Ozone Trend at the Coastal Station Cape Point (34 °S)

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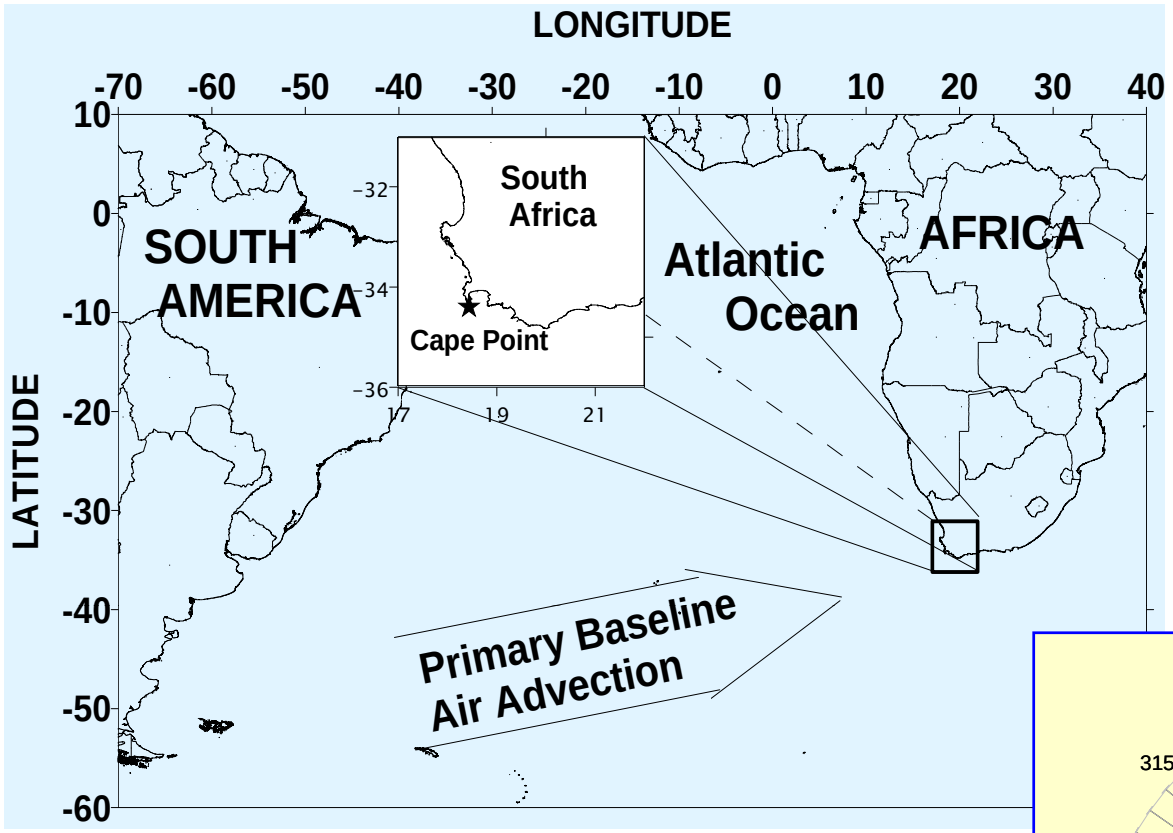
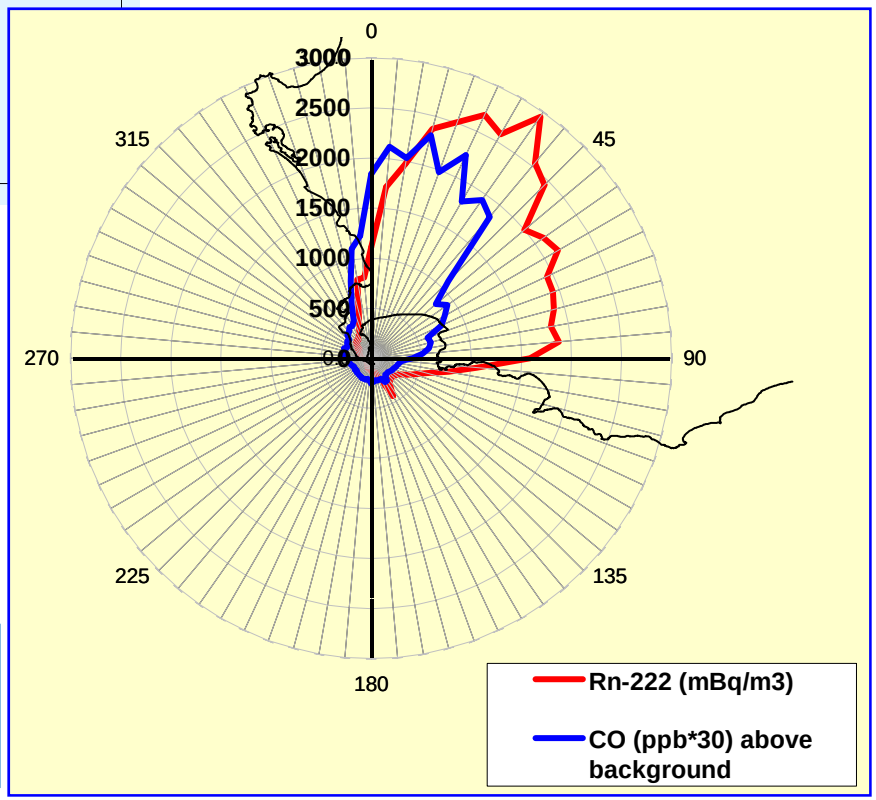
Measurements of surface ozone at Cape Point, (34° S, 18° E; 230 m asl), 1983 - 2008

Karlsruhe Institute of Technology

South African Weather Service

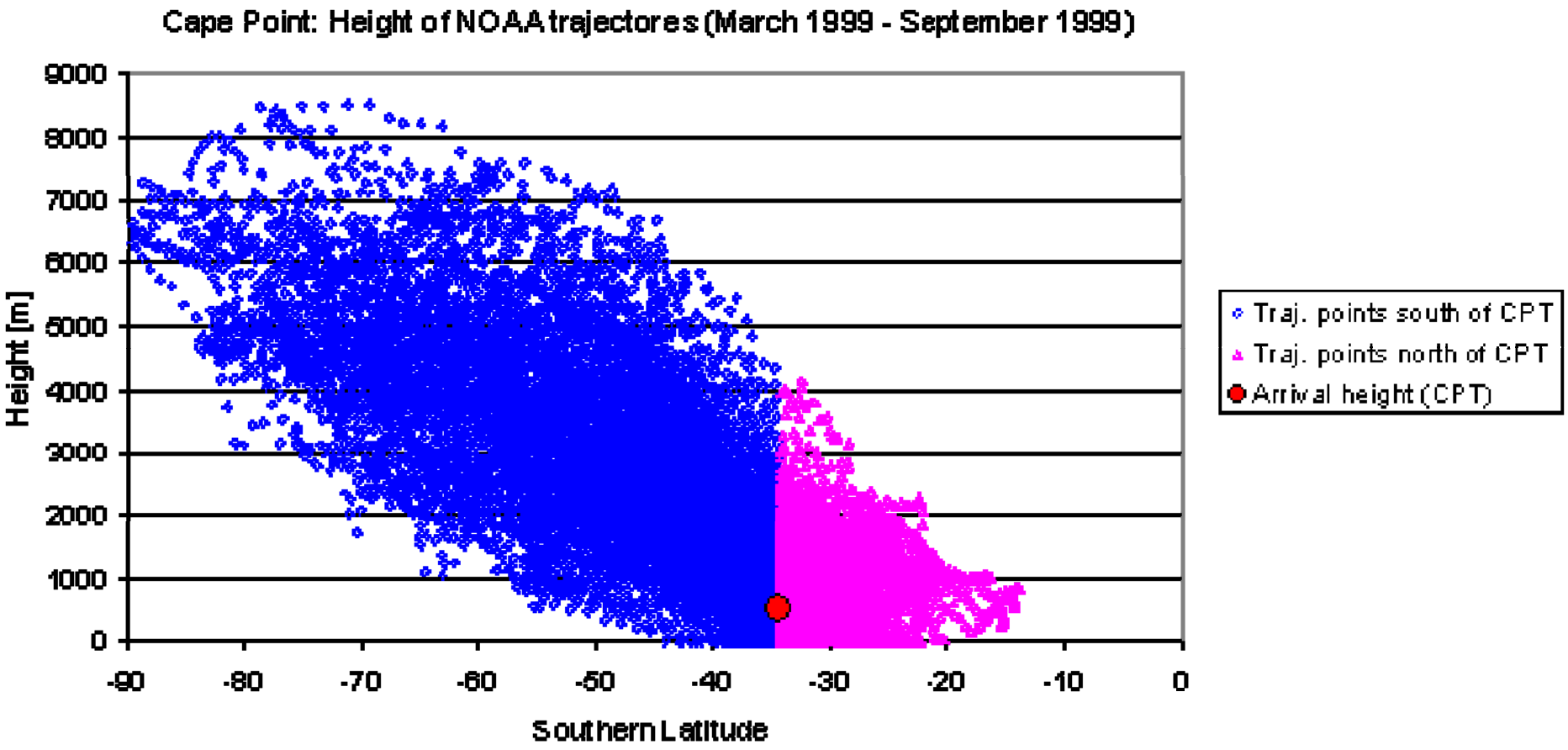
Advection of air masses



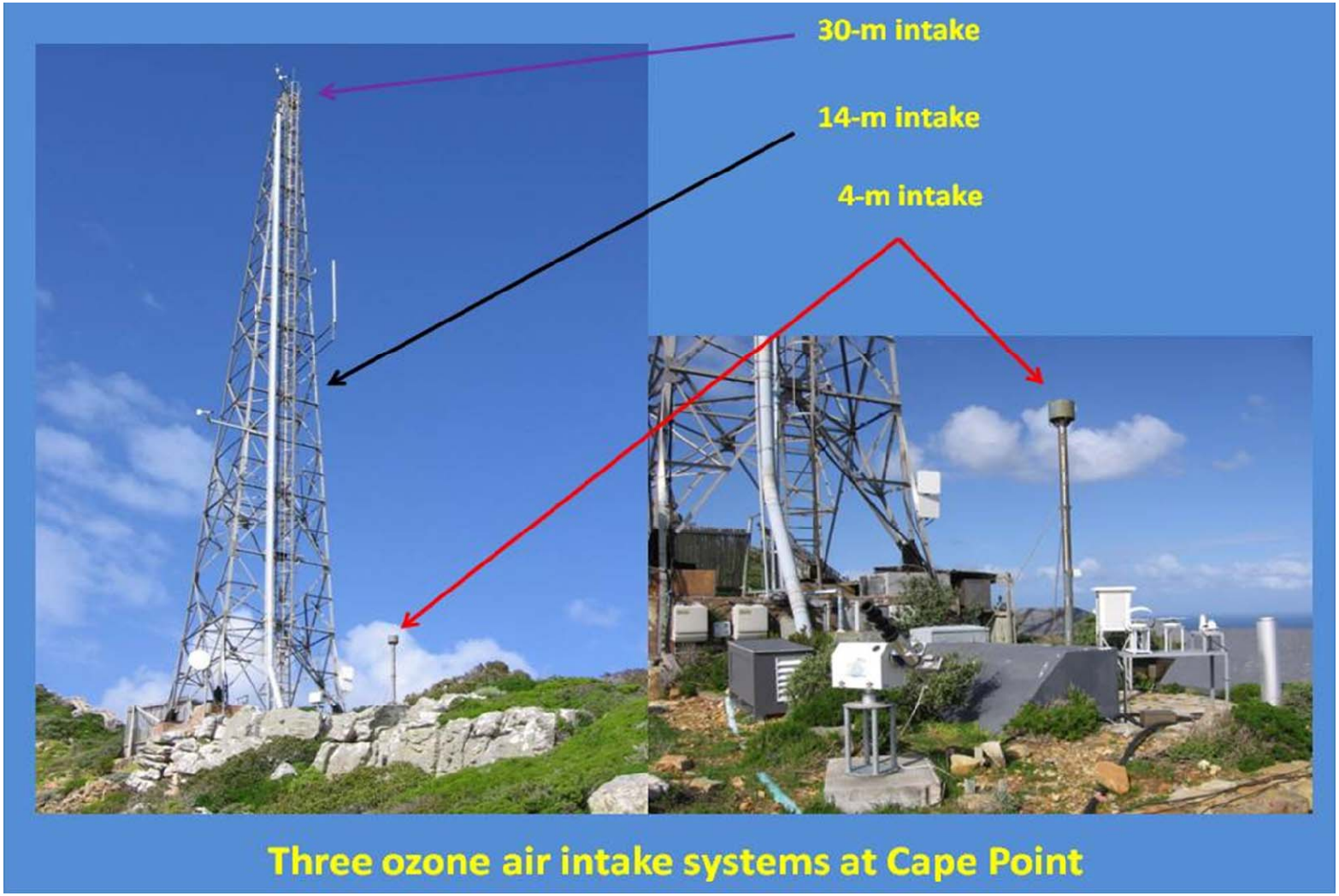


Angular distribution of **CO** and ^{222}**Rn**

Dominance of subsiding air masses at CPT



Plot of the height of 10-day back trajectory data points versus latitude for data from March – September 1999. Trajectories by courtesy of NOAA CMDL (Joyce Harris).
(Taken from: Brunke and Scheel, Final Project Report 2002)

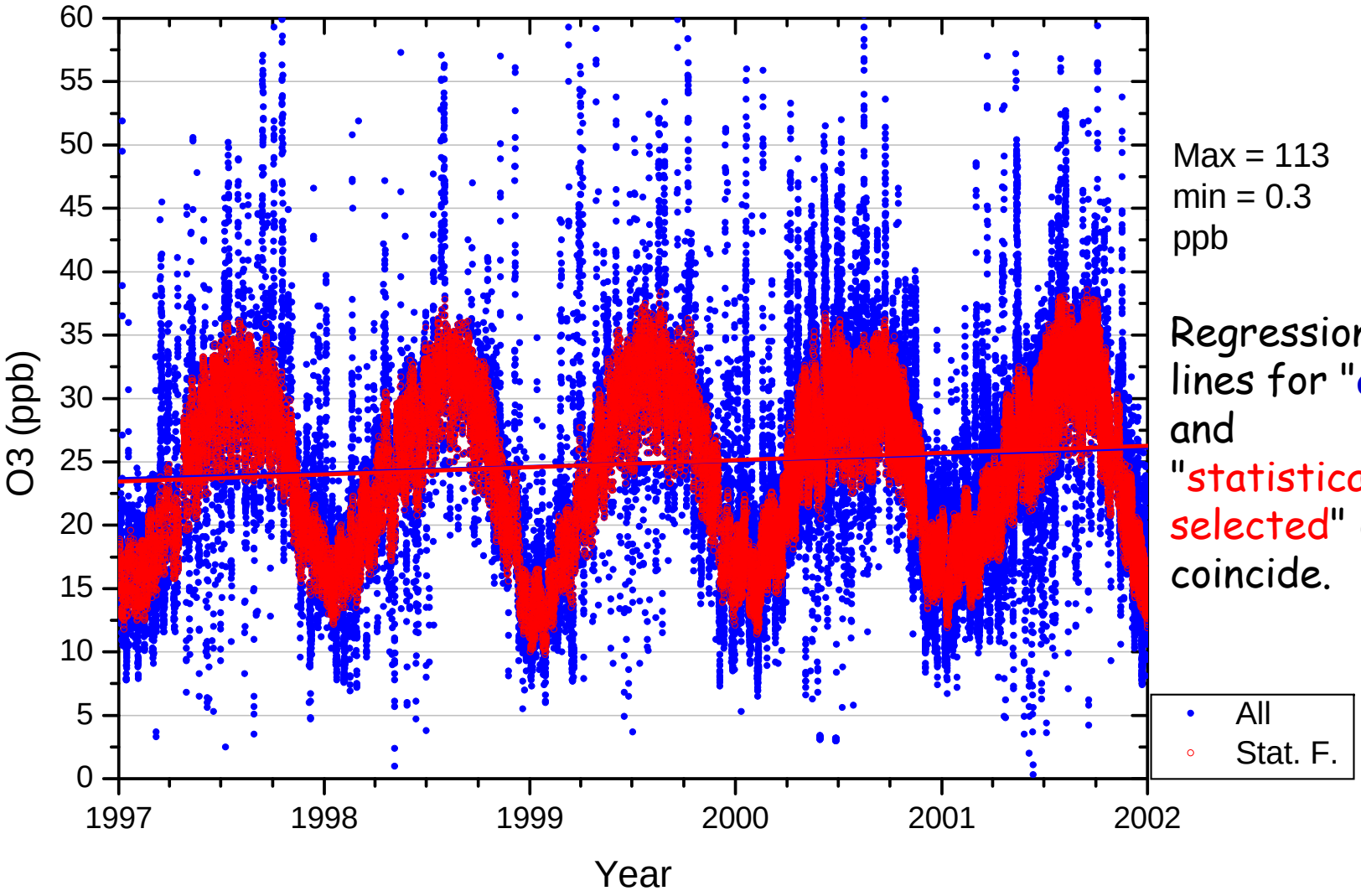


O_3 values from 4, 14 and 30 m height agree within 0.5 ppb under background conditions.

During pollution episodes (especially fire plumes) differences of > 60 ppb could be observed between the intakes. Differences seem to be unsystematic and do not represent a uniform upward or downward O_3 gradient.

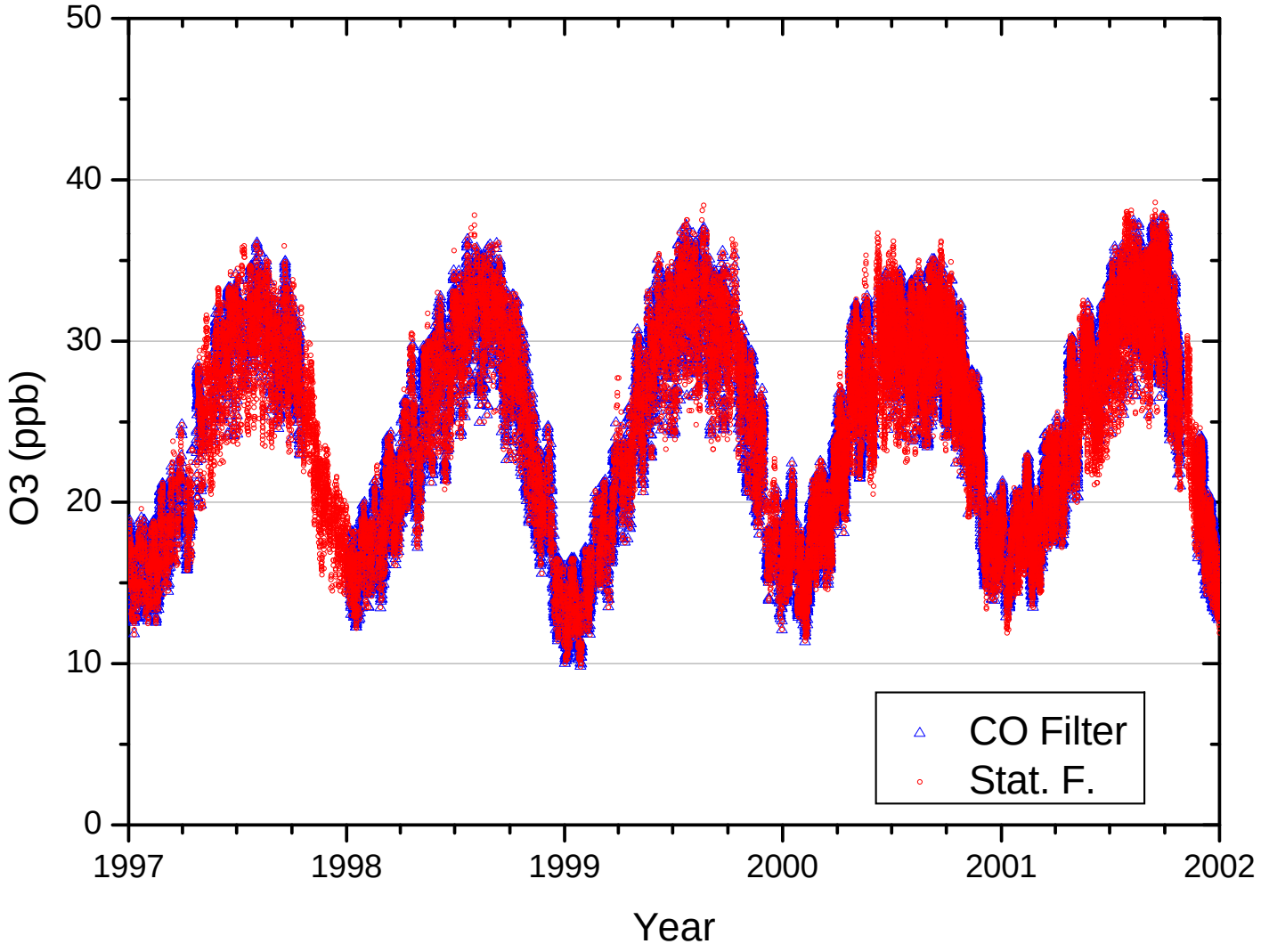
Overview on the O_3 data structure at Cape Point (half-hourly mean values, 1997 – 2001)

By short-term variations a range of about 110 ppb is covered.

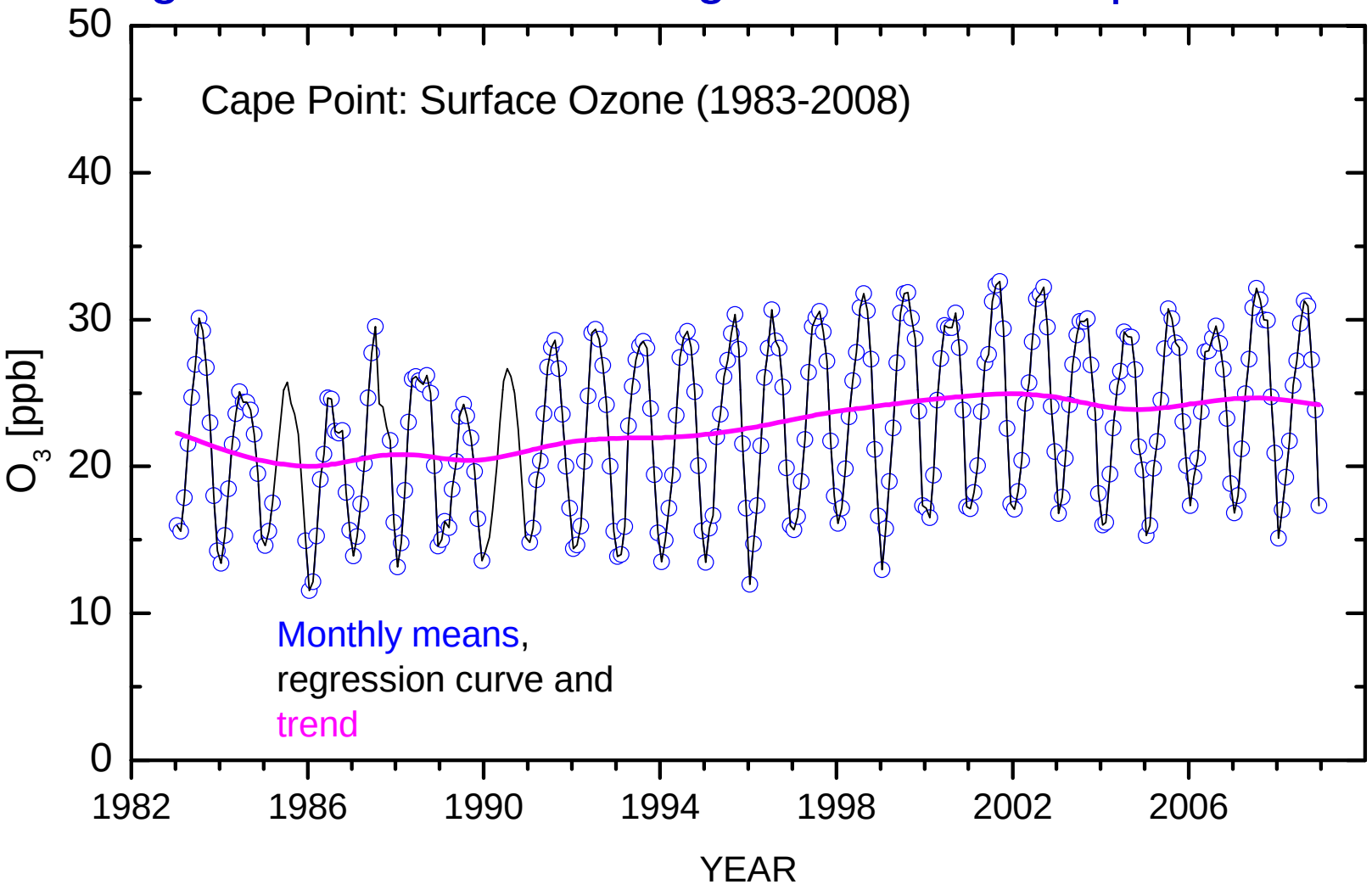


Comparison of data filters for ozone (1997 – 2001)

A statistical filter and filtering with CO background data yield comparable results.



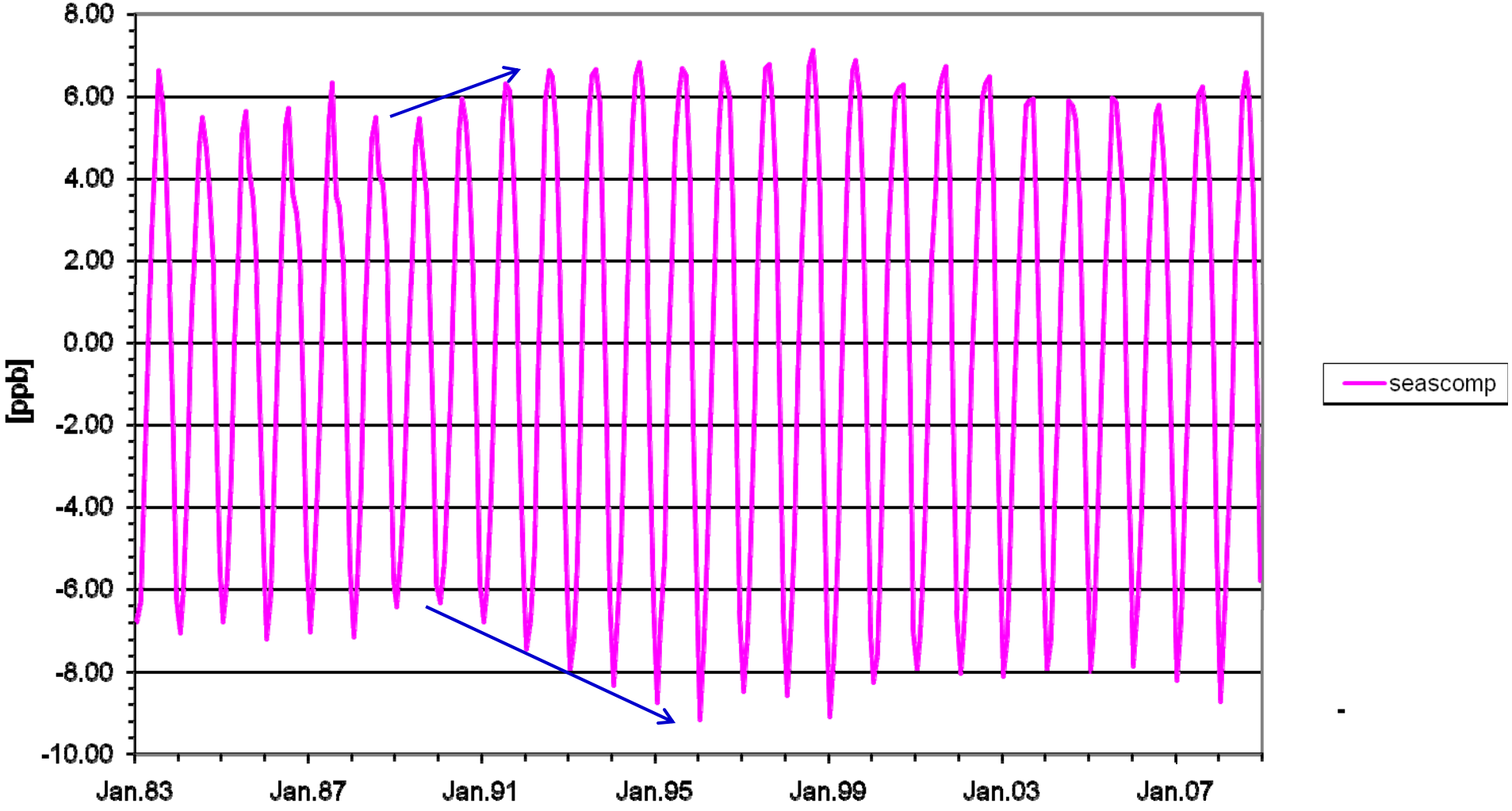
O_3 monthly mean values (1983 – 2008) together with regression curve and long-term trend component



Statistically significant trend between 1991 and 2002 (0.3 ppb/yr, accompanied by an increase in seasonal peak-to-peak amplitudes.

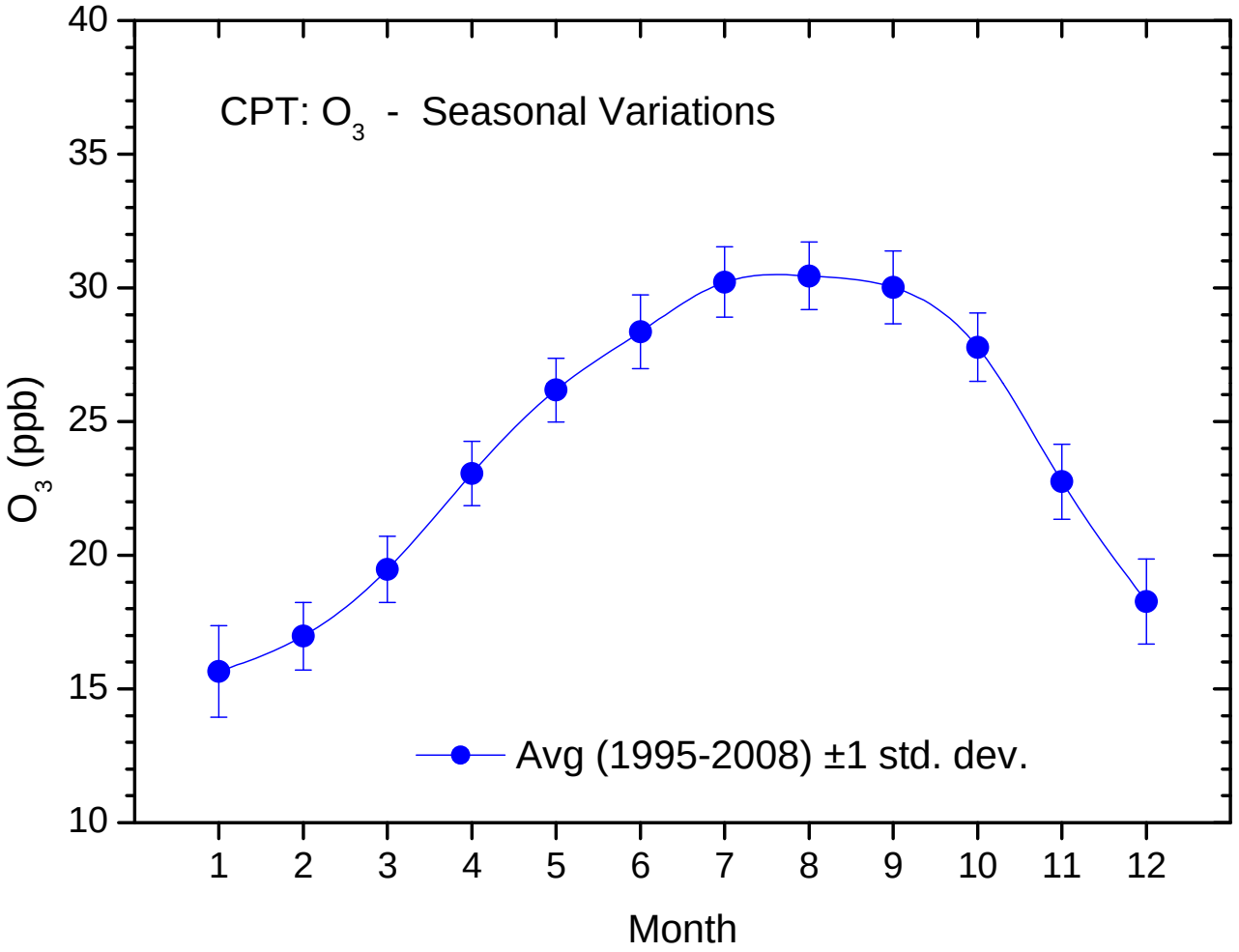
Since 2003 the increase has levelled off.

CPT: O_3, Seasonal component of regression curve (1983 – 2008)



Increasing amplitudes between end of 1980s and mid-1990s

Cape Point, Surface ozone:
Average seasonal variations 1995 – 2008



Seasonal variations with flat July-September maximum and minimum in January.

Ozone at Cape Point (1983 – 2008)

Summary

- **The time series can roughly be devided into 3 parts:**

1983 – 1989/90: No clear trend behaviour, 2 major gaps
1990 – 2002: Ozone increase
2003 onwards: Stabilization

- **Statistical data filtering yields monthly means close to "all-data" values.**

- **Clean-air data filtering based on CO: Similar values for monthly means (compared to the statistical filter).**

Outlook

- ***Detailed studies of major short-term ozone variations***

Ozone at Cape Point

Outlook in more detail

- ***Study O_3 levels (background levels) as a function of travel heights (stratospheric downfolding).***
- ***Variations in the temporal occurrence of the annual maximum and its relationship to CO (long-range transport ?).***
- ***Look at diurnal cycles under pristine background conditions.***
- ***Wind directional growth rate plots for the period of significant increase (similar to what we did for CO_2 and CH_4).***
- ***Cluster years into groups where the seasonal amplitude is similar and investigate what the underlying causes could be.***

Acknowledgements

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