Update on the programme for the Global Climate Observing System (GCOS)

(including some joint activities with WCRP)

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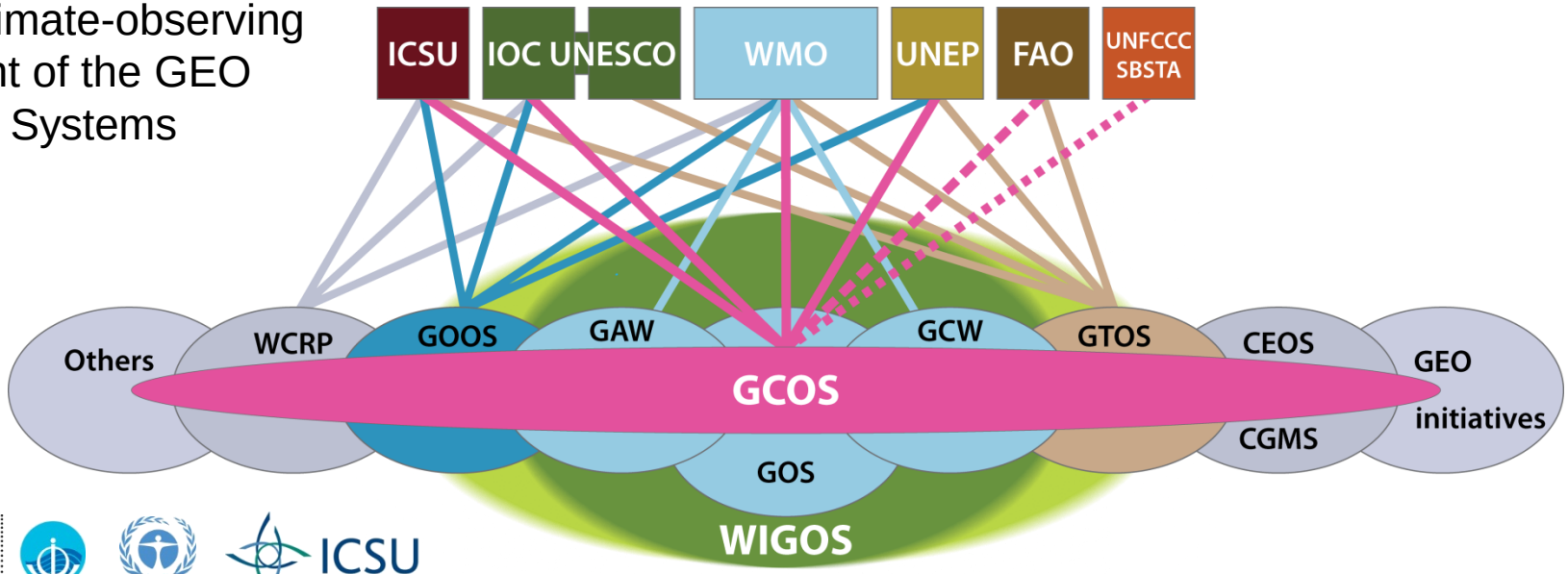
Scope of GCOS

GCOS is concerned with the climate components of:

- WMO observing systems (WIGOS: GOS, GAW, GCW, Hydrological OS)
- IOC-led co-sponsored Global Ocean Observing System (GOOS)
- FAO-led co-sponsored Global Terrestrial Observing System (GTOS)
- observational elements of research programmes (WCRP, IGBP, ...)
- other systems contributing climate observations, data management or products

which together form our overall global observing system for climate,

and the climate-observing component of the GEO System of Systems



The GCOS programme

The GCOS programme

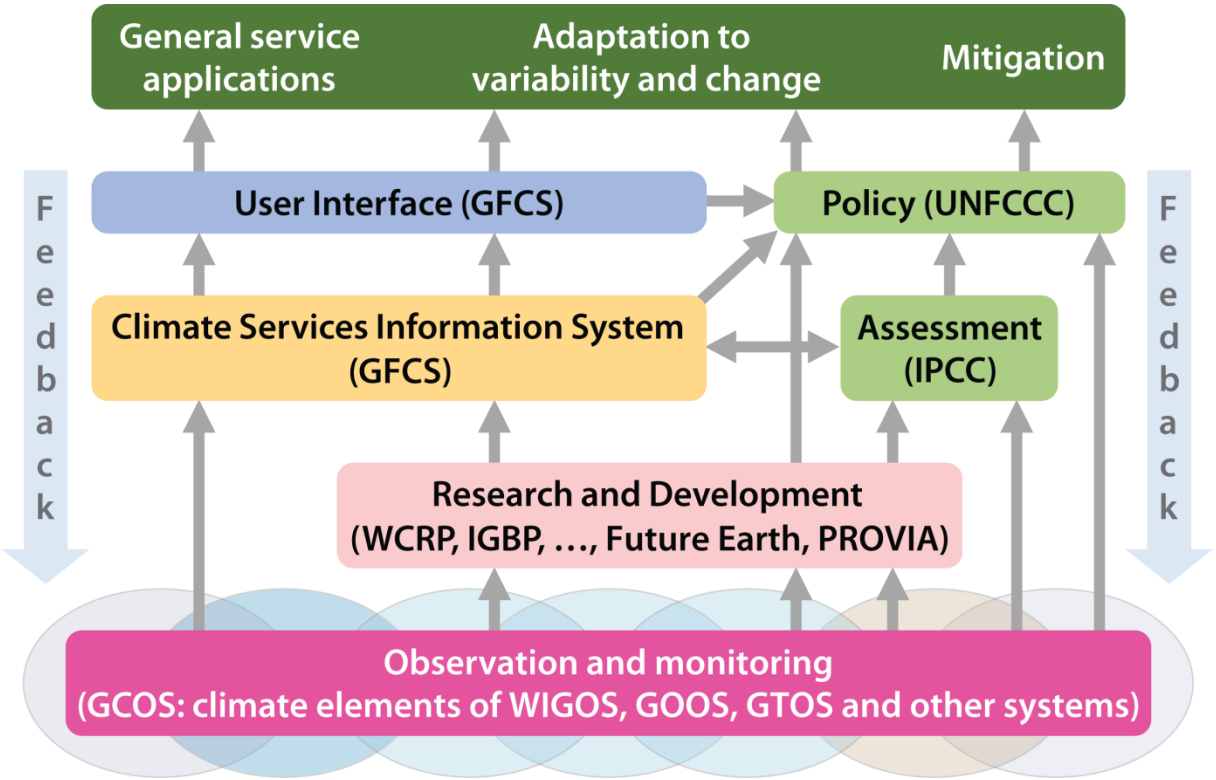
- assesses and communicates requirements for climate observations and products
- advises on and supports implementation; reviews progress
- reports to its sponsors and the parties to the UNFCCC

It supports

- assessment
- policy
- research
- services

and encompasses

- the observations
- data preservation
- generation of data records and products



Adapted from the Third Announcement for WCC-3 and the Report of the High-level Taskforce for the GFCS

The GCOS panels, co-sponsored by WCRP, and related interactions

Atmospheric Observation Panel for Climate (AOPC)

- has most direct contact with WIGOS and WMO commissions; e.g. on *in situ* networks
- new Chair or co-Chairs should take over next year

Ocean Observations Panel for Climate (OOPC) - with co-sponsor GOOS

- reactivated following GOOS reorganization; support now based in GCOS office
- new co-Chairs are Mark Bourassa and Toshio Suga

Terrestrial Observation Panel for Climate (TOPC) - with co-sponsor GTOS

- secretariat of GTOS is non-functional at FAO; new arrangements are needed
- new Chair is Koni Steffen

WCRP Data Advisory Council

- includes panel chairs and representatives of CEOS and CGMS; advances joint interests
- Chair is Otis Brown, with vice-Chair Toshio Koike

FAO is lead sponsor of GTOS
Other sponsors are WMO, UNESCO, UNEP and ICSU

Acknowledgments

GCOS implementation depends on national contributions

- Japan Meteorological Agency is supportive in many ways
  - acting as a regional lead centre and monitoring centre
  - operating a GCOS Reference Upper-Air Network site
  - reprocessing GMS/MTSAT data
  - providing reanalyses
  - …

GCOS and WCRP promote collaboration on reanalysis

- Secondments from JMA to ECMWF reanalysis team have been very beneficial for this
  - includes work on radiosonde bias correction (Onogi) and SSU inter-calibration through adjustments for cell-pressure differences (Kobayashi)
- Collaboration of JAXA and NIES with EU GMES-project partners on GOSAT data is an important contribution to extending capability to include atmospheric composition

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Next round of the assessment cycle

The GCOS programme has started on the process of producing

- a report on progress and adequacy of climate observation scheduled for 2015
- a new “Implementation Plan” scheduled for 2016, which should identify:
  - verifiable, indicatively-costed actions and potential agents for implementation, as before
  - specific requirements for products
- addressed to sponsors and parties to the UNFCCC

Content will be based on various inputs, including outcomes of

- 2011 WCRP Open Science Conference; 2013 SPARC Workshop on Data Requirements
- 2013 GCOS Workshop on Observations for Adaption
- 2013/2014 IPCC Fifth Assessment Report
- 2014 EUMETSAT Climate Symposium
- assessment by GCOS panels; GFCS/WIGOS/FOO planning; other meetings as needed
- open review

WMO UNESCO IOC UNEP ICSU International Council for Science

From 2003 2nd Adequacy Report on global climate observation in support of the UNFCCC

Parties, both individually and through multilateral agreements and intergovernmental mechanisms, should commit to the full ***implementation of integrated global observing systems for climate****, sustained on the basis of* ***a mix of high-quality satellite and in situ measurements****, dedicated infrastructure and targeted capacity-building*

Internationally-coordinated reanalysis activities need to be enhanced and sustained *by the involved Parties to meet the requirements for* ***monitoring climate trends****, to* ***establish ocean reanalysis*** *for the recent satellite era, and to include* ***variables related to atmospheric composition*** *and other aspects of climate forcing*

Parties with responsibility for space agencies should support the long-term operation of Earth observation satellites; ***ensure that homogeneous climate data and integrated products are produced****; and strive to make them available to all*

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Need for more integrated view of *in situ* and satellite observation and datasets

Near-surface atmospheric humidity and soil moisture

- *in situ* data analyses (stand-alone, ERA/JRA) are consistent for atmospheric humidity
- soil moisture from space and reanalysis needs complementary *in situ* data coverage

Ocean reanalysis and uptake of heat by deep ocean

- ocean reanalysis benefits from Argo floats, altimetry and meteorological forcing
- GOOS is developing a strategy for deep-ocean observing

Recent increase in radiosonde data coverage

- pronounced in middle stratosphere; biases are unadjusted in reanalysis
- influences AMSU-A bias adjustment in ERA-Interim but not MERRA; JRA-55 is awaited

Inventory of climate datasets

- CEOS/CGMS/WMO development of inventory of space-based datasets is welcomed
- extension to include products based on *in situ* data is desirable

WMO UNESCO IOC UNEP ICSU International Council for Science

Other topics

Reprocessing of data on winds

- GCOS called in 2006 for GOES reprocessing to complement EUMETSAT/JMA activity
- CIMSS, UW-Madison, is now preparing to reprocess GOES data from 1995 onwards
- meeting at ECMWF this week also discusses polar winds from AVHRR reprocessing

Orbits

- three-orbit coverage should be good for climate as well as NWP

GSICS and related matters

- important for reanalysis; variational bias adjustment makes large changes otherwise
- also need
  - better characterisation of instrumental drifts
  - improved spectral response functions, at least for HIRS
  - variable CO_2 in radiative transfer modelling of equivalents of infrared sounding data

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Some questions for the future observing system

How strong is the case now for a CLARREO-type reference mission?

- given stability of high-resolution IR instruments, and GNSS radio occultation data
- given establishment of GCOS reference upper-air network

Is provision for future limb sounding adequate?

- a concern of WCRP/SPARC as well as GCOS
- water-vapour in lower stratosphere important for decadal variations in radiative forcing

What is the optimal blend of radiosonde and radio occultation data for monitoring the near-tropopause and stratosphere?

- radiosondes remain the key source of tropical stratospheric wind data

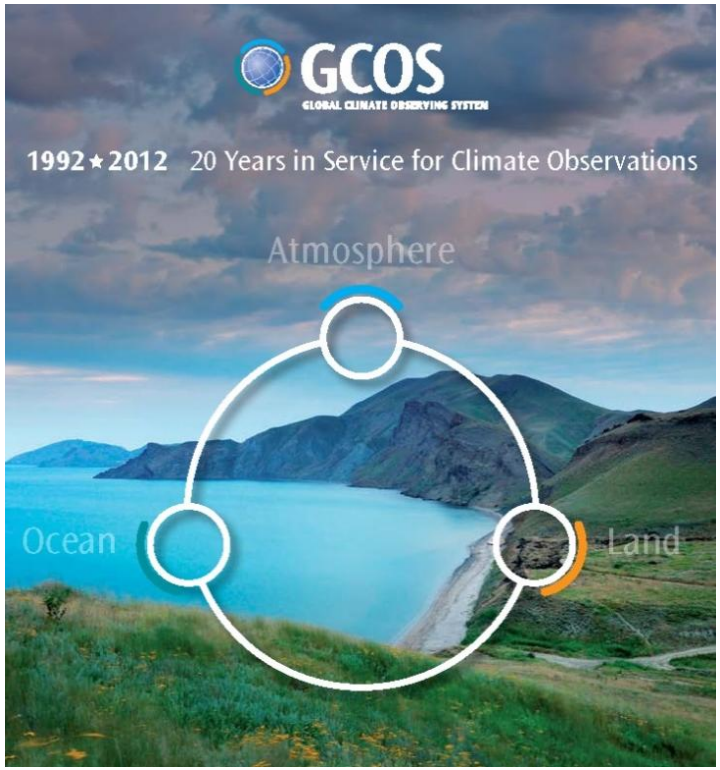
Is provision for spectrally resolved solar irradiance measurement adequate?

- a requirement that has been documented quite recently

Sponsors' review of GCOS

Sponsors of GCOS have set up a Review Board

- under the chairmanship of Wolfgang Kusch, former head of German Weather Service
- to assess the added value of the GCOS programme, its mandate and ToR
- taking account of developments since the sponsors' 1998 MoU was agreed, including
  - establishment of the GEOSS, GFCS and WIGOS
  - evolving requirements for observations and products



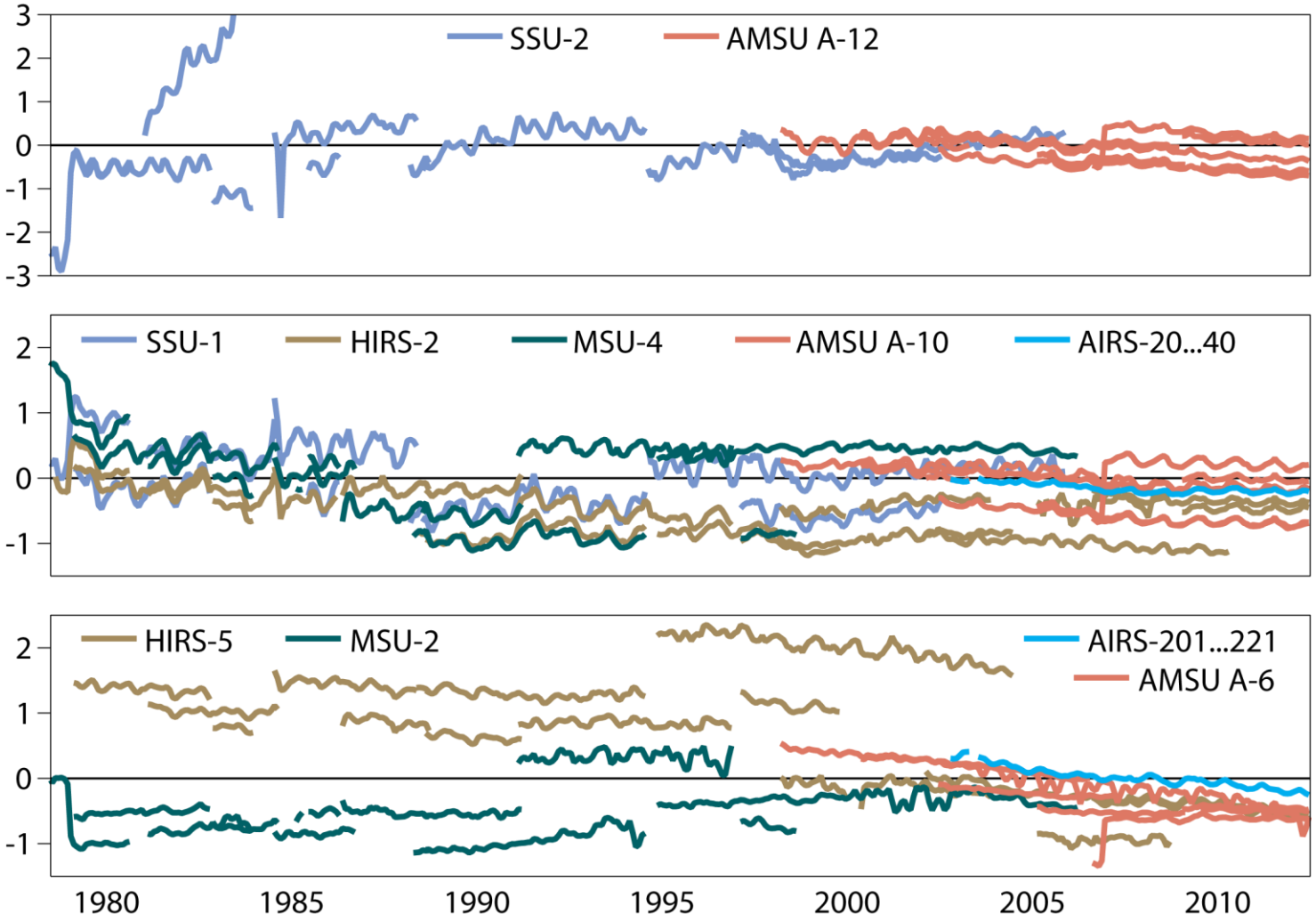
Board first met 26-27 March 2013

A questionnaire has been issued

- and interviews are being conducted

Report is expected before mid-2014

Brightness-temperature bias estimates (K) for some sounding channels used in ERA-Interim



Why we need GSICS, and more

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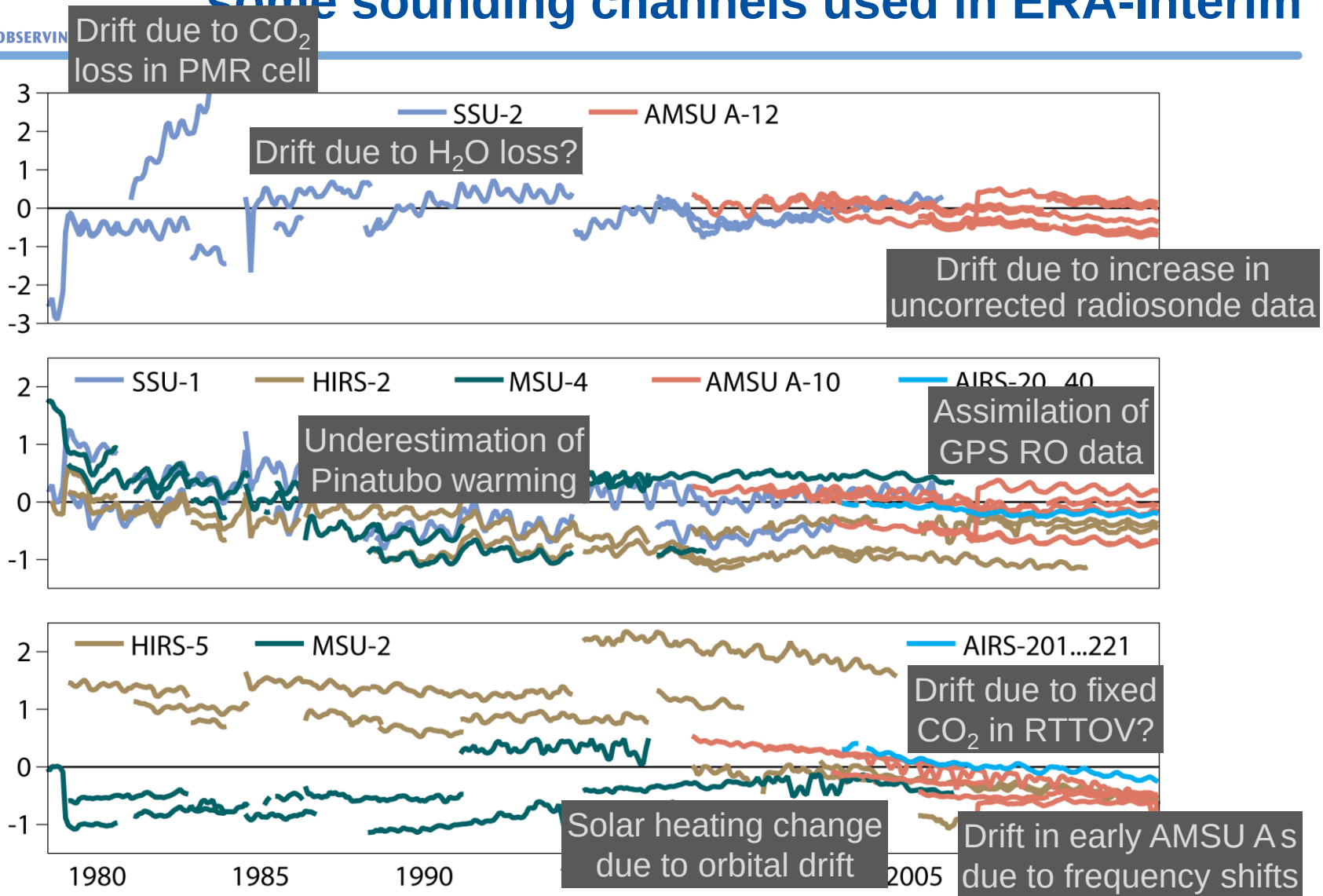

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