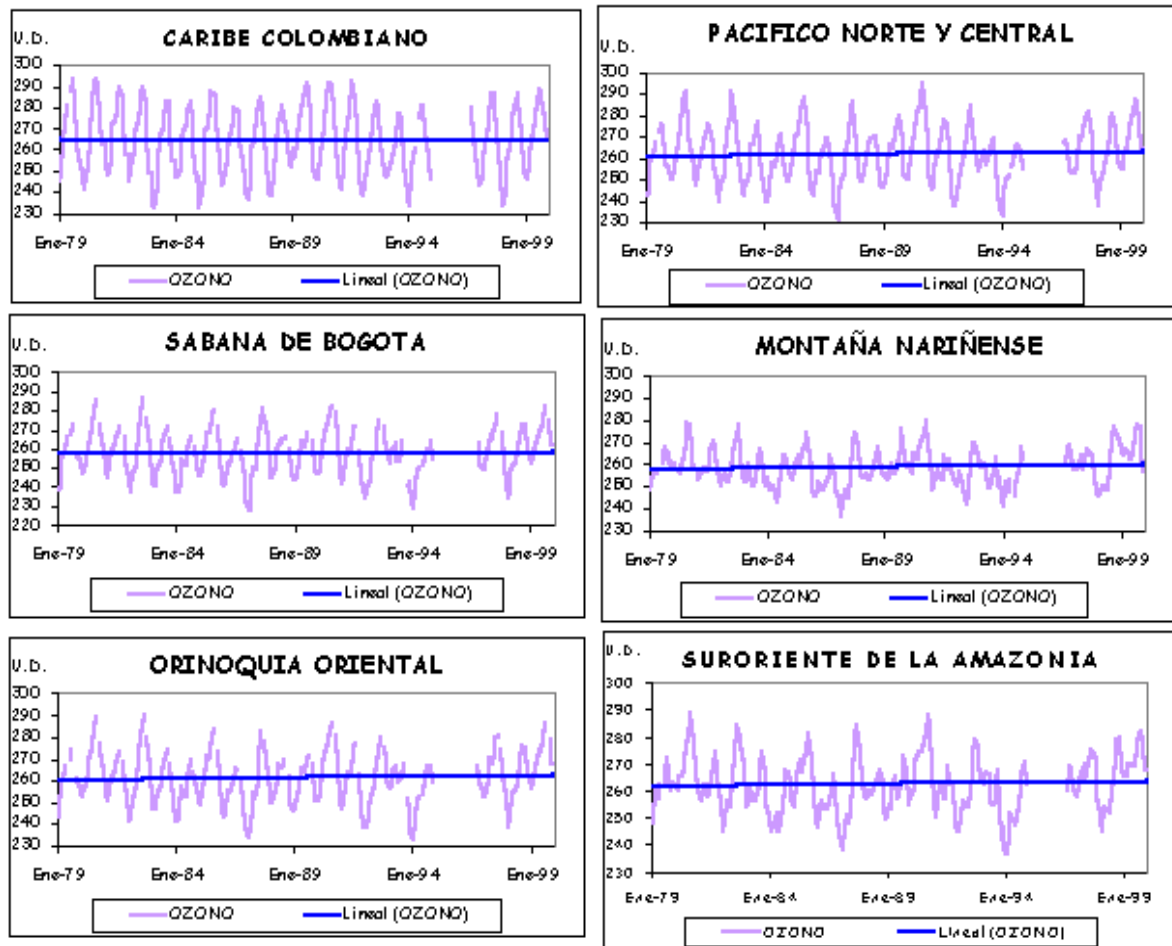


Fig. 2 Trend of the total column ozone in the mean regions of Colombia, obtained from satellite measurements with Total Ozone Mapping Spectrometer (TOMS NASA.).

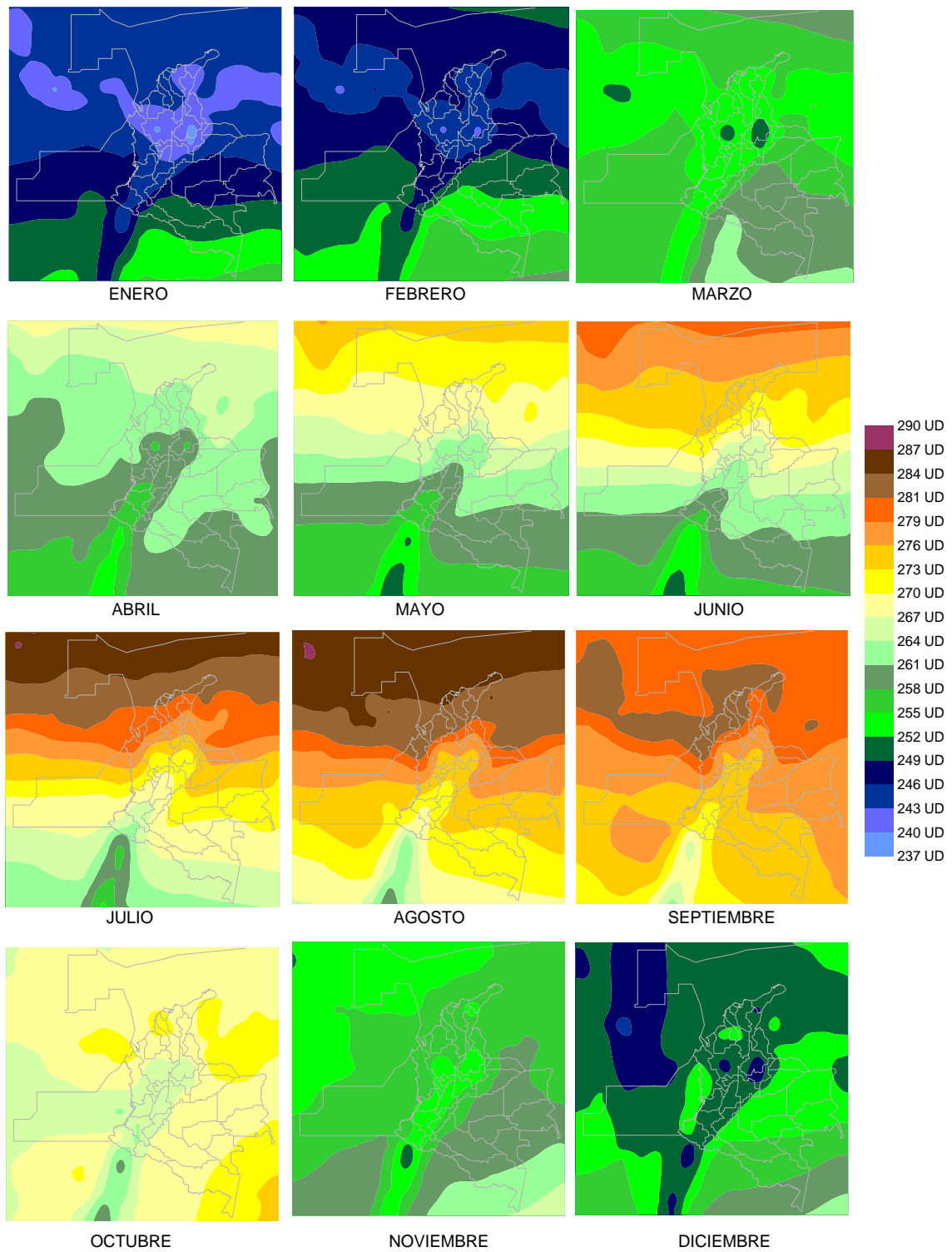


Fig. 3. Seasonal variation of the total column ozone in Colombia, obtained from satellite measurements with Total Ozone Mapping Spectrometer (/TOMS NASA).
