Minutes of the
5th Atmospheric Composition Constellation Workshop (ACC-5)
CSA, Saint-Hubert, Quebec, Canada
30-31 March 2010

The Committee on Earth Observation Satellites (CEOS) ACC-5 was held at the Canadian Space Agency (CSA) Headquarters in Saint-Hubert, Quebec, Canada on 30-31 March 2010. The Atmospheric Composition Constellation (ACC) is one of the six virtual constellations that support the overall goals of the Group on Earth Observations (GEO) and provide prototype systems supporting the implementation of the Global Earth Observing System of Systems (GEOSS). The meeting was attended by representatives from participating CEOS agencies, related universities, and supporting organizations, including CSA, DLR, Environment Canada, Dalhousie University, ESA, EUMETSAT, Harvard University, JAXA, Météo-France, NASA, NIER, NOAA, Northrop-Grumman, SPARC, University of Alabama, University of Bremen, University of Maryland, University of Toronto, USGS, and Yonsei University. We gratefully acknowledge CSA for hosting the workshop.

The Workshop had three sections: 1) Status of ACC activities, (2) Air quality constellation, and (3) Climate Change/GCOS activities. The workshop Agenda and participant list are attached to these minutes. The presentations can be found at:
http://www.ceos.org/index.php?option=com_content&view=category&layout=blog&id=53&Itemid=94.

Workshop Highlights:

1) ACC Activities:
    a. Atmospheric Composition Data Portal: a demonstration website is ready. The goal of this project is to improve in data availability to the user community on its several aspects and provide tools for fast visualization of satellite data on atmospheric composition. This is recognized as a challenge since the optimal implementation model is not yet clear. Nevertheless, the ACC members see it as an important step towards harmonization, at the international level, on how satellite data are distributed, with a strong focus on the user needs. The ACC community is called to support the development by testing and providing feedback.
    b. Volcanic Emission from Space: the project has demonstrated its importance and has seed further initiatives. The ACC members recommended for the organization of a target workshop on this topic.
    c. NO_2 tropospheric retrieval demonstration project: completed. Developed by NOAA, this project has a focus on harmonization of datasets. The results points towards the challenge faced on recovering tropospheric NO2 from nadir measurements and on reconciling measurements from different platforms.
    d. Smoke/Aerosol forecasting system: project completed. Highlighted the limits of current techniques and shows the importance of knowledge of altitude distribution of particle concentration.

    Recommendation for acceptance of new projects: to be based on collaborative efforts, involving more than one Space Agency and to be an activity that requires the CEOS framework. Furthermore, outcome of these projects, like data-sets and documentation (e.g., ATBDs) shall be made available to the public.

    New activity: CEOS conducted a CO_2 satellite measurements gap analysis. Report is available at the CEOS webpage.

2) Air Quality Constellation:
    a. The CEOS-ACC workshop focused on Air Quality that took place in Frascati last July 2009 recommended on the formation of a "CEOS ACC Air Quality Constellation" to foster collaborations early in the development of the first-generation geostationary satellites for air quality measurements. In response, a position paper is being developed

and was presented and extensively discussed during this meeting. The ACC members are engaged in the initiative that shall focus on developing an international collaborative framework to improve the preparation for and capabilities of these missions. Several ACC members from different agencies are involved as points of contact for specific topics demonstrating the wide participation in this initiative.

Goal: to submit the position paper to the CEOS plenary in October 2010.

3) Climate change/GCOS activities:
    a. There are several important initiatives related to climate that involve atmospheric constituents from space. Some of those activities were reviewed and discussed during this meeting. The discussion focus was on possible ACC activities on climate change, the participation on the Carbon task force initiative, and the ACC response to current GCOS activities.

    Result: The ACC members seem to understand that the ACC role would be to support the provision of ECVs and necessary harmonization and/or fusion of satellite measurement products.

4) New ACC project ideas:
    a. Towards provision of harmonized datasets: O_3 profiles.
    b. Towards providing satellite data sets to support the development of numerical models: produce harmonized satellite data sets for the atmospheric chemistry-climate model inter-comparison project (ACCMIP).

The next ACC meeting will take place at Worcester College, Oxford UK 9-10th September 2010 with the main topic on Atmospheric Essential Climate Variables (ECVs).

The content of the workshop discussions is captured in the next section.

1) ACC Activities

Claus Zehner (ACC Co-Lead, ESA) welcomed new members and used the example of the "A-train" to demonstrate the benefits of targeted observations, validation, and calibration using a real constellation of Earth observing spacecraft. Previous ACC workshop topics included data gaps (New York, 2008) and Air Quality (Frascati, 2009). New activities for ACC must consider why they should occur within the CEOS framework.

Chris Lynnes (NASA) reviewed the AC Portal (ACP), a joint ACC/WGISS activity. This is a CEOS task, responding to the GEO workplan. The activity is physically based at the WDC for Remote Sensing of the Atmosphere (RSAT). The portal provides access, tools, and guidance to scientists and value-adding organizations. DLR, NASA, and DataFED are the initial partners, but other data providers and users are being sought. Questions from participants discussed the role of ACC in providing science leadership to the ACP and its potential as an arbiter of algorithms/products between science/product teams and end users? The existence of different products is confusing to potential end users. Other potential uses of the ACP to support ACC projects and collaboration with the CEOS Greenhouse Gas (GHG) Portal were addressed.

Claus Zehner (ESA) discussed the Volcanic Emission from Space project. The project has a very clear customer with the ICAO-established Volcanic Ash Advisory Centers (VAACs). Data latency is critical. In the first couple days after eruption, SO_2 and ash travel together. SO_2 is of specific interest since it can be measured by satellite. Two different projects are underway to develop injection height and plume height info. [This project has clearly demonstrated its importance as a result of the aviation impacts of the eruption of the Eyjafjallajokull volcano in the weeks since the ACC workshop.]

Brad Pierce (NOAA) presented the NO_2 demonstration project on behalf of Shobha Kondragunta (NOAA). OMI/GOME-2 harmonization was an emphasis of this activity with EPA AIRNow and the NOAA NWS as end-users for air quality forecasting applications. The biggest discrepancy between models/measurements is in the weekday to weekend comparisons, pointing to difficulties in mobile source emission inventories. A discussion ensued on why this is a CEOS task. When these initial activities were proposed (~3 years ago), they were considered to be "low-hanging fruit", i.e., ones we could realistically hope to accomplish to success stories providing impetus to further interagency collaboration.

Brad Pierce (NOAA) reviewed the Smoke/Aerosol forecasting system. The project is complete with a follow-on activity accepted through the recent GEO Call for Proposals for a demonstration during the Shanghai World Expo. A lesson learned from the project was that the reverse domain filling (RDF) technique was not well suited to forecasting column quantities, at least when there is not information to constrain initial vertical distribution.

Thomas Piekutowski (CSA) discussed the CASS mission concept. The mission is seen as a gap filler for solar occultation measurements with the potential to retrieve CO_2 profiles. As a result of recent US Congressional direction, the NASA contribution of SAGE-III to CASS is now expected to be flown on the International Space Station. Canada is conducting ongoing assessments of CASS concept through already awarded contracts. They will likely assess ISS as a platform for ACE-FTS but work has not yet begun. Within CSA, the Radarsat budget is a current focus having received an increase, but only 80% of what was needed so they are looking to find the other 20% required.

Brian Killough (CEOS SEO) made a presentation on a CO_2 atmospheric measurement gap analysis. The mission databases that provide inputs to the analysis have issues. The ESA MIM database is not complete enough to consider some parameters such as vertical distribution and is missions some mission information. The SEO has produced an updated version of database. Of the nine different sources of mission "requirements", e.g., GCOS, Eumetsat, WMO, and others, GCOS is the most restrictive. This activity may have to reconsider requirements. One conclusion from the analysis: there will be a gap in lower troposphere CO_2 measurements between OCO-2 and Ascends (assuming a 2020 launch).

Michela Hegglin (University of Toronto/SPARC) gave an overview of SPARC initiatives on data harmonization. SPARC is a WCRP project with the principal objective to help the stratospheric research

community focus on issues of particular interest to climate. Projects are accomplished using a combination of process studies, observations, and modeling activities. The CCM Validation activity involves 18 international models with a report and a JGR special issue anticipated in the near future. There are synergies between the SPARC activities and Lucien Froidevaux's NASA-funded MEaSURES project. Financial support from CEOS-member agencies is sought. Participant discussion also highlighted the potential for the ACP to support some of the evaluation activities.

Vitali Filotev (Environment Canada) discussed the need for an ozone reconciled dataset for trend analysis. The analysis follows from a request made in the Montreal Protocol. Total ozone and vertical profiles are reasonably well understood. Trends beyond SAGE-2 are an issue as merged sets are difficult to create.

2) Air Quality Constellation

Jay Al-Saadi (NASA) introduced the session and the CEOS action to prepare an Air Quality (AQ) constellation position paper by October 2010. The Geo-CAPE mission is now planned for launch no earlier than 2020, but looking at distributed options for earlier flight opportunities.

Joerg Langen (ESA) presented a status of ESA Sentinel Missions for AQ. GMES is the European contribution to GEOSS with the in situ component led by EEA and the space component by ESA. A capacity study (2003-5) considered top-down environmental themes with the conclusion that climate protocol monitoring and AQ apps could be combined in a single mission. The Camelot follow-on study (2007-9) considered mapping geophysical requirements to radiometric, spectral, spatial domains. The Sentinel-4 and Sentinel-5 combination was a management decision. For the AQ observations, the threshold is Europe and surrounding area, while the baseline is global. The Sentinel-5 Precursor (S5P) mission will address continuity of CO, CH_4 observations (from SCIAMACHY), continuity of high spatial resolution observations from OMI, and the provision of diurnal observations (1330 orbit complements Metop/EPS). S5P is approved and funded with a planned 2014 launch. The S4 concept uses existing meteorological requirements/bands in TIR, but may not be able to do chemistry retrievals. S4 is approved and funded, with Phase A competition in process. A 2018 launch is planned.

Opportunities for international collaboration were discussed. While the objectives and requirements are closed for S4 and S5P, there may be some possibility of providing input for S5. Participation in development of retrieval algorithms and OSSEs is open in principle. There is a perceived large mutual benefit in enhanced data quality and access and potential for cooperation on LEO missions because they provide observations on the partner's terrain.

Rosemary Munro (EUMETSAT), on behalf of Cathy Clerbaux (CNRS), discussed EUMETSAT Meteosat Third Generation (MTG) missions for AQ monitoring. The MTG IRS will have the capability to detect high pollution events at urban and regional scales. Its baseline effort is working toward 2 times better performance than IASI with requirements to measure tropospheric O_3 peaks during afternoon with exceedances several days per year and CO exceedances only occurring with large fires. The performance of IASI already exceeds the stated meteorological requirements. The current configuration probably won't be able to detect diurnal variation for O_3 or CO.

Shuji Kawakami (JAXA) gave an overview of Japanese geostationary satellites. The priority for future missions will be based on GEOSS societal benefit areas. For Japan, there are strong emphases on disasters, climate change, and water. Surface observations for continuous AQ monitoring are scarce and not necessarily open for access. The geostationary mission scope includes AQ, climate change, and meteorology. An imaging FTS is being considered for a next generation meteorological satellite, not for operational use. This effort is being conducted in parallel with an earlier effort that has been defining an atmospheric chemistry mission. Mission Definition Review parameters include UV-Vis and TIR sensors with a planned 2017 launch.

Jhoon Kim (Yonsei University) presented a status report of the Korean Geostationary Environment Monitoring Spectrometer (GEMS) for air quality studies. Total mass of COMS satellite is ~2500 kg

The Multi Purpose Geostationary Satellite (MP-GEOSAT) is the follow-on for meteorological observations and ocean color and will be adding an AQ payload called GEMS. The Ministry of Education, Science, and Technology (MEST) is the system integrator for MP-GEOSAT. The Korea Aerospace Research Institute (KARI) is within MEST. Plans for MP-GEOSAT are for 2 separate satellites. The mass allocation for GEMS is now 110 kg (recently doubled from initial plans). At present, there is consideration of either increasing the spatial resolution of the UV-Vis instrument or accommodating another small instrument.

Kelly Chance (Harvard University) discussed progress in defining geostationary instrument requirements. Based on activities for NASA Geocape, he is developing new capabilities to define instrument requirements from a set of measurement requirements. He presented a "scaleable strawman" UV spectrometer instrument design as an example of which tropospheric chemistry requirements drive the instrument design. HCHO determines the mirror size for this set of requirements.

Randall Martin (Dalhousie University) made a presentation on "Satellite Remote Sensing of Air Quality: Implications for a GEO Constellation." The Canada AQ Health Index is based on NO_2, O3, and PM2.5 and it would be valuable to measure these from the same platform. He is using model profiles to improve inferred surface concentration from satellite column measurements and has shown good correlations of satellite observations with surface concentrations in annual means. There is a need for higher temporal resolution observations to improve sub-monthly statistics. Observations throughout the day (e.g., from GEO) will allow exposure to be estimated. This is a big challenge; there is a need for common retrieval algorithms and inter-instrument calibration.

Vincent-Henri Peuch (Météo-France) discussed the Monitoring the Atmosphere from Geostationary Orbit for European Air Quality (MAGEAQ) mission concept which emerged from the ESA Earth Explorer 8 concept proposal submitted in late 2009. There is synergy with the S4/MTG mission. Emphasis for observations focuses on tropospheric O_3 and CO with at least 2 pieces of information in the vertical. NO_2 and PM will also be measured based on priorities that emerged from Boussens workshop. They are conducting OSSE simulations to help develop requirements.

Jay Al-Saadi closed the first day's session with a discussion of the AQ Constellation Position Paper. Key points of the discussion among workshop participants included the following issues:

- There should be a focus on international collaboration to improve the preparation for and capabilities of these missions. We should not be advocating for individual missions.
- A suggested title: "A path forward for a geostationary air quality constellation"
- The term "Gap Analysis" in the present CEOS action may not be properly descriptive as it implies continuity in long-term data records.
- The requirements are regional (i.e., will be different for different regions and therefore missions).
- The document should be addressed to the CEOS principals as a deliverable of ACC. We would like them to see what is to be lost by not coordinating a constellation.
- Regional AQ compliance depends on long range transport (LRT) because it establishes the background. There is a need to better understand and monitor the hourly process-level physics to better quantify this at both the emission and receptor regions (venting of emissions to free troposphere as initial condition for LRT, entrainment into BL at receptor region for AQ impact). NO2 is the dominant diurnally-varying relevant species.
- Tie together the source and receptor regions at common temporal frequency (hourly). The intervening regions, where LRT is taking place (oceans) may be viewed less frequently, i.e., from LEO. LEO observations will be necessary to tie the GEO observations together.
- Should a recommendation be made for instrumentation to ensure continuity of observations? There was agreement that the only way this might be expressed is that this is an opportunity to enable such continuity: work to harmonize retrievals and to use similar design tools such as OSSEs which would enable future instruments to be designed with consideration given to continuity.
- Links to climate. The document title should retain the words "Air Quality" rather than "Atmospheric Composition". We probably should not add "Climate" because to many people it

implies CO_2. We need to be clear that we are focusing on the aspects of climate that are interrelated with AQ, such as short-lived climate forcers. There should be a discussion included of co-benefits.

- Data policy and standards. This should link to existing work in CEOS WGISS and WGCV. Are new standards needed? There was concern that new missions seem to be proposing their own formats.
- Possible figures to be included in the AQ position paper
    - NO_2 weekday to weekend as illustration of need for GEO (mobile sources) Note that current surface in situ NO_2 observations are not specific to NO_2, whereas remote column observations are specific.
    - Regional model assimilation MOCAGE (V-H Peuch), from MAGEAQ proposal
    - Figures from new LRTAP report
    - Diurnal range of NO_2 column (total and troposphere) to show need for hourly temporal resolution

Beginning day 2 of the workshop, Jay Al-Saadi summarized the previous day's Geo AQ position paper discussion.

Audience

- Who is document to/from? From ACC to CEOS, or from CEOS to member organizations? Answer: from ACC to CEOS Principals

Executive summary

- Begin with embracing motivations using appropriate terms (emphasizing commonalities)
    - Services (GMES framework)
    - Science & Societal Benefits (NASA decadal survey missions)
    - Ministry of Environment leadership (Korea ME)
    - Alignment with GEO SBA's (JAXA)
- End with statement of what would be gained by pursuing this opportunity

Introduction

- Background begins with overview of Services, etc. (Need POC's)

Purpose

- LRT – emphasize hourly observations at both source and receptor regions
- Local emissions, but with context of availability for entire industrial world

Recommendations

- Suggest collaborative activities that would be productive (not as formal Working Groups)
- Emphasize international collaboration to improve preparation for, and capabilities of, these missions

Volunteer points-of-contact for additional content

- Randall Martin will be POC to provide quantitative case studies from the draft of the new HTAP report.
- Stella Melo and Randall will provide a section on the role of PCW Arctic observations in the constellation.
- Claus Zehner will coordinate section on Services and User Requirements (from the GMES experience, Heinrich Bovensmann and Vincent-Henri Peuch will also assist.)
- Doreen will be POC for inclusion of US EPA and NOAA AQ requirements
- Shuji Kawakami is the POC for describing the GEOSS SBA requirements in the JAXA mission.
- Jhoon Kim is POC for describing the Korea Ministry of Environment requirements.
- Kevin Bowman and Brad Pierce will contribute section on AQ/Climate co-benefits, drawing from recent report (NRC?) and also NOAA tradeoff study.
- Diego Loyola will contribute a section on Data Policy and Standards.

3) ACC/Climate Change Activities

Richard Eckman (ACC Co-Lead, NASA) discussed the outcomes of the CEOS Climate SBA/GCOS response meeting held in January in Arlington, Virginia. The Global Climate Observing System (GCOS)

has released an updated Implementation Plan (IP) that is currently in public review and will be released in August. CEOS responded to the previous IP by defining the space-based measurement requirements and capabilities for each action. The CEOS Climate SBA coordinator, Mitch Goldberg, with concurrence of CEOS leadership has agreed to organize a CEOS response to the updated IP. This will likely also require an update of the CEOS Progress Report to the UNFCCC SBSTA and the GCOS Satellite Supplement.

Claus Zehner (ESA) presented a report on the meeting held on February 1 in Geneva on the CEOS Advisory Group on Climate Activities. Progress is being made to establish this group and further action will be discussed at the forthcoming CEOS Strategic Implementation Team (SIT) meeting in Tokyo to be held in April.

Heinrich Bovensmann (University of Bremen) discussed recent SCIAMACHY GHG measurements. A study of column averaged CO_2 and CH_4 dry air mole fraction retrievals yielded companion publications in ACP. The CO_2 column retrievals show natural and anthropogenic patterns as well as the year-to-year increase. The CH_4 retrievals showed an unexpected spatial (or seasonal?) patterns which are being used to improve emission patterns and fluxes. The increasing trend in global mean CH_4 over the last few years is in agreement with NOAA estimates.

Takashi Moriyama (JAXA) discussed the CEOS Carbon Task Force. JAXA proposed the establishment of this activity at CEOS SIT-23 to combine related CEOS carbon-related work plan actions. An early deliverable of the task force is the CEOS GHG Portal which will soon be publicly available. The CO_2 gap analysis, discussed on day 1, also supported Task Force goals and gap analyses of other GHGs (e.g., CH_4) are being considered. A GEO Carbon Community of Practice was recently established and is interacting with the CEOS Carbon Task Force. The GEO Carbon Strategy is nearing completion and is considering space-based, ground-based, and in situ measurement strategies. Continued interactions between ACC and the Carbon Task Force were considered and will be discussed further at the forthcoming Tokyo SIT.

Diego Loyola (DLR) made a presentation on the planned French/German GHG mission concept. Launch is planned for 2014 with a 3-year lifetime. The budget will be approximately 120M Euros. The measurement focus will be on CH_4 using a DIAL methodology to infer fluxes as its technical heritage is reasonably mature. DLR will provide the instrument while CNES will provide the platform. Instrument weight will be approximately 80 kg with a 100 kg platform. "User readiness" is very high since the inverse modeling methods are already developed for current missions (e.g., SCIAMACHY, AIRS, IASI, GOSAT). There is a joint technical heritage with common studies on wind lidar projects. This would be the first active optical GHG instrument in space, fitting into the GCOS IP strategy.

Ken Jucks (NASA, by telephone) discussed the OCO-2 reflight plans. This is a virtual carbon copy of the failed OCO-1 mission with a planned launch of February 2013. There will be a focus on sinks, not just sources (which needs high precision). A small footprint is planned to maximize cloud free scenes (1x2 km). There are three grating spectrometers: O_2 A-band, CO_2 1.61 and 2.06 micron bands. The instrument lifetime is mainly limited by fuel. The spacecraft will point, rather than the instrument.

Joerg Langen (ESA) reported on Sentinel 4-5 GHG measurement capabilities. A CO_2 protocol verification mission, implying a verification of the Kyoto Protocol, is out of reach. Among the limiting factors for such a mission are random and systematic errors, uncertainties in inverse modeling, and uncertainties in the modeling of surface fluxes. It would be difficult to do a science mission within the framework of GMES, since GMES needs a demonstration in orbit of the usefulness of data before investing in a long term observational system. There is better technical ability for CH_4 measurements. S5P has O2-A and 2.3 micron band sensors, while S5 has O2-A, 1.6, and 2.3 micron band sensors.

Heinrich Bovensmann (University of Bremen) discussed the Carbonsat mission concept to globally map CO2 and CH4 from satellite using passive sensing. This will be a proposal to the ESA EE8, building on SCIAMACHY. There will be a focus on CO_2 and CH_4 local emission hotspots. There recent U.S. NRC report, "Verifying GHG Emissions: Methods to Support International Climate Agreements", notes that there are large uncertainties. Clouds and aerosols are obstacles to the measurement of global-regional fluxes. An airborne simulator is presently flying.

Thomas Piekutowski (CSA) discussed the CSA Atmospheric Processes of Climate and its Changes (APOCC) mission concepts. An RFP was issues targeting atmospheric processes relevant to climate and studies wrapped up last fall. A national review involving Environment Canada and universities will be conducted. Budget target is uncertain, so CSA will probably pursue several concepts in different budget categories. Among the concepts considered were:

1. STEP: Stratospheric-Tropospheric Exchange Processes, similar to ESA Premier concept.
2. MCAP: Mission for Climate and Air Pollution: CO_2, CH_4, NO_2, O_3, H_2CO, SO_2, BrO, aerosols, and clouds.
3. SOAR: Solar occultation similar to SCISAT ACE measuring vertical profiles of atmospheric gases and aerosols.
4. MEOS: Miniature Earth Observation Satellite
5. TICFIRE: Thin Ice Cloud in Far IR Experiment measuring cold/dry anomalies in polar region near the tropopause
6. SNOWSAT: frozen and light precipitation at high northern latitudes
7. SWIFT-DASH: Stratospheric Winds Interferometer for Transport Studies.

There will be community dialog and an international review to decide path forward. The Polar Communications and Weather (PCW) mission is in phase A and will consist of two satellites to provide near-geostationary coverage poleward of 50N (with a focus on NWP, emergency response, space weather, and atmospheric chemistry).

Brad Pierce (NOAA) presented an overview of NOAA Climate Activities. A new NOAA climate service is being established. A focus of the new service will be to combine observations from multiple platforms to support the establishment of climate data records (CDRs). The goals of the new service are to:

- Focus on anthropogenic climate change, but link anthropogenic climate change and variability to meet broad user needs.
- Provide products and services to minimize climate-related risks.
- Provide predictions and projections relevant to decision support.
- Strengthen observations, standards, and data stewardship.
- Ensure timely assessments.
- Inform policy options.
- Inform regulatory decisions and management options of others.
- Foster climate literacy and workforce development.

Claus Zehner (ESA) discussed the ESA Climate Change Initiative (CCI). There are multiple international climate programs: e.g., GCOS and GEOSS. CEOS is responding to both. Based on existing missions and gap analyses, ESA could contribute to the production of 18 essential climate variables (ECVs), but scaled back to focus initially on 11 ECVs in a 6-year program (2009-2015) at 75M Euros, of which 4 are in the atmospheric domain:

1. Cloud properties
2. Aerosol properties
3. O_3
4. GHGs (CO_2, CH_4, …)

The plan would be for ECV "feedback" loops within stages to gather, deliver, exploit, and show results with the intention to reprocess after approximately 2 years using new data sets. The first phase of 3 years duration would be by contract using a CFP process. As 1st phase proposals are in process, not much can be said at this time. The climate modeling community would also be involved (via a separate contract) for feedback purposes. In phase 1 (3-year duration), ESA would start with science requirements, but this would be principally a prototyping activity. Some ECVs, e.g., total O3, may be developed. Use GCOS documentation to identify, develop, test, and validate algorithms as necessary. Validation is an important component of the process, combining different agency efforts. Perhaps, this would lead to future ACC activities and projects.

Rosemary Munro (EUMETSAT) gave a presentation on EUMETSAT climate change programs. The agency has a mandate for operational monitoring of climate and will support the ESA CCI and follow GCOS principles. Specific needs for climate monitoring taken into account in definition process for new programs, but earlier platforms didn't have a calibration focus. The generation of climate products is addressed through archive activities (reprocessing), Satellite Application Facility (SAF) on climate monitoring, and other SAFs, e.g., sea ice, climate maps, and total O_3. EUMETSAT contributes to the WMO Global Space-Based Intercalibration System (GSICS). Geostationary satellites were not included in the past, but current intercalibration activities use IASI instrument on Metop. EUMETSAT also contributes to the WMO SCOPE-CM (global climate products) effort, and to GEO and CEOS. EUGENE, an FP7 activity, is a consolidated European response to GEO and includes modeling, in-situ, and satellite foci.

Following the presentations, there was a discussion on possible ACC activities on climate change and the ACC response to current GCOS activities. Claus Zehner proposed that we constrain our definition of the ACC response to all 24 space-based ECVs. The issues addressed included:

- How should ACC interact with Carbon Task Force?
    - Grassroots activities could include developing an aerosol "constellation" for detection and correction of aerosol interference in CO_2 datasets (e.g., GOSAT). Randall Martin has developed such corrections for other trace gases (e.g., NO_2 and SO_2).
    - Detection of brush fires. NESDIS already has fire detection capabilities. This may be a bit too far from atmospheric composition issues.
    - ACC could produce fusion products (e.g. AIRS, IASI) to provide additional GHG input, but this might be too broad as we're addressing the Carbon Task force, not a more general GHG activity.
    - CO2 gap analysis could be enhanced by SEO.
    - Further discussion will take place at CEOS SIT meeting in April.
- CEOS response to GCOS
    - Draft response due by mid-April for discussion at CEOS SIT meeting. There was concern that a lot of information is being sought and considerable effort from the community would be needed to complete this activity. Richard Eckman agreed to coordinate this effort with ACC and external community input.
- New ACC project ideas
    - O_3 profiles. Link new measurements to SAGE-2 data sets. Bring in NASA Langley and Goddard researchers.
    - Atmospheric chemistry-climate model intercomparison project (ACCMIP). Kevin Bowman described this activity, which provides advice to IPCC. ACC could potentially provide satellite data sets to ACCMIP in common formats. This could be a linkage to potential new AC Portal activities. There are outstanding scientific issues with comparing/fusing disparate data sets.

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Agenda

March 30	**Session on ACC Activities**	
09.00 – 09.10	Welcome/Logistics	S. Melo/CSA
09.10 – 09.20	Brief Overview on ACC Activities/Review of Membership	C. Zehner/ESA
09.20 – 09.40	The Status of the ACC Web-portal (including a demonstration)	C. Lynnes/NASA
09.40 – 10.00	Volcanic Ash Monitoring – Project Status	C. Zehner/ESA
10.00 – 10.20	Finalised Project on NO2 Retrieval – Outcome (documentation, data sets)	B. Pierce/NOAA
10.20 – 11.00	**Coffee Break**	
11.00 – 11.20	Finalised Demonstration Project on Smoke/Aerosol Forecasting – Outcome (documentation, data sets, demonstration service)	B. Pierce/NOAA
11.20 – 11.40	The future planned gap-filler Mission CASS	T. Piekutowski/CSA
11.40 – 12.00	SEO Update on the Atmospheric CO2 Gap Analysis for CEOS	B. Killough/NASA
12.00 – 12.20	SPARC Initiatives on Data Harmonization	M. Hegglin/SPARC
12.20 – 12.35	The Need for Ozone reconciled Dataset for Trend Analysis	V. Filotev/Env. Canada
12.35 – 12.45	Discussion on possible new ACC Projects	All
12.45 – 13.45	**Lunch Break**	
	Session on an Air Quality Constellation	
13.45 – 14.00	Purpose of Session and expected Outcome - Status/Scope of GEOCAPE	J. Al-Saadi/NASA
14.00 - 14.15	Status/Scope of Sentinel Missions for AQ Monitoring	J. Langen/ESA
14.15 – 14.30	EUMETSAT MTG Missions for AQ Monitoring	R. Munro/EUMETSAT
14.30 – 14.45	Status/Scope of Japanese Geostationary Satellites	S. Kawakami/JAXA
14.45 – 15.00	Status/Scope of GEMS	J. Kim/Yonsei University
15.00 - 15.15	Progress and Opportunities in defining geostationary Instrument Requirements	K. Chance/SAO
15.15 - 15.30	Satellite Remote Sensing of Air Quality: Implications for a geostationary Air Quality Constellation	R. Martin/Dalhousie Univ.
15.30 – 16.00	**Coffee Break**	
16.00 - 16.15	MAGEAQ-Monitoring of the Atmosphere from Geostationary orbit for European AQ	VH. Peuch/Meteo-France
16.15 – 16.30	Presentation/Status of the ACC Position Paper on an AQ Constellation	J. Al-Saadi/NASA
16.30 – 18.00	Comments to and Discussions on the ACC AQ	All

	Constellation Position Paper - define a clear Way forward for an AQ Constellation	
20.00	**Dinner – Montreal Centre**	
March 31	**Session on ACC/Climate Change Activities**	
09.00 – 09.10	CEOS Climate SBA/GCOS/Outcome of the CEOS Meeting in Arlington on Climate Change Activities	R. Eckman/NASA
09.10 – 09.20	Report on the CEOS Meeting Feb. 1 in Geneva on the Setting up a CEOS Advisory Group on Climate Activities	C. Zehner/ESA
09.20 – 09.40	The CEOS Carbon Task Force	T. Moriyama/JAXA
09.40 – 10.00	Results on GHGs measured by SCIAMACHY	H. Bovensmann/Univ. Bremen
10.00 – 10.20	GOSAT Mission Status/Results	T. Moriyama/JAXA
10.20 – 11.00	**Coffee Break**	
11.00 – 11.15	The planned French/German GHG Mission	D. Loyola/DLR
11.15 – 11.30	Plans for the OCO-2 Mission	K. Jucks/NASA
11.30 – 11.45	Status/Scope of Sentinel Missions for AQ Monitoring	J. Langen/ESA
11.45 – 12.00	The CarbonSat Initiative - a Mission Concept for Passive Remote Sensing of CO2 and CH4	H. Bovensmann/Univ. Bremen
12.00 – 12.15	CSA Climate Activities/The APOCC Mission	T. Piekutowski/CSA
12.15 – 12.30	Overview of NOAA Climate Activities	B. Pierce/NASA
12.30 – 12.45	Overview of the ESA Climate Change Initiative	C. Zehner/ESA
12.45 – 13.00	Overview of the EUMETSAT Climate Change Programmes	R. Munro/EUMETSAT
13.00 – 14.00	**Lunch Break**	
14.00 – 15.20	Discussion on possible ACC Activities on Climate Change/CEOS Response to GCOS	All
15.20 – 15.30	Next Meeting/Closing	All

5th Atmospheric Composition Constellation Workshop (ACC-5) - 30-31 March 2010, Montreal, Canada, CSA

Attendee List

Name	Company	Country	Email
Al-Saadi, Jassim	NASA	US	j.a.al-saadi@nasa.gov
Bergeron, Martin	CSA	CA	Martin.Bergeron@asc-csa.gc.ca
Bouchet,Veronique	Environment Canada	CA	veronique.bouchet@ec.gc.ca
Bovensmann, Heinrich	University Bremen	DE	Heinrich.Bovensmann@iup.physik.uni-bremen.de
Bowman, Kevin	NASA	US	kevin.bowman@jpl.nasa.gov
Chance, Kelly	Harvard-Smithsonian	US	kchance@cfa.harvard.edu
Eckman, Richard S.	NASA	US	richard.s.eckman@nasa.gov
Falke, Stefan	Northrop Grumman	US	stefan.falke@gmail.com
Filotev, Vitali	Environment Canada	CA	vitali.fioletov@ec.gc.ca
Flynn, Lawrence	NOAA	US	Lawrence.E.Flynn@noaa.gov
Hegglin, Michaela	University of Toronto	CA	
Hoff, Ray	UMBC	US	hoff@umbc.edu
Jones, Dylan	University Toronto	CA	dbj@atmosp.physics.utoronto.ca
Jucks, Kenneth W.	NASA	US	kenneth.w.jucks@nasa.gov
Kawakami, Shuji	JAXA	JP	kawakami.shuji@jaxa.jp
Kim, Jhoon	Yonsei University	KR	jkim2@yonsei.ac.kr
Kroupnik, Guennadi	CSA	CA	Guennadi.Kroupnik@asc-csa.gc.ca
L. DeWayne Cecil	USGS	US	ldcecil@usgs.gov
Langen, Joerg	ESA	NL	Joerg.Langen@esa.int
Loyola, Diego	German Aerospace Center (DLR)	DE	Diego.Loyola@dlr.de
Lynnes, Chris	NASA	US	
Martin, Randall	Dalhousie University	CA	randall.martin@dal.ca
Melo, Stella	CSA and Environment Canada	CA	stella.melo@asc-csa.gc.ca
Menard, Richard	Environment Canada	CA	richard.menard@ec.gc.ca
Moe, Karen	NASA	US	
Moriyama, Takashi	JAXA	JP	moriyama.takashi@jaxa.jp
Munro, Rosemary	EUMETSAT	DE	Rosemary.Munro@eumetsat.int
Neil, Doreen	NASA	US	d.neil@nasa.gov
Newchurch, Mike	UAHuntsville	US	mike@nsstc.uah.edu
Piekutowski, Thomas	CSA	CA	Thomas.Piekutowski@asc-csa.gc.ca
Pierce, Brad	NOAA	US	brad.pierce@noaa.gov
Seguin, Guy	CSA	CA	guy.seguin@asc-csa.gc.ca
Shepherd, Ted	University Toronto	CA	tgs@atmosp.physics.utoronto.ca
Song, C.K.	NIER	KR	
Vincent-Henri Peuch	Meteo France	FR	vincent-henri.peuch@meteo.fr
Wilkinson, Ronald	CSA	CA	ronald.wilkinson@asc-csa.gc.ca
Wlaker, Kaley	University of Toronto	CA	kwalker@atmosp.physics.utoronto.ca
Won, Young-In	NASA	US	
Zehner, Claus	ESA	IT	czehner@esa.int