

Interactive comment on “The Network for the Detection of Atmospheric Composition Change (NDACC): History, status and perspectives” by Martine De Mazière et al.

Anonymous Referee #1

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This manuscript presents a very valuable overview of the NDACC measurement Network, its history, structure, mission, and achievements. It is mostly well written, however in parts the content could be somewhat more logically organized and sometimes more factual. I found the information provided sometimes also confusing to what extent scientific results were really attributable to NDACC measurements and where not (e.g., Figure 11). I hence recommend publication after minor (although extended) revisions as detailed below.

Two more general criticisms that I have is that the authors should provide more detailed information on the kind of measurements that belong to NDACC and how they are

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distinct from e.g. the WOUDC data archive, AGAGE, HATS, or other globally organised networks from NOAA. This information would be important to provide already in the abstract and introduction to put the network's measurements into better context with what else is going on. A better integration of all the NDACC-related activities in the diagrams and figures presented would thereby also be helpful. Secondly, since the papers main purpose is arguably not to provide new science but to be informative (namely on the background of NDACC) the paper would be more educational (and valuable) to the reader if it better referred to science papers that underpin the historical and scientific arguments presented.

Minor comments

Abstract The mission of NDACC does not become clear to me when reading the abstract. Is it mainly based on instruments and measurements that measure primarily stratospheric composition, or is it also focused on tropospheric composition? It may be good to list the different instruments (FTIR, lidar, ozonesondes, DOAS, Brewers, Dobsons. . .) that are actually part of NDACC (maybe in L28) so that the reader (if interested in a particular one of these) is informed right away.

Introduction Although the history of air quality research is being mentioned in the introduction, it remains unclear if any NDACC related measurements are contributing to studying this issue. I would state somewhere more explicit whether NDACC measurements concentrate primarily on the composition of the middle atmosphere (or not if a contribution to air quality observations is made).

P2L10 '...like carbon dioxide, methane...' do you refer to ground-based in-situ measurements here?

P2L16 A reference to Molina and Rowland, 1974 is here also needed.

Molina, M. J., and F. S. Rowland, Stratospheric sink for chlorofluoromethanes: Chlorine atom catalyzed destruction of ozone, *Nature*, 249, 820–812, 1974.

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P2L17/19/22/23 More references are needed after all these statements. This overview paper otherwise misses a chance to improve its educational value.

P2L29 Please provide reference to this report or where it can be found.

P3L24 Add reference.

P3L27 Add 'US' after 'Colorado'

P4 L9 Please introduce when the name change came along, the mentioning of NDACC for the first time in the introduction is otherwise too abrupt.

P7L2 Wording is unclear. Are there other measurements not included in this figure that also belong to NDACC, or are all measurements included shown?

Figure 2 Do you show here affiliated stations only? It would be good to have the candidate stations included as well. I ask because I wonder whether there is really no candidate station in India? I also thought that there I one or even two NDACC stations in Africa (Kenia and South Africa)? If true, an update of this figure would be needed.

P9L2-4 Please rephrase sentence, I don't quite understand what you are driving at here...

P9L10-17 This mission statement of NDACC would seem more logical and appropriate at the very beginning of Section 2, or even already in the introduction.

Figure 3 Caption, why is the figure only similar, not equivalent to that in Figure 2? Also, I assume that theme and working groups are likely to overlap and it would be nice to reflect this in this diagram.

P11L1 This information sounds incomplete. Why do you only show three of the existing theme groups? It would be more valuable to provide the most up-to-date information even though this may mean that figure 3 would have to be updated.

P13L1 and elsewhere It is confusing to sometimes use NDACC only (even in title!) but

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then in other places NDSC/NDACC. I would suggest to either always use one or the other throughout the paper, after where NDACC replaced the NDSC name.

P13L11 GOZCARDS should be listed in the list with SAGE/OSIRIS, SWOOSH, and ESA-CCI, since it is composed of the same kind of satellite instruments, not just after SBUV-MOD.

P13L13 It seems inappropriate to highlight the ground-based data here as being ‘high-quality’, since it implies the satellite measurements would not be high-quality. Please remove.

P13L13 It is confusing to include ozonesondes first, but then right away exclude them again, since they are not in the figure. Simply describe what is in the figure!

P13L17 Title would be more meaningful with ‘Monitoring long-term atmospheric composition change’

P13L18-24 To my knowledge is it outdated to talk about the three stages of ozone recovery. If you want to stick to this, refer to the respective WMO ozone assessment in which these stages were discussed. Also, from more elaborate statistical evaluations than that presented here, it is not clear whether the second stage of ozone recovery is reached already. Please remove this statement or provide references as a proof.

Figure 5 caption ‘ESC’ is ‘effective stratospheric chlorine’, not what the authors indicate here. You may also want to add a reference to where this figure first appeared in a publication, I assume updated from WMO 2014?

P15L12/Figure 6 It’s incorrect to say that figure 6 shows the limb satellite sounders. Please rewrite or produce a new figure.

P17L10 “NDACC excels...” is this not a little bit an overstatement? It may be true for any trace gas the lidars or ozonesondes may measure, but certainly for minor trace gas species, the resolution of the ACE-FTS satellite limb sounder (approx. 1-3 km in the UTLS) is not achieved?

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P18L6 Please improve the English of this sentence.

Section heading 3.3 Suggest shortening to 'Constraining uncertainties in ozone absorption cross-sections'

Section 3.4 This section would be more appropriate/logical to move to right after (or included within) section 3.1. See suggestion of header change above.

Figure 11 Are AGAGE and HATS measurements really part of the NDACC system? If not, I would not tend to include this figure and discussion in the achievements section here. If yes, since you label it here EESC (in contrast to ESC in an earlier figure) it would be appropriate to explain to the general reader how these variables differ from each other.

Figure caption 12 I do not understand the information given in this figure caption and the main result that this figure represents. Please rework and be more specific also in the text.

P23L8 To have a reference on stratospheric water vapour changes from continuous ground-based measurements will become particularly important in the future and for future climate considerations, since past trends derived from merged limb satellite datasets have been yielding controversial results (cf. Hegglin et al., Nature Geoscience 2014).

P23L20 This definition sounds unnecessarily complicated to me, please consider rewriting.

Section 3.6 The title of this section is more complicated than necessary. Why do you say 'bounding factors', are these not direct UV measurements?

P25L23 What constituents have been evaluated in this context within CCMVal and in which papers? Please expand and provide references.

Section 4.2 I have to admit that I was somewhat lost reading the description of this

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tiered system of systems concept by Thorne et al (2017). I assume a score of 1 is the worst mark, a score of 6 the best mark achievable? What are the requirements to achieve the label of a global reference network?

P28L14 What was the reasoning for using HDF? Wouldn't it have been easier for the community to use NetCDF as common format as mostly used in the climate modeling and Obs4MIP as well?

P30L16 suggest to add 'for validation', or did you refer to something else here?

P31L1 In fact, the lack of plans to fly limb satellite sounders operationally highlights the urgent need to maintain a strong ground-based measurement system so to be able to support the WMO in its task to assess the state of the ozone layer every 4 years as requested by the Montreal Protocol.

P31L25 Add reference to Morgenstern et al. (ACP, 2017)

Technical corrections

P4L24 Check punctuation.

P8L1 put comma after 'France'

P13L19 Missing bracket

Figure 9 caption change 'over the stations' to 'above the stations'

Figure 10 caption correct 'chorine' to 'chlorine'

Figure 12 caption correct 'Norther' to 'Northern'

Figure 14 caption remove extra space after 'Barrow'

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