UV-B, radiation

In the Figure above appears the daily behaviour of total UV-B measured in day of clear sky in the station that has the Faculty of Exact and Natural Sciences in the University Campus of San Lorenzo.

The maximum value is of the order of 1800 mW/m², and is had around the 12:00 hs local.

The instrument is a Piranómetro UV, YES Model UV-B 1, which also measures the biological effectiveness of solar radiation UVB. First calibration was made in the Meteorological Service of Canada (1996). One second calibration in situ was made by investigators of the Meteorological Service of Spain in 1997.

The Solar Radiation (average every 15 minutes) measured with a LiCor, for the month of January of the year 1999 was between 1,185 and 43 W/m², that the values of the radiation are high.

Surface Ozone

The Surface Ozone is measurement with a TECO, Model 49/49-PS, for the same period the maximum value is almost 40 ppbv. In the same one it is observed that also superficial ozone is had at night. This can be due to enriched movement shift of air with ozone that lowers from superior levels of the atmosphere due to the thermal contraction of the air.

In the table are the values average of superficial ozone, and the dates in which were surpassed the norms.
<table>
<thead>
<tr>
<th>Days</th>
<th>Average value in 8 hs (ppbv)</th>
<th>Average value in 10 hs (ppbv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-ago</td>
<td>89</td>
<td>85</td>
</tr>
<tr>
<td>01-sep</td>
<td>78</td>
<td>73</td>
</tr>
<tr>
<td>02-sep</td>
<td>86</td>
<td>81</td>
</tr>
<tr>
<td>03-sep</td>
<td>74</td>
<td>69</td>
</tr>
</tbody>
</table>

Episode of the year 1999.
Measured in station FaCEN - LIAPA.

Stratospheric Ozone

Stratospheric ozone on Paraguay is controlled from the data of the TOMS, down are the means values on Filadelfia, Pedro Juan Caballero, Pozo Colorado, San Pedro, Asunción, Pilar, Encarnacion, important localities by its geographic position and greater human population.

Filadelfia is to the west of Loma Plata, 25 km. San Pedro this to 100 km to the northwest of San Estanislao.
Promedios Mensuales de Ozono Estratosférico sobre Filadelfia.  
Datos del TOMS. Período 1996 - 2005
Promedios Mensuales de Ozono Estratosférico sobre Pedro Juan Caballero.
Datos del TOMS. Periodo 1996 - 2005

Promedios Mensuales de Ozono Estratosférico sobre Pozo Colorado.
Datos del TOMS. Periodo 1996 - 2005
Promedios Mensuales de Ozono Estratosférico sobre San Pedro.
Datos del TOMS. Periodo 1996 - 2005

Promedios Mensuales de Ozono Estratosférico sobre Asunción.
Datos del TOMS. Periodo 1996 - 2005
Promedios Mensuales de Ozono Estratosférico sobre Pilar.
Datos del TOMS. Periodo 1996 - 2005
In all the analyzed stations they are almost observed the same behaviour of monthly distribution during the period from study 1996 - 2005.

<table>
<thead>
<tr>
<th></th>
<th>Encarnacion</th>
<th>Pilar</th>
<th>Asunción</th>
<th>San Pedro</th>
<th>Pozo Colorado</th>
<th>Pedro J. Caballero</th>
<th>Filadelfia</th>
<th>Max</th>
<th>Maximorum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>299</td>
<td>301</td>
<td>299</td>
<td>294</td>
<td>293</td>
<td>292</td>
<td>290</td>
<td>301</td>
<td></td>
</tr>
<tr>
<td>Min</td>
<td>246</td>
<td>246</td>
<td>246</td>
<td>244</td>
<td>245</td>
<td>244</td>
<td>241</td>
<td>241</td>
<td></td>
</tr>
<tr>
<td>Promedio</td>
<td>270</td>
<td>269</td>
<td>268</td>
<td>267</td>
<td>266</td>
<td>265</td>
<td>264</td>
<td>267</td>
<td></td>
</tr>
</tbody>
</table>

In the period of study, the values of ozone never were below the 240 UD, which is that never was reached the condition of "ozone hole".

In the Chaco region (Pozo Colorado and Filadelfia) is observed that the variability is small, however in Pedro Juan Caballero is observed greater variability of ozone, is necessary to remember that in Pedro Juan Caballero region the florets is much more exuberant that in the Chaco.
Some works

1) IRRADIANCIA ERITEMICA E INDICE DE RIESGO SOLAR EN ASUNCION, PARAGUAY EN EL PERIODO 1997-1999

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3 Facultad de Ciencias, Universidad Nacional de Asunción, San Lorenzo, Paraguay

Resume:

We analyze solar irradiance in the UV range (290 nm-400 nm) registered with a biómetro having a filter that reproduce the erythemal (alarm of the skin) action spectral. Data were obtained in Asunción, Paraguay between 1997 and 1999, in the months with large aerosols content due to biomass burning. We compare the solar erythemal irradiance, transformed in the solar risk UV index, with results of the solution of the atmospheric radiativa transfer equation, employing the Madronich code. The most important geophysical variable, ozone, is obtained through measurements made with the instrument TOMS (Total Ozone Mapping Spectrometer)/NASA on board of Earth Probe satellite. We employed the method of variable identification in order to determine the aerosol optical depth. In this way we calculate the time variation of UV index, in particular during the biomass burning event that is particularly important in the Chaco and Amazonia regions during August-September of each year. We compare this index with the corresponding one forecasted by CONAE (Comisión Nacional de Actividades Espaciales/Argentina) for the region, giving in general a rather good agreement, except for the days of high aerosol optical depth due to the intense biomass burning.
Proforma on Solar Light Ozonometer with filters for water vapour measure.

Solar Light Microtops II Ozonometer. I am pleased to enclose as attachment the requested instrument AFO (Automatic Filter Ozonometer) for measuring total ozone.

With the instrument AFO (Automatic Filter Ozonometer) never the amount of total ozone could be measured, by this reason is that we needed an instrument of low cost to measure it as Solar Light Microtops II Ozonometer. I am pleased to enclose as attachment the requested instrument Proforma on Solar Light Ozonometer with filters for water vapour measure.