SEYCHELLES

1.0   BACKGROUND

Seychelles is an archipelago of 115 islands in western Indian Ocean mainly between latitudes 3 degrees and 10 degrees south and longitudes 51 degrees and 57 degrees east. Consists of Mahe group of 41 steeply mountainous granitic islands, and outlying coralline group of flat coral islands. The three neighboring islands of Aldabra, Farquhar, and Desroches, which were dependencies of the Seychelles until 1965 and belonged to the British Indian Ocean Territory after that time, were returned to Seychelles control in 1976. The main island of Seychelles, Mahe is 144 square kilometres is very close to the equator positioned at 04.40°South and 55.31°East and is one of the only islands in the Indian Ocean within the Equatorial Belt, which was found ideal to set up a monitoring ozone station within that area.

With the commissioning of the Meteorological Services Station at the Seychelles International Airport on the island of Mahe in 1971, the Meteorological Services section fell under the Ministry of Tourism and Civil Aviation. Emphasis was more on aeronautical meteorology rather than public weather service and global atmospheric monitoring.

In 1976 it was found necessary to set up an upper wind and temperature station due to lack of upper air data within the tropics, hence the opening of the Rawinsonde station within the southeast area of the Seychelles International Airport. It was almost immediately thereafter that a station for taking ozone data was set up by the British Met. Office under the able leadership of Mr. Mike Long worth and Mr. Colin Brookes. Seychellois staff of the Meteorological Services was trained to operate the ground equipment – the Dobson Spectrophotometer and the compilation of ozone readings was done twice a day.

While the total ozone data was taken by the Meteorological Services staff there was a separate sub-unit dealing with ozone matters (Montreal Protocol) in the Ministry of Environment.

In March 1999 a change in Government Policy made it possible for the Meteorological Services Section to be moved to the Ministry of Environment under the Division of Policy, Planning and Services to become the Seychelles National Meteorological Services which culminated in the development of more interest and better coordination of the ozone issues.

2.0   TRAINING

In March 1999 Dr. Bojkov of W.M.O. in collaboration with Dr. Karel Vanicek of the Solar and Ozone Observatory of the Hydro-meteorological Institute offered the Seychelles Meteorological Services the Dodson Software Package. Some members of the Seychelles Meteorological staff were trained to analyse the Raw Ozone Data and the results were sent directly to Toronto.

Every four years with the financial help of W.M.O. and the Republic of South Africa the ground instrument "The Dobson 57" is sent to the South African Bureau of Standards in Pretoria for general calibration done by the American Technicians from N.A.S.A.

In March 2000 we participated at the Dobson Spectrophotometer Intercomparison meeting in Pretoria, South Africa. We also went for the Dobson Spectrophotometer Operators and ozone data collation and management training in May 2000 at the Czech Hydro meteorological Institute in cooperation with WMO.

In 2001 Seychelles was represented at various seminars and workshops on ozone related matters in Zambia, Montreal and Namibia.

With the knowledge acquired the management found it necessary in January 2002 to set up an ozone unit within the National Meteorological Service of the Division of Policy Planning and Services of the Ministry of Environment.

3.0   RESEARCH

Global studies in ozone have shown that the amount of ozone in an atmospheric column in the tropics is very small as compared to polar region and mid-latitudes. Due to that reason the amount of solar radiation with harmful Ultra-Violet radiation rays received in Mahe, Seychelles is very large. Even a small change of the amount of ozone in the atmosphere will adversely affect Seychelles. And this is why steps are being taken to properly monitor the ozone content in that parts of the World, hence contribute in protecting the ozone layer.

Even though readings of the total ozone started way back in 1976, due to a lack of trained research staff, ozone raw data was sent to British Meteorological Office to be analysed and sent to the World Ozone and Ultraviolet Radiation Data Centre. Unfortunately no feedback was made available to us, and at the present the ozone readings in our possession date back to the year 1994 till presently.

Even though much has been done on finding alternatives to Ozone Depleting Substances, studies of the available ozone readings are very limited. The studies at the moment are geared towards the following-

1.   Ozone fluctuations over the years, and
2.   Seasonal total ozone variations – namely variations between the South-East Monsoons and the North-West Monsoons.

To date no substantial conclusions have been achieved, but from the following table the mean monthly ozone between the years 1994 to 2001 plotted month by month illustrates the distribution of total ozone within this region.

YEAR	MONTHS	(ozone unit-DU)										
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1994	244	246	248	248	250	250	259	273	265	260	260	265
1995	257	256	262	269	263	259	255	250	253	258	253	247
1996	245	238	246	249	248	241	246	256	279	281	274	267
1997	262	261	272	276	271	267	266	268	270	259	250	239
1998	230	232	242	242	248	251	256	256	263	271	267	258
1999	258	257	254	276	271	257	269	265	265	259	255	245
2000	233	245	255	265	266	262	256	253	250	255	253	

Figure 1

Mean Monthly Ozone values from 1994 to 2001 at Seychelles Airport (Mahe)

Figure 2

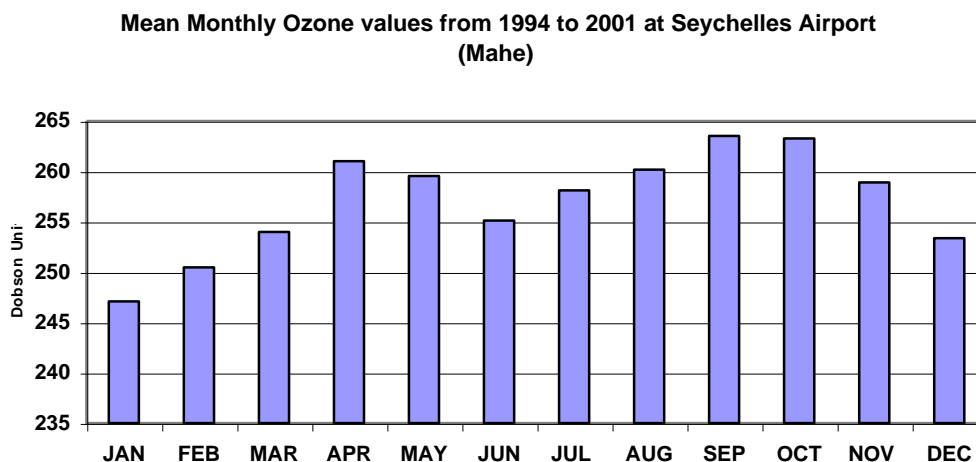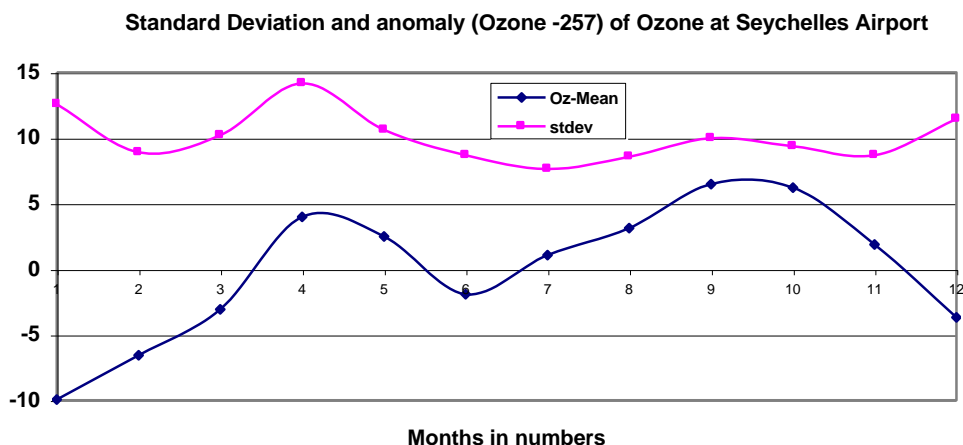**Standard Deviation and anomaly (Ozone -257) of Ozone at Seychelles Airport**

Figure 3

As figures 1, 2 and 3 illustrate, there is scope for a lot more research to be done on the available data to account for low readings during some months between 1994 and the year 2000 and there is evidence of a lack of correlation during some months of the same period. Therefore attempts will be made to investigate the causes of high and low concentrations of ozone by correlation analysis with meteorological factors and other pollutants.

4.0   RESEACH PLANS AND PROGRAMMES

Since our Research work is still in its early stages, coupled with the lack of proper training, our ozone unit would appreciate any assistance available in the following areas:

(i)   Training and exchange of ideas with more experienced members of the
         international community in order to upgrade the capabilities of our local staff and
         equipment.
(ii)   Further training for the technical and operation personnel in the maintenance of
         instruments.
(iii)   Investigating the causes of high and low concentrations of ozone by correlation analysis
          with meteorological factors and other pollutants.

5. 0   CONCLUSION

 At present our Dobson Spectrophotometer is not functioning properly and only test readings are taken occasionally. Since last year the readings have been too low to be of useful value. We will appreciate if WMO continues with regular checks of Dobson Spectrophotometer for gross calibration errors and helps us to make our Dobson Spectrophotometer operational.

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