

Report from the Second SPARC SSG Session

(Princeton, NJ, USA, September 20-23, 1994).

M. Geller who chaired the session welcomed the participants and thanked J. Mahlman to have taken in charge the organisation of the meeting.

Prof. L. Gates, new President of the JSC/WCRP, and R. Newson, WCRP Executive Director by interim until H. Grassl took his new position on October 1, informed the SSG about the evolution of the **WCRP** Programme which was discussed at the recent meeting of the JSC Officers. The programme exists to provide research coordination when necessary but is not supposed to cover all the issues. Closer cooperation and coordination with IGBP is clearly needed. The subject of anthropogenic climate change should be given more attention within WCRP. SPARC should contribute to the inventory (to be performed in the next 6 months) of WCRP contributions to anthropogenic climate change issues. Future emphasis for the whole WCRP will be put on coordination of modelling activities, climate diagnosis in modelling and documentation of climate change. The financial situation of WCRP has to be improved through new type of fundings, to provide more help for the WCRP projects. A new WCRP Newsletter will be published twice a year. The JSC considers that SPARC is developing efficiently and in the right direction. In the light of the new WCRP priorities, there should be no need for SPARC to intervene

on issues where science goes well on the national and regional scale.

Recently, two major **international assessments** relevant to SPARC were carried out - the WMO/UNEP Scientific Assessment of Ozone Depletion, 1994 and the Radiative Forcing of Climate Change, 1994 Report by WG1 of IPCC. Both stress the fact that stratospheric ozone losses cause global - mean negative radiative forcing, but its precise evaluation is dependent upon the vertical distribution of the ozone changes, particularly near the tropopause, which are difficult to estimate due to lack of reliable observations. From the discussions and the written contribution of S. Solomon, the message to the SPARC SSG was to support efforts to determine ozone trends in the Upper Troposphere/Lower Stratosphere.

SPARC Initiatives

Six initiatives had been taken at the Cambridge SSG meeting, and the chairmen of the relevant study groups presented their reports. The SSG decided to modify the mandate of some groups and to generate new ones when gaps in on-going research were obvious. Also, the need for interaction between the groups was stressed.

Stratospheric Models Intercomparison. S. Pawson and K. Kodera, co-chairmen of this initiative, presented a two-phase **GCM-Reality**

Intercomparison Project for SPARC (GRIPS).

Phase 1 is to forge initial links between the participants and to validate some aspects of the performance of tropospheric-stratospheric models. The tasks are : models documentation, GCM climatologies validation, simulation of sudden stratospheric warmings (SSW), troposphere-stratosphere connections during SSW, tropical stratosphere simulation (wind/budget, wave spectra), radiation scheme test, gravity wave drag test.

The objectives of phase 2 will be to integrate the GCMs under (as) identical (as possible) conditions in order to intercompare the models and examine the stratosphere-troposphere links. These objectives will be specified at the IUGG SPARC Workshop (Boulder, 1995) and groups able to participate in GRIPS will be identified.

Gravity wave (GW) Processes and Parameterization. The participants stressed the vital importance (as well as difficulties) of the GW parameterization on valid physical grounds. K. Hamilton summarised basic aims of the initiative and ways of advance (observations, documentation of existing evidence of high frequency motions, detailed simulations of 2D- and 3D- GW fields, and their parameterization in GCMs. A NATO ARW on GW is planned for April 1996 in Santa Fé, USA.

Composition of the SPARC OFFICE

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J. Mahlman (USA)

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J. Pyle (UK)

T. Shepherd (C)

S. Solomon (USA)

H. Tanaka (J)

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Ex-Officio members

IGBP/JGOFS : J. Priddle (UK)

IGBP/GCTE : M. Caldwell (USA)

SCOSTEP WG & : P. Simon (B)

SCOSTEP WG 5 : K Labitzke (G)

WMO/GAW : R. Bojkov (C)

SCOPE : E. De Fabo (USA)

COSPAR : J. Gille (USA)

ICTP : S. Radicella (A)

R. Vincent presented the document «Recommendation for High-Resolution Archiving of Routine Radiosonde Data» based on Allen and Vincent's results (JGR 1994). He urges national agencies to start such archiving as soon as possible (following the initial example of the Australian Bureau of Meteorology and more recently of Météo-France). Concern was stressed that the issue of the future radiosonde network itself is threatened.

Stratosphere-Troposphere Exchange (STE). The major goal of the STE initiative was specified at the previous SSG meeting : 1) to identify a measurement strategy to produce the needed understanding and the quantification of STE involving the complex interplay of lower stratosphere chemistry and dynamics; 2) to define a framework for international co-operation so that the relatively disconnected existing national and international programmes can best mount a coordinated effort to advance progress in this area.

However, after a deeply sounded discussion the SSG agreed that its previously decided action was not the most effective mode of addressing this issue. J. Mahlman presented arguments for a strategy to study STE on the basis of models, even to quantify the exchange of conservative tracers. The discussion dealt with the type of observed parameters needed (mean fields and variances of conservative quantities, high frequency vertical mixing...), the need for both data (aircraft, ground-based) and models and the development of trace gas climatology. It led to the conclusion that the existing STE Planning Committee was not properly composed to fill that duty. It was decided to disestablish it and to establish a SPARC Group of Experts (with T. Shepherd as chairman) to develop a general strategy/programme and recommendations, aimed at different agencies, to further the understanding of STE

Water Vapour Instrumentation and Climatology. A report will be prepared by the group chaired by J. Gille on the state of the measurement techniques, the present plans

for acquiring, processing and validating data, and proposed recommendations. The SSG urged that the report should be available for the next SSG meeting. It was suggested to add E. Remsberg, S. Oltmans and K. Kelly to the group. Interaction with the GEWEX/G-Vap Working Group was recommended to avoid duplication of effort. M.-L. Chanin reported on recent developments of the Raman lidar method very promising for NDSC as a water vapour profiler between 5-20 km.

Stratospheric Temperature Trends Assessment (STTA). The SSG approved V. Ramaswamy's approach to the problem : it involves bringing together different trend analyses in a common framework, trying to understand causes for discrepancies between the analyses, comparing observed and model trends and looking for causes of differences, relating the trends to changes in the atmospheric composition, planetary waves, QBO, ENSO, solar and volcanic forcings.

Reports from the STTA Group are expected at the IUGG SPARC Symposium and at the SPARC Assembly.

UV Monitoring. P. Simon reported on the WMO Meeting of Experts on UV-B Monitoring, Data Quality and Standardization of UV indices (Les Diablerets, July 1994). Coordination between different UV communities was found badly needed, and WMO will take charge of it. An ad-hoc committee was formed (J. Miller (chairman), R. McKenzie, A. Krickler, P. Simon, B. Whetherhead) to nominate the members of the UV Scientific Steering Committee (SSC) (10-12 persons) and define its mandate. This SSC will oversee the design and execution of UV-B measurements. It will cooperate with IAMAS, IO₃C, IRC, national agencies, SPARC, SCOPE, IGBP, etc. It will form 5 working groups : instruments, quality control/quality assurance, data assimilation/radiative transfer model, data centre, user community.

On the issue of UV monitoring at the top of the atmosphere, the decision taken recently by NASA to stop

flights of SSBUV beginning from 1995 was discussed. Since the latter is a key instrument for calibrating TOMS, SBUV and GOME, the SPARC co-chairs will prepare a letter to be addressed by the JSC to NASA emphasizing the acute need for an adequate calibration/validation programme involving SSBUV to ensure the accuracy of the ozone monitoring from space, and stressing the fact that the overall monitoring of climate (including trends) depends on international cooperation, and unilateral intervention needs to be discussed.

Three new SPARC Initiatives were decided in Princeton :

Reference Climatology. The requirement for a reference climatology was stressed in connection with the modelling activity. The SSG decided to set up a Study Group with the aim to produce a SPARC - reference climatology (up to the lower mesosphere), intercomparing the existing analyses, including tropical wind measurements, etc. The climatology is needed for means and standard deviations, stationary and transient eddies, wave fluxes, tropical winds.

The sources to be used are : NMC analyses including the stratosphere, GFDL climatology, Berlin FUB dataset, SSU-UKMO data, MSU data on the lower stratosphere, as well as ECMWF/Reading climatology, assimilated stratospheric data, Japanese, Australian and other contributions. The proposed chairman of that group would be W. Randel. The group to be formed has to prepare recommendations within the next year. A group meeting should be planned in 1995.

Upper Troposphere/Lower Stratosphere Chemistry (UTLS). This topic is of high priority to many problems involving ozone changes near the tropopause layer which received too little attention. D. Ehhalt made a presentation on the impact of NO_x from commercial aircraft on tropospheric ozone. He stressed the need for studies of the NO_x budget in the upper troposphere. M. Geller spoke on large efforts in the US to study aircraft-related chemistry in both the

upper troposphere and lower stratosphere. This being a subject of interest for both SPARC and IGAC, it was recommended that a SPARC/IGAC Expert Group may be formed under the chairmanship of I. Isaksen to critically examine various aspects of the problem, e.g. photolysis rates, water vapour field, ozone production rates, sources of NO_x . Within this group, SPARC is also to consider the dynamical/chemical interface, transport issues, chemistry impact on climate.

Ozone Trend. The SSG found it reasonable that SPARC should provide the continuity between the successive ozone trend assessments. J. Kaye indicated that NASA would support the idea of reanalysing ozone data if found necessary. A SPARC group (with N. Harris as chairman and J. Kaye as vice-chairman) should be formed : to critically examine the underlying research in the existing ozone trends assessment, and to look at plans for the monitoring of ozone (space-and ground-based) to see if the gaps are

filled and calibrations ensured. The group should make its recommendations at the next SSG meeting.

SPARC Interaction with Other Programmes

The need of close cooperation with the WCRP WG on Numerical Experimentation (WGNE) was mentioned in connection with the modelling SPARC Initiative, and between the H₂O Climatology SPARC Initiative and GEWEX GVap effort.

M. Caldwell reported that at the GCTE meeting in Woods Hole, USA, the GCTE/SSC was divided on the impact of elevated UV-B on terrestrial ecosystems as compared to that of elevated CO₂ and temperature. Anyhow GCTE accepted to support two projects - an agricultural pilot project as part of TIGER and a project on terrestrial ecosystems in Southern Argentina. A project on subarctic vegetation in northern Sweden also may be

added to the two existing core projects on UV-B.

E. de Fabo wrote to the SSG on the SCOPE involvement on the impact of UV-B radiation on the Arctic environment (a report will be out in spring of 1995).

As for SCOSTEP, P. Simon, M. Geller and K. Labitzke reported on the development of WG 1, 4 and 5 respectively. M. Geller informed the SSG that the President of SCOSTEP is now Prof. C. H. Liu and that STEP was extended to the end of 1997. Two new proposals as a follow-on of STEP have been received at the time of the SSG meeting : «A Meridional chain of radars and optical instruments» (G. Shepherd), and «Equatorial Atmosphere Transport and Variation International Programme - EATVIP » (S. Fukao, H. Fukunishi, Y. Iwasaka, M. Geller, M.-L. Chanin, R. Vincent, S. Pawson, K. Labitzke, K. Cole). EATVIP includes SPARC - related subprojects : ICEAR-International Centre for Equatorial Atmosphere

Future SPARC and related meetings

Future SPARC meetings :

3-7 April 1995 : EGS General Assembly : Middle Atmosphere Science : Progress in the SPARC and UARS Projects, Conveners : A. O'Neill (CGAM, Dept. of Meteorology, University of Reading, PO Box 239, Reading RG6 2AU, UK) and D. Cariolle (EERM/CNRM, 42 Av. Coriolis, 31 057 Toulouse Cédex, France).

15-20 May 1995 : «International Conference on Ozone in the Lower Stratosphere». Local Organiser : Prof. C. S. Zerefos (Lab. Atmos. Phys., Aristotle Univ. of Thessaloniki, 54006 Thessaloniki, Greece), Halkidiki, Greece.

12 July 1995 : SPARC Symposium, IUGG General Assembly, Conveners : M. -L. Chanin (CNRS/SA, BP3, 91370 Verrières Le Buisson, France) and M. Geller (ITPA/SUNY, Physics Building, B-106, Stony Brook, NY 11794-5000, USA), Boulder, CO, USA.

5-15 September 1995 : NATO ASI on «The Stratosphere and its role in the climate system» Director : G. Brasseur (NCAR, PO Box 3000, Boulder 80307, Co, USA), Québec, Canada.

1995/96 : Tentative Joint US/Japan meeting on «QBO/ENSO Variations in the Global Stratosphere/Troposphere System», Conveners : T. Matsuno (Center for Climate System Research, University of Tokyo, 4-6-1 Komaba, Meguroku, Tokyo 153, Japan) and M. Geller.

April 1996 : NATO ARW «Gravity Wave Climatology and Parameterization», Convener : Kevin Hamilton (GFDL, PO Box 308, Princeton, NJ 08542, USA), Santa Fe, NM, USA.

December 1996 : First SPARC General Assembly, Australia. Conveners : M. Geller and D. Karoly.

July 1997 : IAMAS General Assembly, SPARC Session, Uppsala, Sweden.

SPARC related meetings :

July 1995 : SPARC related Workshops, IUGG General Assembly, Boulder, CO, USA :

- **11 July** : Intercomparison of Middle Atmosphere Models, Conveners : S. Pawson (Institut für Meteorologie, Freie Universität Berlin, Carl-Henrich-Becker-Weg 6-10, 12165 Berlin, Germany).

- **13 July** : Gravity wave Sources and Parameterizations, Convenor : D. Fritts (LASP, University of Colorado, Boulder, CO 80309-0392, USA).

Research, EPIC-Equatorial Processes Including Coupling, CDME-Chemical and Dynamical Modification in Equator; the proposed time schedule is : 1996-proposals to governments to construct equatorial facilities, 1998-start of continuous measurements for 5-10 years, 2000-2002-intensive field campaigns.

Some **national programmes** were commented : H. Tanaka outlined the Japanese SPARC programmes to be carried out by the University Group and by the National Institute Group; the SPARC budget is still under study. D. Ehhalt reported on the creation in Julich (**Germany**) of the Institute for Stratospheric Chemistry (director D. McKenna). M.-L. Chanin mentioned that the French programmes on Middle Atmosphere and on tropospheric trace gases have been merged into an unique programme on atmospheric physics and chemistry.

M.-L. Chanin informed the SSG of a programme on «**Environmental Sciences for Developing Countries**» proposed at the ICTP in Trieste. It was agreed that the SSG should be kept informed of its development.

SPARC Office activities

M.-L. Chanin stressed the difficulties she is meeting to support a permanent scientific staff at the Office and asked for suggestions.

A financial support from different organisations should be facilitated by a direct action of the WCRP Executive Director. Several suggestions for candidate were made and will be studied.

Yu. Koshelkov spoke about the preparation of the Newsletter N°3: about 20 national SPARC-related programmes were described, and some more will be published in the Newsletter N°4, together with reports from this SSG and other scientific meetings. The SSG approved the format and contents of the first three Newsletters. It was suggested to publish a yearly update of the national contributions in the Newsletter, to publish a list of reports (Assessments, NASA reports) of interest to SPARC scientists, indicating how to receive them and to publish summaries of the activities of the SPARC Initiatives groups.

M.-C. Torre described the SPARC Directory, which now includes nearly 2000 names. The SPARC Office offers to make this directory available for SPARC scientists - either by e-mail or by diskette.

Future meetings

J. Kaye presented the contents of the International Conference on Ozone in the Lower Stratosphere (Halkidiki, Greece, 15-20 May 1995), with 8 topics : ozone trends; NO_y observations/interpretations; HO_x; halogen compounds;

uncertainties in chemistry/transport; aerosol observations/interpretation; laboratory measurements; radiation. According to H. Tanaka, Prof. Matsuno has obtained support for the QBO/ENSO joint US/Japan meeting planned for late 1996. The one-day IUGG SPARC symposium in Boulder will be made of a series of invited papers given by the chairmen of the SPARC Initiatives. Contribution for oral or poster presentations should be sent before 15 March to the SPARC chairmen. A SPARC session is also planned at the 1997 IAMAS meeting in Uppsala.

The SSG accepted enthusiastically the proposal of D. Karoly to hold the First SPARC General Assembly in Australia in early December 1996 (the first circular is to appear in March 1995) (D. Karoly and M. Geller co-chair the organising committee), with sessions on Stratospheric Modelling (S. Pawson and K. Kodera, conveners), GW Processes (K. Hamilton and R. Vincent), Reference Climatology (B. Randel), Climatology and Trends (Ozone - N. Harris, Temperature - V. Ramaswamy, Water Vapour - J. Gille), STE (T. Shepherd), Upper Troposphere/Lower Stratosphere Chemistry (I. Isaksen), UV-B (P. Simon).

It was decided to accept the kind invitation of K. Labitzke to hold the next **SPARC SSG meeting** in Berlin in 1995.

SPARC ACTIVITIES : STUDY GROUPS REPORTS

Stratospheric Models Intercomparison (Project GRIPS)

S. Pawson, K. Kodera - Co-Chairs

The intercomparison of GCMs which extend from the surface through the stratosphere was given the name **GRIPS** (GCM-Reality Intercomparison Project for SPARC). Participation is open to groups running GCMs with full representations of physical pro-

cesses in the troposphere and stratosphere, including the hydrological cycle and radiative transfer. All participating GCMs will then be applicable to climatic studies. A document describing the aims of GRIPS is available from the chairmen.

Discussions with several potential participants showed that resources are too scarce to launch into full intercomparisons of multi-year integrations; there are also scientific reasons for starting

at a lower level of intercomparison. So a **preliminary intercomparison** will be made using existing integrations, with emphasis on several aspects of the GCM performance directly related to their ability to capture specific circulation features and hence produce a realistic climatology. These are :

- Documentation of the participating GCMs in a common format.
- Comparison of climatologies; the identification of common problems.