Ozonesonde product development

Greg

Presented at 5th GRUAN Implementation and Coordination meeting, De Bilt, The Netherlands, 26 February 2013

The plan of action

- As discussed yesterday the GRUAN ozonesonde data product document will follow the structure of the GRUAN Guide to Operations much along the lines of the lidar document.
- Rather the constituting a new task team, we propose that the development of this documentation occurs under the auspices of the 'sondes' task team.
- Close cooperation with the NDACC ozonesonde working group (Rene Stubi and Bryan Johnson) and with WMO/GAW (Herman Smit) will be required. We are not the experts.
- The document will build on extensive existing documentation (e.g. *Quality Assurance and Quality Control for Ozonesonde Measurements in GAW* – GAW report no. 201). Added value will come in the form of developing methods to assess, quantify and verify uncertainties on measurements.

Key operational issues to address

Management of change is essential since every profile measurement uses a new instrument.

- Treatment of background current.
- Effects of different sensing solutions.
- Measuring pump flow rate.
- Estimating degradation in pump efficiency.
- Measuring pump temperature.
- Determining the partial ozone column above the top of flight.
- Contribution of radiosonde to net error.
- Drift correction.
- Effects of stoichiometry on response times.
- Reprocessing highly likely → thorough metadata collection.
- Different sondes → BM, ECC and CI.

Ozonesonde measurement scheduling

Three communities to consider.

- Long-term trend detection → pick up on the expertise developed in the SPARC/IGACO/IO_3C/NDACC initiative. The number of years of measurements required to detect a trend at the 95% confidence level with a probability of 0.9 can be approximated by (Whiteman et al., 2011):

Function of sampling and error on each measurement

$$n^* = \left[\frac{3.3\sigma_N}{|\omega_0|} \sqrt{\frac{1+\phi_N}{1-\phi_N}} \right]^{2/3}$$

Either assume that this is the same as for total column ozone, CTM output, or from renalyses.

Trend from CCMs

- Process studies → particular emphasis on UTLS processes and effects of ozone change on climate.
- Satellite calibration and validation → focus on ozone SASBE.