Thoughts on the laboratory measurements related to ACSO (2013)

1.Spectroscopic data should be checked if some problems in retrievals happen, but not «manipulated» (wavelength shifts). All instrument function should be documented and reported.

2. Recommendation (or stupid question): Need to take care of wavelength dependence of molecular transitions in lab work and atmospheric retrieval. Is this consistently applied over different spectral regions (UV/VIS MIR/IR)? Use of a fixed wl scale might lead to artificial shifts. As an example: The increase of pressure from 0 to 1 atm is 0.1 nm (difference between vacuum and air wavelength).

3. Laboratory data should have uncertainties that *match* users' requirements (e.g. systematic and statistical errors, correlations?). Clear uncertainties budgets should be documented in details and provided to users. On the other hand, users have to respect limits that are imposed by measurement techniques and should use the uncertainty provided with the laboratory data.

4. Clear statement of the users needs should be made (even in an official document) specifying spectral regions, line shapes, resolution, temperatures.

5. Reference single wavelengths («standards») should be selected to provide reliable broadband scaling.

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6. Experimental conditions and data analysis should be reported in detail (e.g. cut wavelengths, regions recorded simultaneously).

7. The temperature dependence of the cross-sections (and its parameterization) need special attention (Huggins and Chappuis bands).

8. New measurements are ongoing or in preparation (depending on funding & user request) so new data will need assessments:

- Reims: 5 -10 μm (mostly around 5 μm), $^{668}O_3$ absolute intensity before the end 2013; long term – UV FTS;
- Paris: 253 nm absolute at 293K, to be published before the end this year; 10 μm (complementary study on $^{688}O_3$); high resolution around 10 μm (QCL) – long term (fund available); tunable UV source – long term; temperature dependence in Huggins (single wavelengths) – very long term; Chappuis (632 nm): absolute/simultaneous with UV at 253 nm.
- Bremen: 350 – 420 nm and 900 – 1100 nm, all T, absolute x-sections; long term - thermal IR (with FTS) all T.
- Sèvres: absolute x-sections at 3 wavelengths in UV (publication is expected by the end of 2013);
- Munich (DLR): ???? Input from J.Orphal

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9. Some important results are not yet published, which can be a problem e.g. for recommendations.
    - Phase I: end of 2013 – first recommendations and outlook for future investigations and improvement in close collaboration between „users“ and „spectroscopists “ as discussed above
    - Phase II: long-term measurements and publications
10. Current recommendations:
    - A recommendation cannot be done from purely «spectroscopic» point of view;
    - Based on more recent labwork, Hearn’s value (which is used as reference for the BP and Bogumil data) is somewhat high;
    - From the absorption in the Hartley band there is no reason to prefer BP to other data;
    - Datasets with better documentation (also on uncertainties) might have higher priority .
11. Recent measurements seem to go towards better agreement in some regions, e.g. Hartley band.