

G GLOBAL
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**WORLD METEOROLOGICAL
ORGANIZATION**

**INTERGOVERNMENTAL
OCEANOGRAPHIC COMMISSION**

**SUMMARY REPORT OF THE EIGHTH SESSION OF THE

GCOS/GTOS TERRESTRIAL OBSERVATION
PANEL FOR CLIMATE**

(Ispra, Italy, 6-7 April 2004)

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GTOS - 35**

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SUMMARY REPORT OF THE EIGHTH SESSION OF THE GCOS/GTOS TERRESTRIAL OBSERVATION PANEL FOR CLIMATE

The Eighth Session of the Terrestrial Observation Panel for Climate (TOPC) of the Global Climate Observing System (GCOS) and Global Terrestrial Observing System (GTOS) was held at the European Commission's Joint Research Centre in Ispra from 6-7 April 2004. The Agenda and List of Participants are given in Appendices 1 and 2.

1. REPORT FROM THE GCOS STEERING COMMITTEE (AGENDA ITEM 3)

The Twelfth Session of the GCOS Steering Committee was held at the WMO headquarters in Geneva from 15-18 March 2004.

GCOS presented the Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the United Nations Framework Convention on Climate Change (UNFCCC) to the Eighteenth Session of the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA-18) in June 2003 and to the Ninth Conference of the Parties (COP) to the UNFCCC in Milan, 1-12 December 2003. The final report is available at <http://www.wmo.ch/web/gcos>.

The COP-9 decision concerning the work of GCOS and the Second Adequacy Report recommends that Parties review the report within the context of their national capabilities and consider what actions they can take. It also asks GCOS to coordinate development of a five- to ten-year implementation plan for the integrated global observing systems for climate, using a mix of high-quality satellite and *in-situ* measurements, dedicated infrastructure and targeted capacity-building.

The Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC is progressing rapidly. The first draft will be completed by 15 April, open scientific review will take place in July, and it will be presented to the UNFCCC in December 2004.

The Implementation Plan identifies all Essential Climate Variables (ECVs) needed to characterize the state of the global climate system and its variability; monitor climate forcing; attribute the causes of climate change; predict climate change; project climate change information down to regional and local scales; and characterize extreme events important in impact assessment, adaptation, risk assessment and vulnerability. Earth observing satellites and *in-situ* networks form the backbone of the emerging climate observing system.

The remainder of TOPC-8 was devoted to a review and refinement of the terrestrial component of the Implementation Plan. This was supported by two presentations: 1) from Bernard Pinty on retrieval of albedo from observations made from geostationary satellites; and 2) from Stephan Bojinski on the current status of the Global Terrestrial Network for Hydrology (GTN-H). The presentations led to modifications to the relevant parts of the Implementation Plan and final TOPC-8 conclusions.

2. IMPLEMENTATION PLAN DRAFT REVIEW (AGENDA ITEM 4)

The Panel reviewed all parts of the terrestrial component of the Implementation Plan. This resulted in a 34-page revised section submitted to the GCOS Secretariat. The section has been incorporated into the action plan made available for public review. This can be downloaded from the GCOS web site.

In summary, through the efforts of many nations' research programmes (including those of their space agencies) TOPC could, within the next five years, provide the ECVs listed below. The framework for these actions is generally in place, but the institutional arrangements supporting them are less well developed for some than for others - and none have long-term, sustained, operational status. Additional, and as yet unsecured, national commitment is needed to complete the networks identified in the first four actions; the following six will be completed if established partnerships continue to be supported; and GCOS can only meet its climate observing goals if, and only if, every one of these actions is eventually supported by robust institutional commitment on a sustained basis – not from research programmes.

Nevertheless, research remains an important element of TOPC's planning. Access to a more complete suite of climate variables depends on the outcome of longer-term research and planning (five to ten years, and beyond); this will strengthen the river discharge network; it will establish much needed, but non-existent networks covering ground water, lakes and measures of plant productivity; it will result in reliable measurements of land cover change and provide a proven basis for reversing the contraction of some *in-situ* networks (especially snow) by blending measurements from space with those from the ground.

Summary actions leading to terrestrial ECVs to be implemented in the next five years:

1. Reporting from all nodes of the Global Terrestrial Network for Glaciers (GTN-G) including the Global Land Ice Measurements from Space (GLIMS).
2. Reporting from all nodes of the Global Terrestrial Network – Rivers (GTN-R) 350 priority stations near the downstream end of the largest rivers of the world.
3. Generation of spatially referenced global information on the area of irrigated land for the AQUASTAT database.
4. Reporting from all nodes of the Global Terrestrial Network for Permafrost (GTN-P).
5. Generation of Northern and Southern Hemisphere snow extent maps.
6. Generation of digital elevation maps of the ice sheet surfaces.
7. Characterization of land cover (the location and extent of inland water bodies, vegetation type, snow and ice, barren surfaces, artificial surfaces, fractional tree cover) at 250 – 500 m resolution.
8. Production of global directional hemispherical reflectance factor (or black sky albedo).

9. Generation of global measurements of Fraction of Absorbed Photosynthetically Active Radiation (fAPAR).
10. Generation of global active fire and burnt area datasets at 250m – 1 km resolution.

In the longer term (5 to 10 years):

- Sustain all of the above, and:
- Expand GTN-R to cover near real time reporting of river discharge data from all significant rivers.
- Establish a new baseline network recording lake level and area.
- Design a network for ground water and aquifer monitoring.
- Reverse the contraction of the distribution and number of snow depth monitoring stations.
- Map global land cover change at 30 m resolution.
- Report methods used to establish biomass in forest inventories and harmonize same.
- Establish a globally representative network of reference sites measuring Leaf Area Index (*in-situ*) and above-ground biomass.

Full details of the actions associated with these are to be found in the Implementation Plan on the GCOS web site.

3. OTHER AGENDA ITEMS (AGENDA ITEMS 5-9)

Other agenda items will be revisited at the next TOPC meeting.

4. MEETINGS AND MEMBERSHIP (AGENDA ITEMS 10 AND 11)

All current Panel members reaffirmed their interest in membership and agreed to attend the annual meeting. New nominations are needed in some key domains. The importance of an annual meeting was stressed by the GCOS and GTOS Secretariats. The next meeting is planned for early 2005.

5. CONCLUSIONS AND KEY ACTIONS

Nominations for new membership should be made by Panel members to the Chair.
ACTION: All.

Some Panel members will be involved in a meeting at WMO to be held in August 2004 to respond to the open review process of the Implementation Plan. The full Panel will be kept informed of the outcome. ACTION: A. Belward to keep Panel informed.

TOPC needs to engage the WMO's Technical Commission for Hydrology (CHy) with a view to implementing key hydrological components of the Implementation Plan. ACTION: S. Bojinski to act as interface with CHy.

TOPC needs to secure the involvement of the Committee on Earth Observation Satellites (CEOS) Working Group on Calibration and Validation (WGCV) for support in benchmarking actions associated with land cover, fire, fAPAR, albedo. ACTION: A. Belward to contact CEOS WGCV.

The Institute for Environment and Sustainability was thanked for hosting TOPC-8.

**EIGHTH SESSION OF THE TERRESTRIAL OBSERVATION PANEL FOR CLIMATE
OF THE GLOBAL CLIMATE OBSERVING SYSTEM AND GLOBAL TERRESTRIAL
OBSERVING SYSTEM**

Ispra, 6-7 April 2004

Agenda

6th April convene 09.00

1. Welcome and introductions
2. Review of Agenda
3. Report from GCOS Steering Committee
4. GCOS Implementation Plan draft review
5. Review of Terrestrial Essential Climate Variables
6. Terrestrial Commission development; roles, responsibilities and strategy
7. TOPC pilot project status (CGMS Albedo, others)
8. Proposals for GCOS Fund activities in developing countries
9. Relations with CEOS WGCV and IGBP
10. Membership review
11. Calendar and future meetings
12. AOB

7th April close of meeting 16.00

A working dinner will be hosted by the Institute for Environment and Sustainability on
6th April 2004

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LIST OF PARTICIPANTS

Roger BARRY
National Snow & Ice Data Center
University of Colorado
Campus Box 449
Boulder CO 80309-0449, USA
Tel.: +1 303 4925488
Fax: +1 303 4922468
E-Mail: rbarry@kryos.colorado.edu

Alan BELWARD (TOPC Chairman)
Institute for Environment & Sustainability
European Commission, Joint Research Centre
Via Fermi
21020 Ispra Varese, Italy
Tel.: +39 0332 789298
Fax: +39 0332 789073
E-Mail: alan.belward@jrc.it

Stephan BOJINSKI
Global Climate Observation System Secretariat
C/o World Meteorological Organization
P.O. Box 2300
7bis, Avenue de la Paix
1211 Geneva 2, Switzerland
Tel.: +41 22 7308150
Fax: +41 22 7308052
E-Mail: sbojinski@wmo.int

Wolfgang CRAMER
Dept. of Global Change and Natural Systems
Potsdam Institute for Climate Impact Research
P.O. Box 60 12 03
14412 Potsdam, Germany
Tel.: +49 331 2882637
Fax: +49 331 2882600
E-Mail: Wolfgang.Cramer@pik-potsdam.de

Sandy HARRISON
School of Geographical Sciences
University of Bristol
University Road
Bristol BS8 1SS, UK
Tel.: +44 117 3317222
Fax: +44 117 9287878
E-Mail: sandy.harrison@bristol.ac.uk

Hal KIBBY
Western Ecology Division
United States Environmental Protection Agency
200 S.W. 35th Street
Corvallis OR 97333, USA
Tel.: +1 541 7544488
Fax: +1 541 7544799
E-Mail: kibby@mail.cor.epa.gov

Paul MASON (GCOS SC Chairman)
Department of Meteorology
University of Reading
Earley Gate, POB 243
Reading RG6 6BB, UK
Tel.: +44 118 3788957
Fax: +44 118 3788791
E-Mail: p.j.mason@reading.ac.uk

Thomas MAURER
Global Runoff Data Centre
Federal Institute of Hydrology (BfG)
P.O. Box 20 02 53
56058 Koblenz, Germany
Tel.: +49 261 13065224
Fax: +49 261 13065671
E-Mail: thomas.maurer@bafg.de

Massimo MENENTI
Laboratoire des Science de l'Image, de l'Informatique et de la Télédétection
Université Louis Pasteur
Boulevard Sébastien Brant
BP 10413
67412 Illkirch Cedex, France
Tel.: +33 390 244459
Fax: +33 390 244455
E-Mail: menenti@sepia.u-strasbg.fr

David NORSE
University College London
China Office
4 Taviton Street
London WC1H 9EZ, UK
Tel.: +44 20 76794543
Fax: +44 20 78132812
E-Mail: d.norse@ucl.ac.uk

Paul REICHERT
GTOS Secretariat
Environment and Natural Resources Service (SDRN)
Food and Agriculture Organization of the UN (FAO)
Viale delle Terme di Caracalla
00100 Rome, Italy
Tel: +39 06 57054173
Fax: +39 06 57053369
E-Mail: paul.reichert@fao.org

LIST OF ACRONYMS

CEOS	Committee on Earth Observation Satellites
CGMS	Coordination Group for Meteorological Satellites
CHy	Commission for Hydrology (WMO)
COP	Conference of the Parties (to UNFCCC)
ECVs	Essential Climate Variables
FAPAR	Fraction of Absorbed Photosynthetically Active Radiation
GCOS	Global Climate Observing System
GLIMS	Global Land Ice Measurements from Space
GTN	Global Terrestrial Network
GTN-H	Global Terrestrial Network for Hydrology
GTN-G	Global Terrestrial Network for Glaciers
GTN-P	Global Terrestrial Network for Permafrost
GTN-R	Global Terrestrial Network - Rivers
GTOS	Global Terrestrial Observing System
IGBP	International Geosphere-Biosphere Programme
SBSTA	Subsidiary Body for Scientific and Technological Advice (UNFCCC/COP)
TOPC	Terrestrial Observation Panel for Climate
UNFCCC	United Nations Framework Convention on Climate Change
WGCV	Working Group on Calibration and Validation

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LIST OF GCOS PUBLICATIONS*

- GCOS-1**
(WMO/TD-No. 493) Report of the first session of the Joint Scientific and Technical Committee for GCOS (Geneva, Switzerland, April 13-15, 1992)
- GCOS-2**
(WMO/TD-No. 551) Report of the second session of the Joint Scientific and Technical Committee for GCOS (Washington DC, USA, January 11-14, 1993)
- GCOS-3**
(WMO/TD-No. 590) Report of the third session of the Joint Scientific and Technical Committee for GCOS (Abingdon, UK, November 1-3, 1993)
- GCOS-4**
(WMO/TD-No. 637) Report of the fourth session of the Joint Scientific and Technical Committee for GCOS (Hamburg, Germany, September 19-22, 1994)
- GCOS-5**
(WMO/TD-No. 639) Report of the GCOS Data System Task Group (Offenbach, Germany, March 22-25, 1994)
- GCOS-6**
(WMO/TD-No. 640) Report of the GCOS Atmospheric Observation Panel, first session (Hamburg, Germany, April 25-28, 1994)
- GCOS-7**
(WMO/TD No. 641) Report of the GCOS Space-based Observation Task Group (Darmstadt, Germany, May 3-6, 1994)
- GCOS-8**
(WMO/TD No. 642)
(UNEP/EAP.MR/94-9) Report of the GCOS/GTOS Terrestrial Observation Panel, first session (Arlington, VA, USA, June 28-30, 1994)
- GCOS-9**
(WMO/TD-No. 643) Report of the GCOS Working Group on Socio-economic Benefits, first session (Washington DC, USA, August 1-3, 1994)
- GCOS-10**
(WMO/TD-No. 666) Summary of the GCOS Plan, Version 1.0, April 1995
- GCOS-11**
(WMO/TD-No. 673) Report of the GCOS Data and Information Management Panel, first session (Washington DC, USA, February 7-10, 1995)
- GCOS-12**
(WMO/TD-No. 674) The Socio-economic Benefits of Climate Forecasts: Literature Review and Recommendations (Report prepared by the GCOS Working Group on Socio-economic Benefits), April 1995
- GCOS-13**
(WMO/TD-No. 677) GCOS Data and Information Management Plan, Version 1.0, April 1995
- GCOS-14**
(WMO/TD-No. 681) Plan for the Global Climate Observing System (GCOS), Version 1.0, May 1995
- GCOS-15**
(WMO/TD-No. 684) GCOS Plan for Space-based Observations, Version 1.0, June 1995
- GCOS-16**
(WMO/TD-No. 685) GCOS Guide to Satellite Instruments for Climate, June 1995
- GCOS-17**
(WMO/TD-No. 696) Report of the GCOS Atmospheric Observation Panel, second session (Tokyo, Japan, March 20-23, 1995)

*GCOS publications may be accessed through the GCOS World Wide Web site at:
<http://www.wmo.ch/web/gcos/gcoshome.html>

- GCOS-18**
(WMO/TD-No. 697)
(UNEP/EAP.MR/95-10) Report of the GCOS/GTOS Terrestrial Observation Panel, second session (London, UK, April 19-21, 1995)
- GCOS-19**
(WMO/TD-No. 709) Report of the GCOS Data Centre Implementation/Co-ordination Meeting (Offenbach, Germany, June 27-29, 1995)
- GCOS-20**
(WMO/TD-No. 720) GCOS Observation Programme for Atmospheric Constituents: Background, Status and Action Plan, September 1995
- GCOS-21**
(WMO/TD-No. 721)
(UNEP/EAP.TR/95-07) GCOS/GTOS Plan for Terrestrial Climate-related Observations, version 1.0, November 1995
- GCOS-22**
(WMO/TD-No. 722) Report of the fifth session of the Joint Scientific and Technical Committee for GCOS (Hakone, Japan, October 16-19, 1995)
- GCOS-23**
(WMO/TD-No. 754)
(UNEP/DEIA/MR.96-6)
(FAO GTOS-1) Report of the GCOS/GTOS Terrestrial Observation Panel for Climate, third session (Cape Town, South Africa, March 19-22, 1996)
- GCOS-24**
(WMO/TD-No. 768)
(UNESCO/IOC) Report of the Joint GCOS/GOOS/WCRP Ocean Observations Panel for Climate, first session (Miami, Florida, USA, March 25-27, 1996)
- GCOS-25**
(WMO/TD-No. 765)
(UNEP/DEIA/MR.96-5) Report of the GCOS Data and Information Management Panel, second session (Ottawa, Ontario, Canada, May 14-17, 1996)
- GCOS-26**
(WMO/TD-No. 766) Report of the Joint CCI/CBS Expert Meeting on the GCOS Surface Network (Norwich, UK, March 25-27, 1996)
- GCOS-27**
(WMO/TD-No. 772)
(UNEP/DEIA/MR.96-7) Report of the Expert Meeting on Hydrological Data for Global Observing Systems (Geneva, Switzerland, April 29-May 1, 1996)
- GCOS-28**
(WMO/TD-No. 793)
(UNEP/DEIA/MR.97-3) *In Situ* Observations for the Global Observing Systems (Geneva, Switzerland, September 10-13, 1996)
- GCOS-29**
(WMO/TD-No. 794)
(UNEP/DEIA/MR.97-4) Report of the Global Observing Systems Space Panel, second session (Geneva, Switzerland, October 16-18, 1996)
- GCOS-30**
(WMO/TD-No. 795) Report of the sixth session of the Joint Scientific and Technical Committee for GCOS (Victoria, British Columbia, Canada, October 28-November 1, 1996)
- GCOS-31**
(WMO/TD-No. 803) Proceedings of the fifth meeting of the TAO Implementation Panel (TIP-5) (Goa, India, November 18-21, 1996)

- GCOS-32**
(WMO/TD-No. 796) GCOS/GTOS Plan for Terrestrial Climate-related Observations, version 2.0, June 1997
- GCOS-33**
(WMO/TD-No. 798) GHOST - Global Hierarchical Observing Strategy, March 1997
- GCOS-34**
(WMO/TD-No. 799) Initial Selection of a GCOS Surface Network, February 1997
- GCOS-35**
(WMO/TD-No. 839) Report of the second Joint CCI/CBS Meeting on the GCOS Surface Network (De Bilt, The Netherlands, June 25-27, 1997)
- GCOS-36**
(WMO/TD-No. 844)
(UNESCO/IOC) Report of the Joint GCOS/GOOS/WCRP Ocean Observations Panel for Climate, second session (Cape Town, South Africa, February 11-13, 1997)
- GCOS-37**
(WMO/TD-No. 845)
(GOOS-10) & (GTOS-9) Report of the Global Observing Systems Space Panel, third session (Paris, France, May 27-30, 1997)
- GCOS-38**
(WMO/TD-846)
(GTOS-10) Report of the Meeting of Experts on Ecological Networks (Guernica, Spain, June 17-20, 1997)
- GCOS-39**
(WMO/TD-No. 847)
(GOOS-11) & (GTOS-11)
(UNEP/DEIA/MR.97-8) Report of the GCOS/GOOS/GTOS Joint Data and Information Management Panel, third session (Tokyo, Japan, July 15-18, 1997)
- GCOS-40**
(WMO/TD-No. 848) Report of the GCOS/WCRP Atmospheric Observation Panel for Climate, third session (Reading, UK, August 19-22, 1997)
- GCOS-41**
(WMO/TD-No. 849)
(GOOS-33) Report of the Joint GCOS/GOOS/WCRP Ocean Observations Panel for Climate (OOPC) Ocean Climate Time-Series Workshop, (Baltimore, MD, USA, March 18-20, 1997)
- GCOS-42**
(WMO/TD-No. 857) Report of the seventh session of the Joint Scientific and Technical Committee for GCOS (Eindhoven, The Netherlands, September 22-26, 1997)
- GCOS-43a**
(GOOS-36) TAO Implementation Panel, sixth session (Reading, U.K., November 4-6, 1997)
- GCOS-43b**
(GOOS-55) International Sea Level Workshop (Honolulu, Hawaii, USA, June 10-11, 1997)
- GCOS-44**
(GOOS-61) Report of the Joint GCOS/GOOS/WCRP Ocean Observations Panel for Climate (OOPC), third session (Grasse, France, April 6-8, 1998)
- GCOS-45**
(WMO/TD-No. 922)
(GOOS-58) & (GTOS-16)
(UNEP/DEIA/MR.98-6) Report of the Joint Meeting of the GCOS/WCRP Atmospheric Observation Panel for Climate and the GCOS/GOOS/GTOS Joint Data and Information Management Panel, fourth session (Honolulu, Hawaii, USA, April 28-May 1, 1998)

- GCOS-46**
(GTOS-15) Report of the GCOS/GTOS Terrestrial Observation Panel for Climate, fourth session (Corvallis, USA, May 26-29, 1998)
- GCOS-47**
(WMO/TD-No. 941)
(GOOS-67) (GTOS-20) Report of the Global Observing Systems Space Panel, fourth session, (College Park, Maryland, USA, October 22-23, 1998)
- GCOS-48** Report on the Adequacy of the Global Climate Observing Systems (United Nations Framework Convention on Climate Change, November 2-13 1998, Buenos Aires, Argentina)
- GCOS-49**
(GOOS-64) Implementation of Global Ocean Observations for GOOS/GCOS, first session (Sydney, Australia, March 4-7, 1998)
- GCOS-50**
(GOOS-65) Implementation of Global Ocean Observations for GOOS/GCOS, second session (Paris, France, November 30, 1998)
- GCOS-51**
(GOOS-66) Global Ocean Observations for GOOS/GCOS: An Action Plan for Existing Bodies and Mechanisms
- GCOS-52**
(GOOS-68) TAO Implementation Panel, 7th Session (Abidjan, Ivory Coast, November 11-13, 1998)
- GCOS-53**
(WMO/TD-No. 958) GCOS Surface Network (GSN) Monitoring Centre Implementation Meeting (Offenbach, Germany, January 19-20, 1999)
- GCOS-54**
(WMO/TD-No. 953) Report of the eighth session of the WMO-IOC-UNEP-ICSU Steering Committee for GCOS (Geneva, Switzerland, February 9-12, 1999)
- GCOS-55** Report of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC), fifth session (Silver Spring, MD, USA, April 20-23, 1999)
- GCOS-56**
(GOOS-75) Special Report of the Joint GCOS/GOOS/WCRP Ocean Observations Panel for Climate (OOPC), fourth session (May 17, 1999); The CLIVAR Upper Ocean Panel (UOP), fourth session (May 21, 1999); A Joint Planning Meeting of the OOPC and the UOP for the OCEANOBS99 Conference (Woods Hole, MA, USA, May 18-20, 1999)
- GCOS-57**
(WMO/TD-No. 978)
(GOOS-79) Report of the OOPC/AOPC Workshop on Global Sea Surface Temperature Data Sets (Palisades, N.Y., USA, November 2-4, 1998)
- GCOS-58**
(GOOS-71) Report of the 6th Session of the IOC Group of Experts on the Global Sea Level Climate Observing System (GLOSS)
- GCOS-59**
(GTOS-22) Report of the GCOS/GTOS Terrestrial Observation Panel for Climate, fifth session (Birmingham, UK, July 27-30, 1999)
- GCOS-60**
(WMO/TD-No. 1004)
(GOOS-70) GCOS/GOOS/GTOS Joint Data and Information Management Plan, Version 1.0, May 2000

- GCOS-61**
(WMO/TD-No. 1031) Report of the ninth session of the WMO-IOC-UNEP-ICSU Steering Committee for GCOS (Beijing, China, September 12-14, 2000)
- GCOS-62**
(WMO/TD-No. 1038) Report of the Pacific Islands Regional Implementation Workshop on Improving Global Climate Observing Systems (Apia, Samoa, August 14-15, 2000)
- GCOS-63**
(WMO/TD-No. 1047)
(GTOS-26) Establishment of a Global Hydrological Observation Network for Climate. Report of the GCOS/GTOS/HWRP Expert Meeting (Geisenheim, Germany, June 26-30, 2000)
- GCOS-64**
(GOOS-107) Report of the eighth session of the TAO Implementation Panel (TIP-8) (St. Raphael, France, October 15, 1999)
- GCOS-65**
(WMO/TD-No. 1055) Report of the sixth session of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC) (Geneva, Switzerland, April 10-13, 2000)
- GCOS-66**
(GOOS-108) Report of the ninth session of the TAO Implementation Panel (TIP-9) (Perth, Australia, November 16-17, 2000)
- GCOS-67**
(WMO/TD-No. 1072) GCOS Implementation Strategy: Implementing GCOS in the New Millennium
- GCOS-68**
(WMO/TD-No. 1093) Report of the seventh session of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC) (Geneva, Switzerland, April 30-3 May, 2001)
- GCOS-69**
(GOOS-98) Report of the fifth session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Bergen, Norway, June 20-23, 2000.
- GCOS-70**
(GOOS-113) Report of the sixth session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Melbourne, Australia, May 2-5, 2001
- GCOS-71**
(WMO/TD-No. 1099)
(GTOS-29) Report of the GCOS/GTOS/HWRP Expert Meeting on the Implementation of a Global Terrestrial Network - Hydrology (GTN-H), Koblenz, Germany, June 21-22, 2001
- GCOS-72**
(GOOS-95) Report of the 7th Session of the IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Honolulu, April 26-27, 2001
- GCOS-73**
(WMO/TD-No. 1106) Manual on the GCOS Surface and Upper-Air Networks: GSN and GUAN, April 2002
- GCOS-74**
(WMO/TD-No. 1109) Report of the GCOS Regional Workshop for Eastern and Southern Africa on Improving Observing Systems for Climate, Kisumu, Kenya, October 3-5, 2001
- GCOS-75**
(WMO/TD-No. 1124) Summary Report of the tenth session of the WMO-IOC-UNEP-ICSU Steering Committee for GCOS, Farnham, UK, April 15-19, 2002
- GCOS-76**
(WMO/TD-No. 1125) Report of the eighth session of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC), Wokingham, UK, May 20-24, 2002

- GCOS-77**
(GOOS-122) International Workshop for Review of the Tropical Moored Buoy Network, September 10-12, 2001, Seattle, Washington, USA. Workshop Report
- GCOS-78**
(WMO/TD-No. 1126) Report of the GCOS Regional Workshop for Central America and the Caribbean. "Observing Climate from Weather Extremes to Coral Reefs", San José, Costa Rica, March 19-21, 2002 (disponible también en español)
- GCOS-79**
(WMO/TD-No. 1133) Interim Report to the Sixteenth Session of the Subsidiary Body for Scientific and Technological Advice of the UNFCCC by the Global Climate Observing System, Bonn, Germany, June 5-14, 2002
- GCOS-80**
(WMO/TD-No.1140) Report of the GCOS Regional Workshop for East and Southeast Asia on Improving Observing Systems for Climate, Singapore, September 16-18, 2002
- GCOS-81**
(GOOS-124) Seventh Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Kiel, Germany, June 5-8, 2002
- GCOS-82**
(WMO/TD-No.1143) Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC
- GCOS-82 (ES)**
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- GCOS-83**
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(GTOS-33) Report of the Global Terrestrial Network - Hydrology (GTN-H) Coordination Panel Meeting, Toronto, Canada, November 21-22, 2002
- GCOS-84**
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(GTOS-32) Report of the GCOS/GTOS/HWRP Expert Meeting on Hydrological Data for Global Studies, Toronto, Canada, November 18-20, 2002
- GCOS-85**
(WMO/TD-No.1167) Report of the GCOS Regional Workshop for Western and Central Africa on Improving Observing Systems for Climate, Niamey, Niger, March 27-29, 2003 (disponible en français)
- GCOS-86**
(WMO/TD-No.1183) Report of the GCOS Regional Workshop for South America on Improving Observing Systems for Climate, Santiago, Chile, October 14-16, 2003 (disponible también en español)
- GCOS-87**
(WMO/TD-No.1189) Summary Report of the eleventh session of the WMO-IOC-UNEP-ICSU Steering Committee for GCOS, Melbourne, Australia, April 7-10, 2003
- GCOS-88**
(WMO/TD-No. 1190) Report of the ninth session of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC), Asheville, NC, USA, June 23-27, 2003
- GCOS-89**
(GOOS-140) Eighth Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Ottawa, Canada, September 3-6, 2003
- GCOS-90**
(GOOS-141) IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Eighth Session, October 13 and 16-17, 2003

- GCOS-91**
(WMO/TD-No.1221) Summary Report of the twelfth session of the WMO-IOC-UNEP-ICSU Steering Committee for GCOS, Geneva, Switzerland, March 15-19, 2004
- GCOS-92**
(WMO/TD-No.1219) Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC
- GCOS-92 (ES)**
(WMO/TD-No. 1244) Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC – Executive Summary
- GCOS-93**
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(GTOS-35) Summary Report of the Eighth Session of the GCOS/GTOS Terrestrial Observation Panel for Climate, Ispra, Italy, April 6-7, 2004

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GCOS Secretariat
Global Climate Observing System
c/o World Meteorological Organization
7 *bis*, Avenue de la Paix
P.O. Box No. 2300
CH-1211 Geneva 2, Switzerland
Tel: +41 22 730 8275/8067
Fax: +41 22 730 8052
Email: gcosjpo@wmo.int