# MINUTES

## NDSC ozonesonde PI meeting

**Meeting dates:**   29.6 - 1.7.1998 at Alfred Wegener Institute, Potsdam, Germany

**Present:**   Marc Allaart, Matthias Alpers, Anna Benesova, Bojan Bojkov, Rumen Bojkov, Geir Braathen, George Chronopoulos, Hans Claude, Jonathan Davies, Terry Deshler, Dirk De Muer, Valery Dorokhov, Bryan Johnson, Rigel Kivi, Esko Kyrö, Ralph Lehmann, Andrew Matthews, Ib Steen Mikkelsen, Gerry Murphy, Bruno Nardi, Roland Neuber, Fiona O'Connor, Sam Oltmans, Françoise Posny, Eero Puhakka, Fabrizio Ravegnani, Markus Rex, Juan Manuel Sancho, Astrid Schulz, Thomas Seiler, Kazuo Shibasaki, Pavla Skrivankova, Herman Smit, René Stübi, Geraint Vaughan, Claude Vialle, Peter von der Gathen, Andrea Weiss.

**Distribution:**   Participants

**Minutes prepared by:**   Geir O. Braathen. Draft minutes were sent out on 10 July 1998. Corrections and comments received from Bryan Johnson and Marc Allaart have been taken into account in these final minutes.

# Agenda

The agenda was made available via anonymous ftp before the meeting. The final version of it is appended to this document.

# Overheads

All the overheads that were presented were copied by AWI staff and handed out to the participants on the last day of the meeting.

# Opening of the meeting

The meeting was opened at 14:00 on Monday 29 June by Peter von der Gathen who welcomed all the participants.

The welcoming address was then followed by a short presentation by Geir Braathen who gave an overview of the background and purpose of the meeting. The main reason for the meeting is that the ozonesonde (ECC type) has been selected as an

NDSC instrument. This has led to the need for a meeting among ozonesonde PIs in order to exchange experience and in order to agree on common routines for sonde preparation, conversion of raw data to geophysical quantities and a common data format.

Another reason for the meeting is the question of a regional (European) data collection centre for ozonesondes to be hosted by NILU.

A third reason for the meeting was to discuss formal and practical questions around the real time submission of ozonesonde data to the European Centre for Medium Range Weather Forecasts (ECMWF).

The meeting had the following purposes:

- To get acquainted, which means better communication within the ozonesonde community.
- To arrive at common practices for sonde preparation.
- To implement common algorithms for conversion of raw data.
- To agree on routines for quality control.
- To agree on a common data format.
- To discuss improved data submission to WOUDC
- To implement routines for real-time transfer of ozonesonde data to the GTS.
- To get an overview of intercomparisons between different sondes and between sondes and other instruments.
- To communicate with Vaisala.
- To present own work through poster sessions.
- To have an open discussion.

The meeting consisted of 9 plenary sessions and two poster sessions. A lot of information can be found in the copies of the overheads. These minutes will try to convey what was discussed after each presentation and give an overview of the most important issues.

# Session 1.    Pre-flight preparation practices

This session was opened by Bryan Johnson of NOAA-CMDL who gave an introduction to the issue of pre-flight preparation of sondes.

At NOAA they have carried out tests with various cathode solution concentrations. The conclusion so far is that one should continue to use a 1% KI solution and also use the prescribed amounts of buffer chemicals, that is 5.0 g of $Na_2HPO_4 \cdot 12H_2O$ and 1.25 g of $NaH_2PO_4 \cdot H_2O$ for 1 litre of solution. The solution should also contain 25 g of KBr. This is the same recipe as in the Vaisala manual. It turns out that the sonde performance is more sensitive to the concentration of the buffer chemi-

cals that to KI concentration. This is especially the case for the $NaH_2PO_4$, so one should be careful when weighing this ingredient and make sure that one uses a balance that is precise to 0.01 g.

It is also recommended to use 3.0 cm3 of cathode solution since evaporation during the flight will then have a smaller effect compared to using 2.5 cm3.

NOAA use both ECC-6A sondes from SPC and 1Z-ECC from ENSCI. The two manufacturers have somewhat diverging preparation procedures, although they are quite similar in most aspects. The two manuals are compared in the copies of the overheads.

On the day of the flight one should make sure to add the cathode solution to the cell before the anode solution.

NOAA employs a correction to the measured flow rate to account for evaporation of the soap bubble solution when measuring the sonde pumping speed. The flow rate measured by a soap bubble flow meter can lead to negative errors in the 0-4% range, depending on the RH, temperature, and pressure of the lab room. The ENSCI manual notes that a more precise air flow rate measurement can be made by using humidified air. The SPC check list for flight preparation requires the room temperature, pressure and relative humidity be recorded. This data can then be used to correct the flow at a later time. Bryan showed a sample correction curve that can be used. The graph is included in the copies of the overheads.

It is also recommended to run the sonde a few minutes in ambient (i.e. outside) air so that the sonde equilibrates with the surroundings. 5-10 minutes should be OK, but in the case of hot summer days this time might have to be shortened down to prevent over-heating of the sonde box.

Andrew Matthews informed us that PSC changed supplier for the platinum electrodes and this led to a change in the cell performance. This means that it is important that there is some institution that can check sonde performance on a routine basis, so that such changes can be discovered as early as possible.

There was an agreement that there is a need for a unified Standard Operating Procedure for the ECC sondes. Bojan Bojkov underlined the need for good recipes in order to avoid problems. Bryan Johnson wanted to know what kind of experience the various stations have that may not be included in the existing manual instructions.

Bojan Bojkov also mentioned the severe box temperature problems experienced at NILU. This led Sam Oltmans to point out that quality control should not only involve the ozone profile, but also other parameters, such as the box temperature.

The question of 0.5% vs. 1.0% KI in the cathode solution was discussed. Sam Oltmans explained that this question has to be seen in conjunction with the pump efficiency corrections that we apply to the raw data. Several groups measure the pump efficiency for each individual sonde before launch. However, the method they use to determine the pump efficiency is not necessarily the same as the one Walt Komhyr

used when he made the pump correction tables. After having determined the pump efficiency as a function of atmospheric pressure Komhyr then experimented with the composition of the cathode solution until he obtained ozone profiles which gave total ozone columns that agreed well with Dobson measurements. This means that the cathode solution recipe and the pump efficiency are intimately linked, and if you start to experiment with one of them you might get erroneous results.

Sam Oltmans pointed out that more experiments should be carried out in the Jülich test chamber before one recommends to change any of the existing procedures, such as the concentration of the cathode solution.

### *Question from Gerry Murphy*

How accurately do we have to measure the background current?

### *Reply from the "experts"*

One needs a good meter that can measure down to 0.01 μA.

# Session 2.  Conversion of raw data into geophysical data

Geir Braathen gave an introduction to the conversion of raw data into geophysical data with emphasis on the Vaisala systems. There are several ground based systems as well as software packages around for the registration of ozonesonde data and for the conversion of raw data (i.e. ozone cell current) into geophysical data (e.g. ozone partial pressure). Three main systems are used among the NDSC stations:

- The system based on the TMAX interface card.
- The Vaisala system with the old "ozone" software.
- The Vaisala system with the new Metgraph software.

It will be impossible to provide every station with just one program for conversion of raw data. We must therefore make sure that we use the same algorithms for the calculation of ozone from the cell current. The following items must be considered when one compares algorithms:

- Radiation and ventilation correction of temperature data.
- Pump efficiency correction table. There are several tables "on the market".
- Correction of background current for currents caused by oxidants other than ozone. Some use a height dependent correction, others use a constant background current.
- Criteria for rejection of bad data.

The positioning of the box temperature sensor is also important. There will be more about that problem later in the document.

Geir Braathen then went on to describe a conversion program developed at NILU in conjunction with the EASOE campaign in 1991-92.

Vaisala's "ozone" program from 1988 lacked certain features, such as wind and radiation/ventilation correction of the temperature. This, together with the need for routines to produce data in the NASA Ames format, led to the development of a fortran program for conversion of the so-called o-file into a NASA Ames formatted file with geophysical entities. This program has now evolved into version 6 and is called convert 6.0. This most recent version produces NASA Ames files in the same format as the "nasaconv" program developed at FMI for conversion of Metgraph data into NASA Ames. Convert 6.0 is available from NILU via anonymous ftp. There will be version for both DOS and Unix. A manual for the use of this program was handed out at the meeting. This document is also available via ftp. The address is: ftp.nilu.no:/pub/NILU/geir/convert. There are subdirectories for source code, binaries and documentation.

The session continued with Bojan Bojkov presenting some of the problems experienced at NILU with the Metgraph system. These include:

- Frequent "freezing" of the software and overall system crashes.
- Termination of ozone measurements in flight for no apparent reason.
- Ambiguous handling of the data within the "Special Data Handler".

Suggested solutions to these problems can be found in the copies of the overheads. Bojan Bojkov then showed problems with the box temperature experienced at the Ørland station in Norway. In some of the measurements the box temperature suddenly drops to -10˚C and then after a while shoots back to normal values. It was not clear whether this was caused by software bugs or interface card problems. Investigation of the raw data files after the meeting was over show that the problem most likely is caused by a malfunction in the interface card.

# Session 3. Quality control of sonde data

Esko Kyrö opened the session by presenting the quality control work carried out in the EU projects OSDOC and THESEO-O$_3$LOSS. In Sept. 1996 an intercomparison of algorithms was carried out. FMI sent out a few raw data files that each station in the OSDOC network should convert into geophysical data. The differences between the stations were very small, so this shows the value of a homogeneous network using approx. the same software for data conversion.

An E-mail was sent to all the stations in December 1996 in order to harmonise the ground procedures.

Esko Kyrö then presented results from the quality control of the sonde data. There is near real-time quality control during the campaigns and post campaign QC. There are two checks that have been carried out:

- The total ozone calculated from the sonde is compared to TOMS total ozone.
- The ozone mixing ratio at 550 K (approx. 23 km) for soundings where the PV is within certain limits is plotted in a scatter plot vs. time. This kind of plot makes it easy to spot outliers.

The graphs are included in the copies of the overheads.

FMI has carried out sonde flights with two temperature sensors inside the styrofoam box; one sensor glued to the pump and one connected to the air inlet tube close to the cell. Typically there are differences of 8-10 K between the two positions. This will amount to an approx. 3% error in ozone.

There was then some discussion on what method one should use to calculate total ozone from the sonde data. One method is to use climatological data based on satellite observation for the part above the burst altitude. This is, however, not possible for soundings carried out in the polar night. The other method is to assume that the ozone mixing ratio is constant from the burst altitude (which has to be at 20hPa or higher up) to the top of the atmosphere. There is no reason to say that one method is better than the other, so it must be the choice of the investigator to decide which method is most suitable depending on the purpose of the study and the time and location of the observation. For real time quality checks it should be OK to use data from the sondes only, but for scientific studies using sonde data, the investigator can always calculate total ozone with the method he/she believes is the best.

The session went on with Fiona O'Connor showing an intercomparison of profiles obtained from two nearby stations; namely Aberystwyth (Wales) and Valentia (Ireland). Concurrent flights have been carried out at the two stations. The Aberystwyth sondes also measured $T_{box}$ at two locations (pump and inlet tube). For some of the flights the two stations both used sondes from SPC, whereas for other flights Aberystwyth used ENSCI sondes. The conclusions from this study are:

- Placing the Tbox thermistor at the inlet tube rather than at/in the pump results in an underestimation at nearly all heights of the order of 1-4%.
- No significant discrepancy is observed between Aberystwyth and Valentia when both stations use SPC sondes
- No bias was introduced between Aberystwyth and Valentia when Aberystwyth used ENSCI sondes.

# Session 4.    Data file format

The session was opened by the chairman (Rumen Bojkov) giving an introduction to the importance of common and readable data formats. The first speaker, Bojan

Bojkov, then gave an overview of the various formats in use. Four main NASA Ames formats have been in use since 1988. There are also numerous sub-formats. This has led to complaints from investigators using the data. A single format will make life easier both for end users and for the data centre in conjunction with e.g. real-time quality control. A common format also facilitates the distribution of data.

Jonathan Davies continued the session by presenting the ExtCSV format used by the WOUDC. Also this format has evolved over the years.

After Davies' presentation there was a discussion on what format to use in the network. There was agreement on using the NASA Ames 2160 format as specified by FMI. It is important that variables should be in fixed columns, so that ozone, for example, always is column no. 7. In case of new developments new auxiliary variables should be appended after the existing ones.

Bojan Bojkov and Jonathan Davies will collaborate on developing a routine for conversion of NASA Ames files into ExtCSV.

# Session 5.  Regional WMO centre for Europe

Bojan Bojkov gave an introduction to the background for this initiative. Since the late 1980's many new ozonesonde stations have been put into operation. The creation of the data centre at NILU might have impeded the submission of sonde data to WOUDC in Toronto from some of these new stations. In order to amend this WMO has contacted NILU and asked if NILU is willing to host a European ozonesonde data collection centre that will make sure that the data are passed on to WOUDC. NILU has replied positively to WMO, but we need an agreement with each station PI. A letter from NILU's director was sent out to all the European PIs earlier this year, and those who have replied have all been positive. NILU is now waiting for formal replies from the remaining stations.

During the discussion after Bojkov's presentation there were no objections to the idea of the collection centre at NILU. There was some discussion about the time delay that would be allowed between the measurement and the submission to WOUDC. Jonathan Davies informed that WOUDC can hold data back for a time period as specified by the PI if this is wanted. The conclusion was that the PIs send formal replies back to NILU indicating what they would consider a desirable time lag between measurement and publication on the WOUDC database.

# Session 6.  Provision of sonde data in real time to the GTS

The session was opened by Bojan Bojkov giving an introduction to this topic. Supplementary information was provided by Rumen Bojkov and Marc Allaart.

ECMWF wants ozone data in order to produce a better meteorological analysis. Their primary data source will be satellite total ozone data. However, some height resolved data will be necessary to make sure that the vertical distribution of ozone will not be too far from the truth. For this they want to use ozonesonde data. ECMWF will need the sonde data within 3 hours of the termination of the sounding. Routines will be set up at NILU to ensure that the data are passed on to ECMWF after quality control. NILU will submit the data in NASA Ames format and ECMWF will take the trouble to convert this to their own format. To begin with this will be an experiment and the data will remain inside ECMWF.

Jonathan Davies gave a presentation on the Canadian experience on submitting sonde data to the GTS.

During the discussion after the presentations there seemed to be a general consensus on this data submission. Sam Oltmans suggested that someone from ECMWF should present to the ozonesonde community why they need real time ozonesonde data. This could be done at the Ozone Symposium, for example. There was also a general feeling that it would be nice to get some feedback from ECMWF after some time in order to get information on how useful this is for ECMWF.

# Session 7.  Presentation by Vaisala

Eero Puhakka presented new developments from Vaisala. He handed out various brochures and the overheads he showed are included in the binder with the overhead copies.

# Session 8.  Intercomparison between ozonesondes and other NDSC instruments

Due to time constraints this will have to wait until the next version of the minutes.

# Session 9.  Ozonesonde intercomparisons and differences between sondes

The session was opened by René Stübi giving a description of parallel Brewer Mast and ECC flights from Payerne. The question in Payerne is whether they should change from BM to ECC. The positive arguments are:

- What will the quality of the BM sondes be in the future as the use and production volume is declining?
- ECC has easier pre-flight preparation
- The ECC performs better

The arguments against a change are:

- Break in time series
- There is no unified SOP for the ECC type of sonde
- There is a need for more intercomparisons between BM and ECC.

Stübi showed results from two intercomparisons, the SONDEX 96 and the OZEX 98.

The BM sonde does not measure the temperature in the box. In Payerne they assume that Tbox = 280 K, and in Hohenpeißenberg they assume that Tbox = 300 K.

It is well known that the BM underestimates ozone at the top of the profile, and Hans Claude showed an intercomparison with SAGE where BM gives 20% less ozone around 30 km.

In summary the Payerne investigators:

- See need for an SOP for the ECC sonde
- Want to gain experience with the ECC sonde
- Want to review BM - ECC intercomparisons

The session continued by Herman Smit giving a comprehensive and very well presented description of the JOSIE-96 intercomparison. (JOSIE = Jülich Ozonesonde Intercomparison Experiment). The reader is referred to the large number of overheads that can be found in the binder with the overhead copies. The report from JOSIE-96 has been sent to WMO for printing as a WMO report. After the JOSIE-96 experiment KFA has been nominated by WMO to host the World Calibration Centre for Ozonesondes (WCFOS). This centre will have three main tasks:

- QA of manufacturers
- QA of users (i.e. us, the ozonesonde PIs)
- QA of SOPs

The JOSIE intercomparison involved several types of ozone sensors. Conclusions from the intercomparison are:

- The ECC sondes show more consistent results ($\pm 5\%$) compared to non-ECC sondes ($\pm 15\%$).
- The response time (1/e time) of the ozonesondes is approx. 25 s.
- Sondes that were individually corrected for pump efficiency gave too much ozone at the top of the profile.
- Those who use the 1986 table get good results.
- One should not use $O_2$ dependent background correction.

Dirk De Muer presented results from dual BM-ECC flights from Uccle. He has obtained new BM pump corrections that depend on both T and p. The new correction method gives much better agreement between BM and ZECC. Herman Smit suggested that one could use a pump correction that depends on density, since density depends both on T and p. Smit also asked the somewhat philosophical question: "Why do we have to correct for pump efficiency? What is the physical foundation

for this?" We should try to understand the physics behind the various corrections rather than just applying them because they give good results.

# Session 10.   Conclusions

On the last day the participants went through all the topics and wrapped up the discussions that had taken place. The agreements reached during this long, yet constructive, discussion are given below sorted by session.

## Session 1: Pre-flight preparation

### Cathode solution

Cathode solution concentration and pump efficiency correction factors are intimately linked. There is a need for more test (lab. and field) before we can recommend changes.

*Advice:*
- Use 1% KI and previously prescribed amounts of buffer. This applies to both ZECC (ENSCI) and ECC-6A (SPC).
- Use the STOIC pump corrections from 1986.
- Use 3.0 cm$^3$ of cathode solution.
- Use accurate balance for the 1.25 g of $NaH_2PO_4 \cdot H_2O$
- New solution should be made every 3 months. Store in a cool and dark place. Don't let the bottle hang around on the lab. bench for hours. Check $I_B$ to make sure that the solution is OK.
- Use distilled water for the solutions.

### Flow rate

The flow rate depends on the humidity and temperature of the lab air. ENSCI suggests using humidified air for more accurate flow rate. SPC says: Record the temperature, pressure and relative humidity of the room for later correction.

*Advice:*
- Measure flow rate as normal from filtered air source. Report in the header file RH, T, P in the lab.

### Background current

Background current must be low for a sonde to be launched.

*Advice:*
- Don't launch if IB > 0.12 μA. Report in the file header $I_B$ before exposure to high ozone and just before sonde is taken out for launch.

### Evaporation of solution

Evaporation of cathode solution should be avoided, not so much because of change in KI but because of changes in the buffer concentration.

*Advice:*
- Don't let the sonde run for too long, and don't let the sonde sit around for hours after it has been filled with solution.

### SOP

The two ECC manufacturers have somewhat different OPs. There is a need for a unified SOP. Esko Kyrö made an SOP for OSDOC that was sent out by E-mail in Dec. 1996. This mail can be found in the copies of the overheads.

*Advice:*
- Esko Kyrö and Herman Smit find out if there is an immediate need for a unified SOP. In the long term WCFOS will develop an ozonesonde SOP. It was also recommended by Bojan Bojkov that the SOP could include small tests during those times that now are idle in order to check sonde performance.

### Background current correction

Results from flights and chamber experiments show that the background current is constant with altitude.

*Advice:*
- Use constant background for whole profile. Use the small background current that is measured before the sonde is exposed to high ozone.
- Use good amperemeter with $0.01\,\mu A$ resolution.

### Where to place box temperature sensor?

There was some discussion on where to put the sensors. For reasons of continuity one could argue that it should be placed near inlet tube, as before. However, as pointed out by Sam Oltmans, there is only one right place to measure the temperature, and that is in the pump!

*Advice:*
- Put temperature sensor into the hole in the pump. On the ZECC this hole is placed just above the pump motor and enters the pump from behind.
- Before launch, measure the temperature both in pump and inlet and record these in file header. The new ozonesonde data file format will accommodate both these measurements.

### Comparison between ECC-6A and ZECC

Concurrent flights from Aberystwyth and Valentia with the two types of sonde show no systematic difference.

*Advice:*
- No reason to prefer one brand over the other.

## Session 2: Conversion of raw data

### Conversion software

There are many kinds of ground equipment and hence many different raw data formats. There are also several software packages for calculation of ozone from raw data.

*Advice:*
- Stations with Vaisala "ozone" software use "convert 6.0" from NILU to process the data. Wait for upgrade of 6.0 to 6.1 after new format has been determined.
- Stations with Vaisala Metgraph software use "nasaconv" from FMI.

### Algorithm intercomparison

The question that was raised was: Should we carry out an algorithm intercomparison for the whole network? The conclusion was that it would be worth while to do this for the TMAX stations. The Vaisala equipped stations have already gone through the exercise.

*Advice:*
- Geraint Vaughan and Terry Deshler find a way to carry out such an intercomparison

## Session 3: Q.C. of sonde data

The various stations use different QC routines depending on the use of the data. There is a need for a common total ozone algorithm for quality control purposes. It is also necessary to check not only ozone but also other parameters, such as box temp.

*Advice:*
- Groups with experience in QC collaborate on arriving at a common set of basic tests that each station should carry out.
- Agree on a common total ozone algorithm based on the ozonesonde profile only.
- All stations should check the box temperature of their soundings.

## Session 4: Data format

There are many formats in use. The discussions during the meeting led to agreement that we still use the NASA Ames 2160 format for data exchange.

*Advice:*
- Adopt Esko Kyrö's 2160 format. The existing format will be expanded a bit as a result of this meeting. A new format will be available in Sept. 1998.

## Session 5: Regional ozonesonde collection centre for Europe

Letter was sent out by NILU's director to all the stations in Europe. All replies so far are positive. Data will not be sent to Toronto until a reply from the PI has been received.

***Advice:*** • Please reply to letter from NILU as soon as possible.

## Session 6: Transfer of data to ECMWF

ECMWF wants data within 3 hours after termination of sounding. NILU will carry out automated basic QC.

***Advice:*** • Do your best to send data as soon as possible, and preferably within an hour after end of sounding.

## Session 9: Ozonesonde intercomparisons

### Background current correction

JOSIE-96 shows that $I_B$ is constant.

***Advice:*** • Use constant $I_B$ in the ozone calculations.

### Pump efficiency correction

JOSIE-96 shows that individual pump corrections give too high ozone at top of profile. 1986 table gives good results.

***Advice:*** • Use 1986 table (same as Vaisala 1988 table).

### Sampling interval

What sampling frequency do we need in our data files? Sam Oltmans pointed out that for geophysical purposes a resolution of 10s is good enough. For QC it might be useful to have a 1s resolution, since one then can study the nature of spikes etc.

***Advice:*** • For reporting of data to databases: 10s sampling is OK.
• Warning from Esko Kyrö to those who use or used Microcora and PP-12. There is a 6 cycles shift between PTU and ozone data.

# Program/Agenda

**Venue: Alfred Wegener Institute, Telegrafenberg, Potsdam**

**Start of meeting: Monday 29 June 1998 at 14.00 (Sightseeing at 11.00, Lunch at 12.00)**

**End of meeting: Wednesday 1 July 1998 at 14.00**

The formal program of the meeting will start at 14.00 on Monday, but you can join in for the sightseeing by showing up at 11.00 and for lunch by showing up at AWI before 12 noon. There will also be a sightseeing round on Tuesday for those who miss the Monday round.

# Monday 29 June

| | | |
|---|---|---|
| 11:00 | **Sightseeing around the Telegrafenberg** | **Ralph Lehmann** |
| 12:00 | **Lunch** | |
| 14:00 | **Welcome and practical info** | **Peter von der Gathen** |
| 14:15 | **Background for and purpose of meeting** | **Geir Braathen** |

## Session 1: Pre-flight preparation practices

*Chair: Andrew Matthews*

| | | |
|---|---|---|
| 14:30 | **Introduction to pre-flight preparation practices** | **Bryan Johnson** |
| 15:00 | **Discussion about pre-flight preparation practices** | **All** |
| 15:45 | **Coffee break** | |

## Session 2: Conversion of raw data into geophysical data

*Chair: Sam Oltmans*

| | | |
|---|---|---|
| 16:15 | **Introduction to conversion of raw data** | **Geir Braathen** |
| 16:30 | **Description of convert 4.4** | **Geir Braathen** |
| 16:45 | **Description of Metgraph and specific problems** | **Bojan Bojkov** |
| 17:00 | **Description of FMI's conversion program using Metgraph S and Z files** | **Esko Kyrö** |
| 17:15 | **Questions and discussion on conversion of raw data** | **All** |

## Poster session 1: Technical aspects of ozonesonde measurements

| | |
|---|---|
| 17:45 | **Start of poster session** |
| 18:30 | **Reception hosted by AWI** |
| 19:30 | **Adjourn** |

# Tuesday 30 June

## Session 3: Quality control of sonde data

*Chair: Geraint Vaughan*

| | | |
|---|---|---|
| 9:30 | **Quality control in OSDOC and THESEO-O$_3$LOSS** | **Esko Kyrö** |
| 9:50 | **Comparison of profiles from different stations** | **Fiona O'Connor** |
| 10:05 | **Questions and discussion** | **All** |

## Session 4: Data file format

*Chair: Rumen Bojkov*

| | | |
|---|---|---|
| 10:20 | **Why do we need one format?** | **Bojan Bojkov** |
| 10:30 | **What is wrong with NASA Ames and why should we still stick to it?** | **Esko Kyrö** |
| 10:50 | **The WOUDC Extcsv format** | **Jonathan Davies** |
| 11:00 | **Questions and discussion on data format** | **All** |
| 11:30 | **Coffee break** | |

## Session 5: Regional WMO centre for Europe

*Chair: Geir Braathen*

NILU has been contacted by WMO and asked to take on the task to host a regional ozonesonde data centre for Europe.

| | | |
|---|---|---|
| 12:00 | **Background and introduction** | **Bojan Bojkov** |
| 12:30 | **Discussion on formal and practical issues** | **All** |
| 13:00 | **Lunch** | |

## Session 6: Provision of sonde data in real time to the GTS

*Chair: Peter von der Gathen*

The background is that ECMWF wants to include ozonesonde data in their weather prediction model. How can this be accomplished in practice?

| | | |
|---|---|---|
| 14:00 | **Background and introduction** | **Bojan Bojkov** |
| 14:15 | **The Canadian experience with transmission of ozonesonde data to the GTS** | **Jonathan Davies** |
| 14:40 | **Discussion on how to implement this in practice** | **All** |

# Tuesday 30 June cont.

## Session 7: Presentation by Vaisala

**15:00**     **Presentation of Vaisala's newest software for ozone sounding and raw data storage. Information on the ECC-6A ozone sensor**                         **Eero Puhakka**

**15:25**     **Coffee break**

## Poster session 2: Scientific use of ozonesonde data

There should be enough space so that the posters from session 1 still can be on display.

**15:40**     **Start of poster session**

**17:00**     **End of poster session and adjourn**

**17:15**     **Sightseeing around the Telegrafenberg**                  **Ralph Lehmann**

**20:00**     **Dinner in Potsdam**

# Wednesday 1 July

## Session 8: Intercomparison between ozonesondes and other NDSC instruments

*Chair: Herman Smit*

| | | |
|---|---|---|
| 9:30 | **Overview of intercomparisons** | **Samuel Oltmans** |
| 9:45 | **Intercomparison between ozonesondes, lidar and other instruments at Lauder, New Zealand** | **Andrew Matthews** |
| 10:00 | **Ny-Ålesund Aerosol and Ozone Measurements Intercomparison** | **Roland Neuber** |
| 10:15 | **Some preliminary results from the intercomparison at OHP in July 1997** | **Geir Braathen** |
| 10:30 | **Trend analysis from ozonesondes and umkehr measurements from Switzerland** | **Andrea Weiss** |
| 10:45 | **Questions and discussions** | **All** |

## Session 9: Ozonesonde intercomparisons and differences between sondes

*Chair: Dirk De Muer*

| | | |
|---|---|---|
| 11:15 | **Results from the JOSIE intercomparison at Jülich** | **Herman Smit** |
| 12:00 | **Coffee break** | |
| 12:30 | **Parallel BM and ECC flights from Payerne** | **René Stübi** |
| 12:40 | **Algorithm intercomparison and intercomparison of HALOE and sonde data at high latitudes** | **Esko Kyrö** |
| 12:55 | **Box and pump temperatures and differences between Science Pump and EnSci sondes** | **Fiona O'Connor** |
| 13:10 | **Discussion of what has to be done in order to minimize the differences between the various sondes in use** | **All** |

## Conclusions

| | | |
|---|---|---|
| 13:35 | **Summary of meeting** | **Geir Braathen** |
| 13:55 | **Concluding remarks** | **Peter von der Gathen** |
| 14:00 | **Close** | |