World Meteorological Organization

Weather • Climate • Water

OSCAR *ad hoc* workshop on the RRR Gap Analysis Requirements for OSCAR *(Offenbach, 6-8 July 2015)*

Background information and status of OSCAR

Etienne Charpentier (WMO/OSD)

Jerome Lafeuille (WMO/SBOSD)

Timo Proescholdt (WMO/WIGOS-PO)

Jörg Klausen (MeteoSwiss)

OSCAR Background

- An evolution of the former WMO-CEOS Database and “GOS Dossier” on the space-based GOS
- Was initiated through the WMO Space Programme in cooperation with former CBS ET-ODRRGOS in support of WMO Rolling Review of Requirements (RRR)
  - Technology free observational users requirements
  - Observing systems capabilities
  - Gap analysis originally done with Excel sheet
- “GOS Dossier” included satellite programme descriptions (satellites & their instruments, gap analysis, estimated performance of satellite products, compliance analysis potential product performances)

OSCAR Background

- Strategy for establishing a database in support of the Rolling Requirements Review (RRR) process was drafted by *ad hoc* group established by ICT-IOS-6 (2010) & approved by CBS Ext 2010
- Requirements Database (avail. since 2011), now included as **OSCAR/Requirements**
- Content of “Dossier on the space-based GOS” was migrated to **OSCAR/Space in** 2012
- Missing piece was OSCAR/Surface
  - Partnership with MeteoSwiss initiated in 2014 with blessing of ICG-WIGOS and CBS (through ICT-IOS, and IPET-WIFI)
  - Opportunity to migrate Vol. A to OSCAR
- **Available on-line at oscar.wmo.int**

Rolling Review of Requirements (RRR) and Evolution of Global Observing Systems

Long term vision of global observing systems

Application Areas

User requirements

Observing Systems Capabilities (Space & Surface)

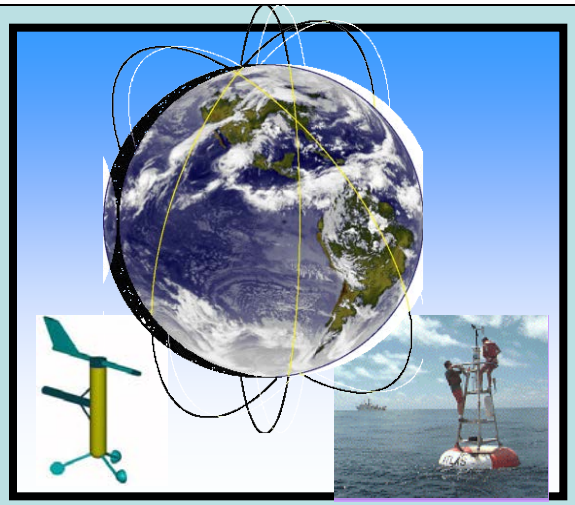
(OSCAR)

Critical review

Statements of Guidance (gap analysis)

Impact Studies (e.g. NWP5)

Priorities, cost effectiveness



Members' and Space Agencies Observation Programmes

Implementation Plan (EGOS-IP)

WMO Application Areas

1. Global Numerical Weather Prediction
2. High Resolution Numerical Weather Prediction
3. Nowcasting and Very Short Range Forecasting
4. Sub-seasonal to longer predictions
5. Aeronautical Meteorology
6. Forecasting Atmospheric Composition
7. Monitoring Atmospheric Composition
8. Providing Atmospheric Composition information to support services in urban and populated areas
9. Ocean Applications
10. Agricultural Meteorology
11. Hydrology
12. Climate Monitoring (GCOS)
13. Climate Applications (Other aspects, addressed by the Commission for Climatology)
14. Space Weather

Cross cutting:

- Global Cryosphere Watch (GCW)
- Global Framework for Climate Services (GFCS)

OSCAR/Requirements

- Repository of Technology Free Observations User Requirements for
  - 14 Application Areas
  - 28 Layers in Atmosphere, Ocean, Terrestrial and Outer Space domains
  - 8 Regional dimensions (global, global ocean, global land, coastal areas, regional, sub-regional, local, point)
  - 260 variables
  - 2 Cross cutting themes (cryosphere, volcanoes)
  - 585 user requirements recorded in the database
- For each Application Area, designated focal points have limited editing rights on the database
- After review and endorsement, these changes become visible to the public
- Process overseen by CBS IPET-OSDE

OSCAR/Requirements

User requirements for observation (OSCAR/Requirements)

This database is the official repository of requirements for observation of physical variables in support of WMO Programmes and Co-sponsored Programmes. These requirements are maintained by the focal points designated for each application area.
It is the foundation of the **Rolling Requirements Review (RRR)** process overviewed by the **Inter-Programme Expert Team on Observing System Design and Evolution (IPED-OSDE)** of CBS. (More information)

The requirements are regularly reviewed by groups of experts nominated by these organizations and programmes. For WMO, this process is conducted by the Inter-Programme Expert Team on Observing System Design and Evolution (IPED-OSDE) and its designated focal points for each of the Application areas .

In addition, Themes offer an additional, cross-cutting view on variables and requirements

Using the database

To explore the database, you can use the **"Quick Search"** in the top right corner, when looking for a specific Variable or Application area. You can also **consult the full tables accessible through the top menu**, and use the filter options provided.

The database is open for consultation. Editing is only possible by designated focal points, after login.

For any questions or clarifications regarding the **content** of the database , please directly contact the respective focal point. A list of all focal points can be found on the Application areas page

Definitions

Requirements are expressed for geophysical variables in terms of 6 criteria: **uncertainty**, **horizontal resolution, vertical resolution, observing cycle, timeliness,** and **stability** (where appropriate).
For each of these criteria the table indicates 3 values determined by experts:

- The **"threshold"** is the minimum requirement to be met to ensure that data are useful
- The **"goal"** is an ideal requirement above which further improvements are not necessary
- The **"breakthrough"** is an intermediate level between "threshold" and "goal" which, if achieved, would result in a significant improvement for the targeted application. The breakthrough level may be considered as an optimum, from a cost-benefit point of view, when planning or designing observing systems.

The "uncertainty" characterizes the estimated range of observation errors on the given variable, with a 68% confidence interval (1 σ).

Requirements for SLP (OSCAR Database)

http://www.wmo-sat.info/oscar/variables/view/10

Requirements defined for *Air pressure (at surface)* (10)

This tables shows all related requirements. For more operations/filtering, please consult the full list of Requirements

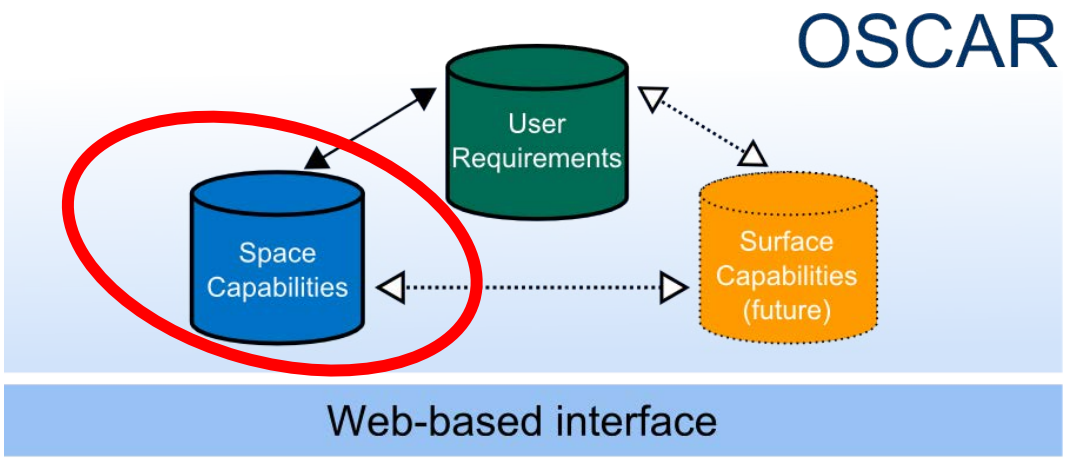
Note: In reading the values, goal is marked blue, breakthrough green and threshold orange

Id	Variable	Layer	App Area	Uncertainty	Stability / decade	Hor Res	Ver Res	Obs Cyc	Timeliness	Coverage	Conf Level	Val Date	Source
250	Air pressure (at surface)	Near Surface	Global NWP	0.5 hPa 1 hPa 1 hPa		15 km 100 km 500 km		60 min 6 h 12 h	6 min 30 min 6 h	Global land	firm	2009-02-10	John Eyre
251	Air pressure (at surface)	Near Surface	Global NWP	0.5 hPa 1 hPa 1 hPa		15 km 100 km 500 km		60 min 6 h 12 h	6 min 30 min 6 h	Global ocean	firm	2009-02-10	John Eyre
335	Air pressure (at surface)	Near Surface	High Res NWP	0.5 hPa 0.6 hPa 1 hPa		1 km 5 km 20 km		30 min 60 min 3 h	15 min 30 min 2 h	Global land	firm	2010-02-01	T Montmerle
336	Air pressure (at surface)	Near Surface	High Res NWP	0.5 hPa 0.6 hPa 1 hPa		1 km 5 km 20 km		30 min 60 min 6 h	15 min 30 min 2 h	Global ocean	firm	2010-02-01	T Montmerle
417	Air pressure (at surface)	Near Surface	Marine biology	10 hPa 12 hPa 15 hPa		50 km 75 km 100 km		24 h 36 h 2 d	3 h 4 h 7 h	Global ocean	firm	2003-10-20	GOOS JPO
487	Air pressure (at surface)	Near Surface	Ocean Applications	0.5 hPa 1 hPa 1 hPa		10 km 25 km 100 km		30 min 2 h 12 h	30 min 60 min 2 h	Global ocean	firm	2011-03-07	Ali Mafimbo (JCOMM)
488	Air pressure (at surface)	Near Surface	Ocean Applications	1 hPa 5 hPa 10 hPa		1 km 10 km 25 km		60 min 3 h 6 h	3 h 6 h 12 h	Global ocean	firm	2011-03-07	Ali Mafimbo (JCOMM)
67	Air pressure (at surface)	Near Surface	Climate-AOPC	0.5 hPa 0.65 hPa 1 hPa		200 km 300 km 500 km		3 h 6 h 24 h	3 h 6 h 12 h	Global land	reasonable	2007-07-19	AOPC
68	Air pressure (at surface)	Near Surface	Climate-AOPC	0.5 hPa 0.65 hPa 1 hPa		200 km 300 km 500 km		3 h 6 h 24 h	3 h 6 h 12 h	Global ocean	reasonable	2007-07-19	AOPC
721	Air pressure (at surface)	Near Surface	Aeronautical Meteorology							Point	firm	2013-12-05	J van der Meulen

OSCAR/Space – oscar.wmo.int/space

Presentation by Jerome Lafeuille (WMO/SBOSD)

OSCAR/Space – oscar.wmo.int/space



Available on line since Sept 2012

- 800-1000 visits per day , from various countries worldwide
- Space agencies, researchers, students, application centres, consultants
- Feeds the CGMS website
- Used as reference for reports, application planning, gap analysis, socio-economic benefit studies, frequency management, etc.

Two kinds of information in OSCAR/Space

- Factual information:
  - > 600 satellites
  - > 800 instruments (including ~ 260 for space weather)
  - Regularly updated based on input from space agencies including the reports to CGMS and ET-SAT

- Expert assessments:
  - Mapping of instruments to variables with degree of relevance (rated 1 to 5)
  - Mapping with WMO-defined target capabilities (rated 1 to 5)

(1) Factual information content

Agency

Programme

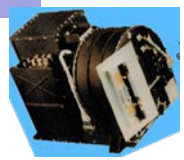
Satellite

- Name, purpose
- Mass, power
- Orbit (type, alt, ECT, lon)
- **Launch date, end date, status**
- Data access, telecom

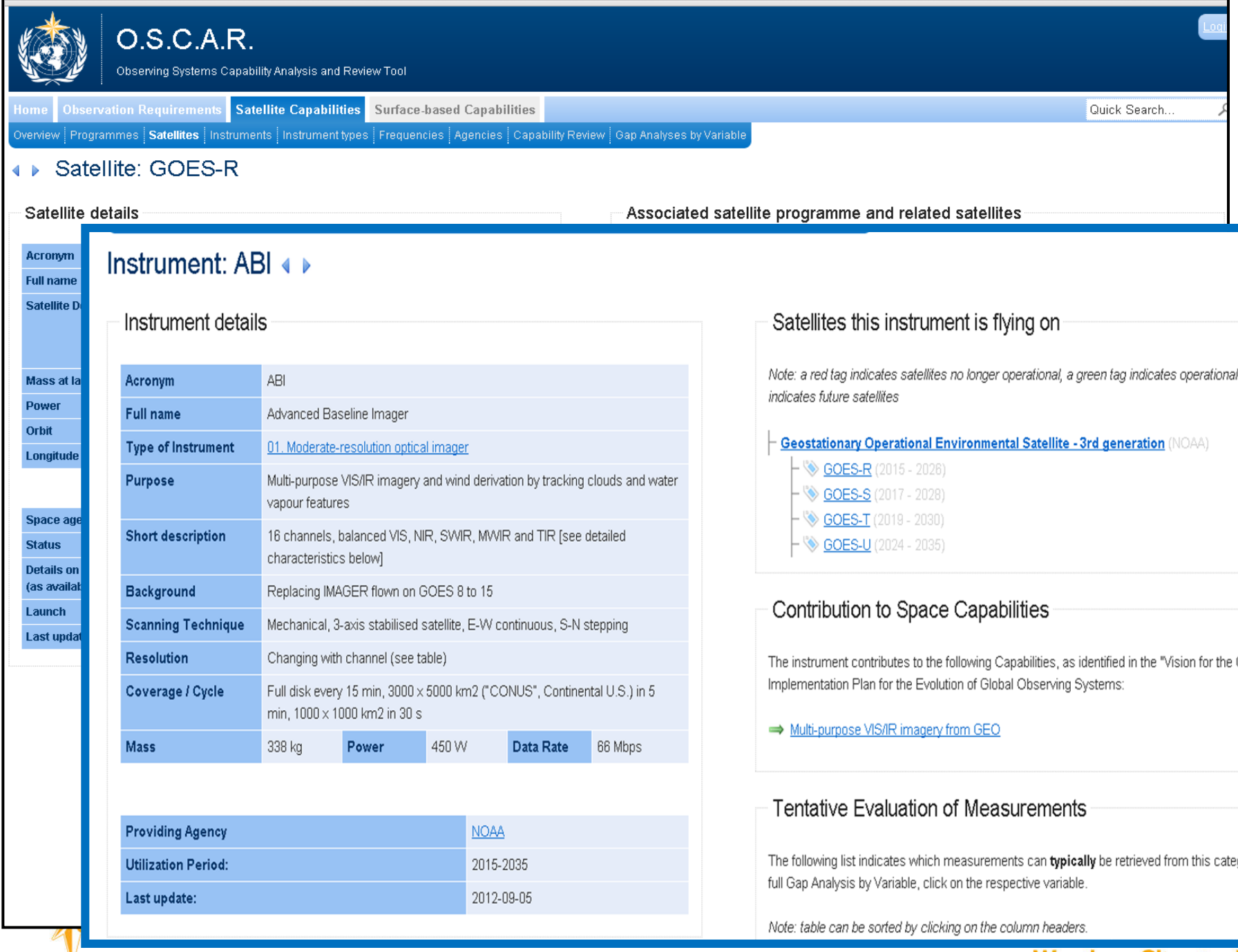
Satellite payload

- Detailed status, dates
- Link to details

Instrument



- Name, purpose
- Mass, power
- Type, description, scan mode
- Resolution FOV, coverage
- Status
- Spectral characteristics


O.S.C.A.R.
Observing Systems Capability Analysis and Review Tool
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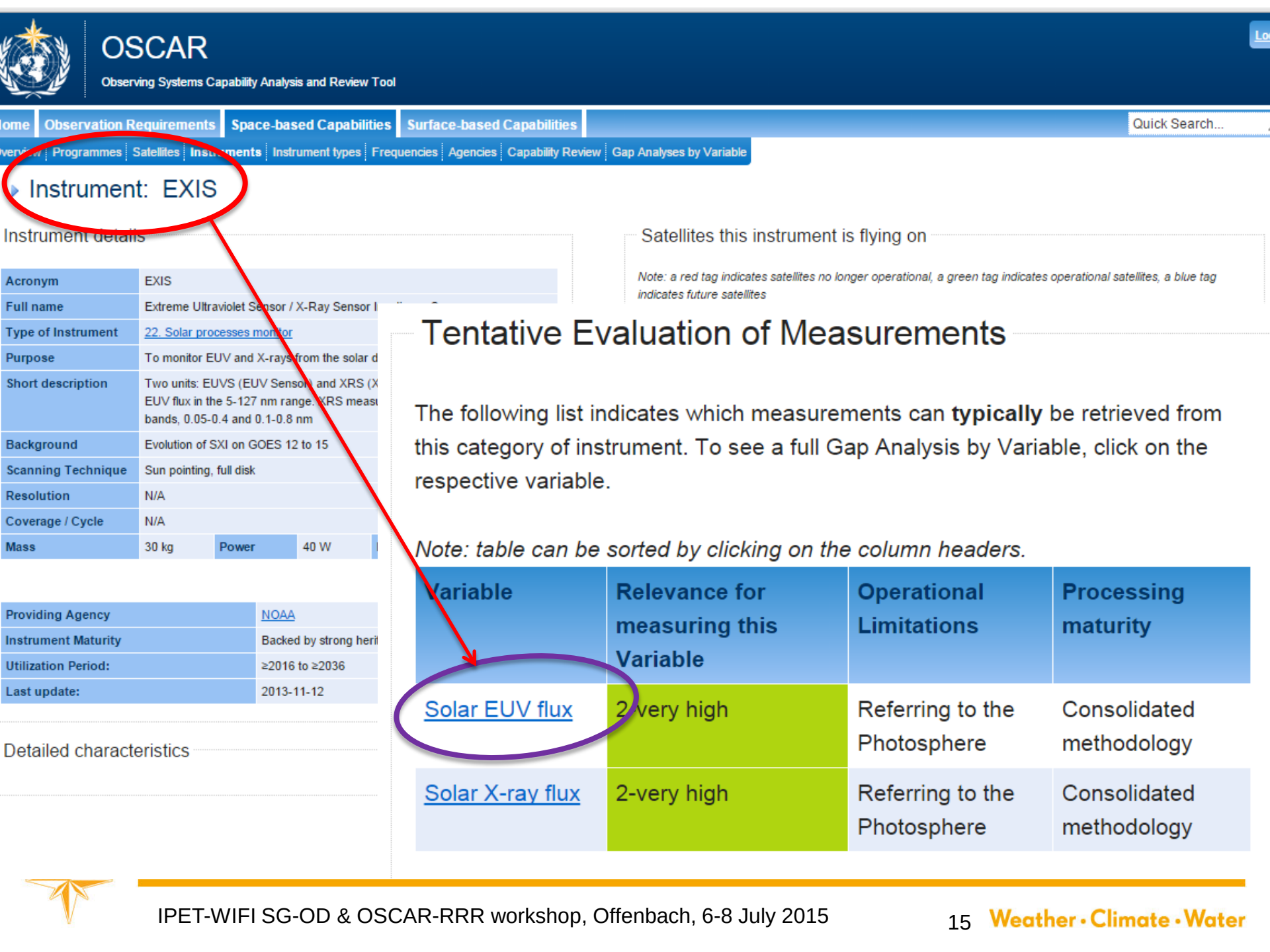
Satellite: GOES-R
Satellite details
Associated satellite programme and related satellites
Acronym
Full name
Satellite D
Mass at la
Power
Orbit
Longitude
Space age
Status
Details on
(as availab
Launch
Last updat
Instrument: ABI
Instrument details
Acronym
ABI
Full name
Advanced Baseline Imager
Type of Instrument
01. Moderate-resolution optical imager
Purpose
Multi-purpose VIS/IR imagery and wind derivation by tracking clouds and water vapour features
Short description
16 channels, balanced VIS, NIR, SWIR, MWIR and TIR [see detailed characteristics below]
Background
Replacing IMAGER flown on GOES 8 to 15
Scanning Technique
Mechanical, 3-axis stabilised satellite, E-W continuous, S-N stepping
Resolution
Changing with channel (see table)
Coverage / Cycle
Full disk every 15 min, 3000 x 5000 km2 ("CONUS", Continental U.S.) in 5 min, 1000 x 1000 km2 in 30 s
Mass
338 kg
Power
450 W
Data Rate
66 Mbps
Providing Agency
NOAA
Utilization Period:
2015-2035
Last update:
2012-09-05
Satellites this instrument is flying on
Note: a red tag indicates satellites no longer operational, a green tag indicates operational s
indicates future satellites
Geostationary Operational Environmental Satellite - 3rd generation (NOAA)
GOES-R (2015 - 2026)
GOES-S (2017 - 2028)
GOES-T (2019 - 2030)
GOES-U (2024 - 2035)
Contribution to Space Capabilities
The instrument contributes to the following Capabilities, as identified in the "Vision for the GC
Implementation Plan for the Evolution of Global Observing Systems:
Multi-purpose VIS/IR imagery from GEO
Tentative Evaluation of Measurements
The following list indicates which measurements can typically be retrieved from this catego
full Gap Analysis by Variable, click on the respective variable.
Note: table can be sorted by clicking on the column headers.

(2) Expert assessments: mapping instruments to variables

- Which variables can be derived from a given instrument ?
- Which instruments can be used to measure a given variable ?

- ➢ OSCAR provides first-level response based on expert assessment of instrument design features
- ➢ This is the basis of the gap analysis


OSCAR
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Gap Analyses by Variable
Instrument: EXIS
Instrument details
Acronym
EXIS
Full name
Extreme Ultraviolet Sensor / X-Ray Sensor
Type of Instrument
22. Solar processes monitor
Purpose
To monitor EUV and X-rays from the solar d
Short description
Two units: EUVS (EUV Sensor) and XRS (X
EUV flux in the 5-127 nm range. XRS measu
bands, 0.05-0.4 and 0.1-0.8 nm
Background
Evolution of SXI on GOES 12 to 15
Scanning Technique
Sun pointing, full disk
Resolution
N/A
Coverage / Cycle
N/A
Mass
30 kg
Power
40 W
Providing Agency
NOAA
Instrument Maturity
Backed by strong heri
Utilization Period:
≥2016 to ≥2036
Last update:
2013-11-12
Detailed characteristics
Satellites this instrument is flying on
Note: a red tag indicates satellites no longer operational, a green tag indicates operational satellites, a blue tag indicates future satellites
Tentative Evaluation of Measurements
The following list indicates which measurements can typically be retrieved from this category of instrument. To see a full Gap Analysis by Variable, click on the respective variable.
Note: table can be sorted by clicking on the column headers.
Variable
Relevance for measuring this Variable
Operational Limitations
Processing maturity
Solar EUV flux
2-very high
Referring to the Photosphere
Consolidated methodology
Solar X-ray flux
2-very high
Referring to the Photosphere
Consolidated methodology

Measurement Timeline for *Solar EUV flux*

Definition:

Integrated EUV flux over the solar disk

Filter by Satellite or Instrument

Instrument	Relevance	Satellite	Orbit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
EIT	3-high	SOHO		X	X	X	X	X																
EXIS	very high	GOES-R	137°W							X	X	X	X	X	X	X	X	X	X	X	X			
EXIS	very high	GOES-T	137°W										X	X	X	X	X	X	X	X	X	X	X	X
SUVI	3-high	GOES-R	137°W							X	X	X	X	X	X	X	X	X	X	X	X			
SUVI	3-high	GOES-T	137°W										X	X	X	X	X	X	X	X	X	X	X	X
SEM/XRS-EUV	2-very high	GOES-15	135°W	X	X	X	X	X	X	X	X	X	X	X										
SEM/XRS-EUV	2-very high	GOES-14	105°W	X	X	X	X	X	X	X														
EXIS	2-very high	GOES-S	75°W								X	X	X	X	X	X	X	X	X	X	X	X		
EXIS	2-very high	GOES-U	75°W																X	X	X	X	X	X
SEM/XRS-EUV	2-very high	GOES-13	75°W	X	X	X	X	X	X															
SUVI	3-high	GOES-S	75°W								X	X	X	X	X	X	X	X	X	X	X	X		
SUVI	3-high	GOES-U	75°W																X	X	X	X	X	X
SOLIST	2-very high	Zond	TBD						X	X	X	X												
SXEUV	3-high	FY-4C	86.5°E											X	X	X	X	X	X	X	X			
SXEUV	3-high	FY-4E	86.5°E																		X	X	X	X
SXEUV	3-high	FY-4B	105°E									X	X	X	X	X	X	X	X					
SXEUV	3-high	FY-4D	105°E														X	X	X	X	X	X	X	X
SECCHI/EUVI	3-high	STEREO (2 sats)	23.44 °	X	X	X	X	X																
EUI	3-high	Solar Orbiter	25 °									X	X	X	X	X	X	X	X					
AIA	3-high	SDO	28.5 °	X	X	X	X	X	X															
LYRA	2-very high	PROBA-2	06:00 asc	X	X	X	X	X	X															
SWAP	3-high	PROBA-2	06:00 asc	X	X	X	X	X	X															

All instruments for measuring *Solar EUV flux*

Instruments	Relevance of Measurement	Processing Maturity	Operational Limitations
LYRA PHOKA	very high	Consolidated methodology	Referring to the Photosphere

Mapping instruments to variables:
a complex issue requiring expert assessment

- Instrument-variable is not a one-to-one relationship
- Most instruments are measuring «radiances» : product derivation results of complex multispectral processing
- Evolving with the progress of science
- Various degrees of relevance
- Different users have different criteria (depending on application requirements)
- Users and providers may have different views

Instrument: ASCAT

Instrument details

Acronym	ASCAT				
Full name	Advanced Scatterometer				
Type of Instrument	16. Radar scatterometer				
Purpose	Sea surface wind vector. Also large-scale soil moisture				
Short description	C-band (5.255 GHz), side looking both left and right. 3 antennas (each side				
Background	Evolution of the AMI-SCAT flown on ERS-1 and ERS-2				
Scanning Technique	Two 550-km swaths separated by a 700-km gap along-track. 3 loo each pixel (45, 90 and 135° azimuth)				
Resolution	Best quality: 50 km – standard quality: 25 km – basic sampling: 1				
Coverage / Cycle	Global coverage in 1.5 days				
Mass	260 kg	Power	215 W	Data Rate	42 kbps

Providing Agency	ESA
Instrument Maturity	Flown on operational programme
Utilization Period:	2006-10-19 to ≥2024
Last update:	2012-06-06

Detailed characteristics

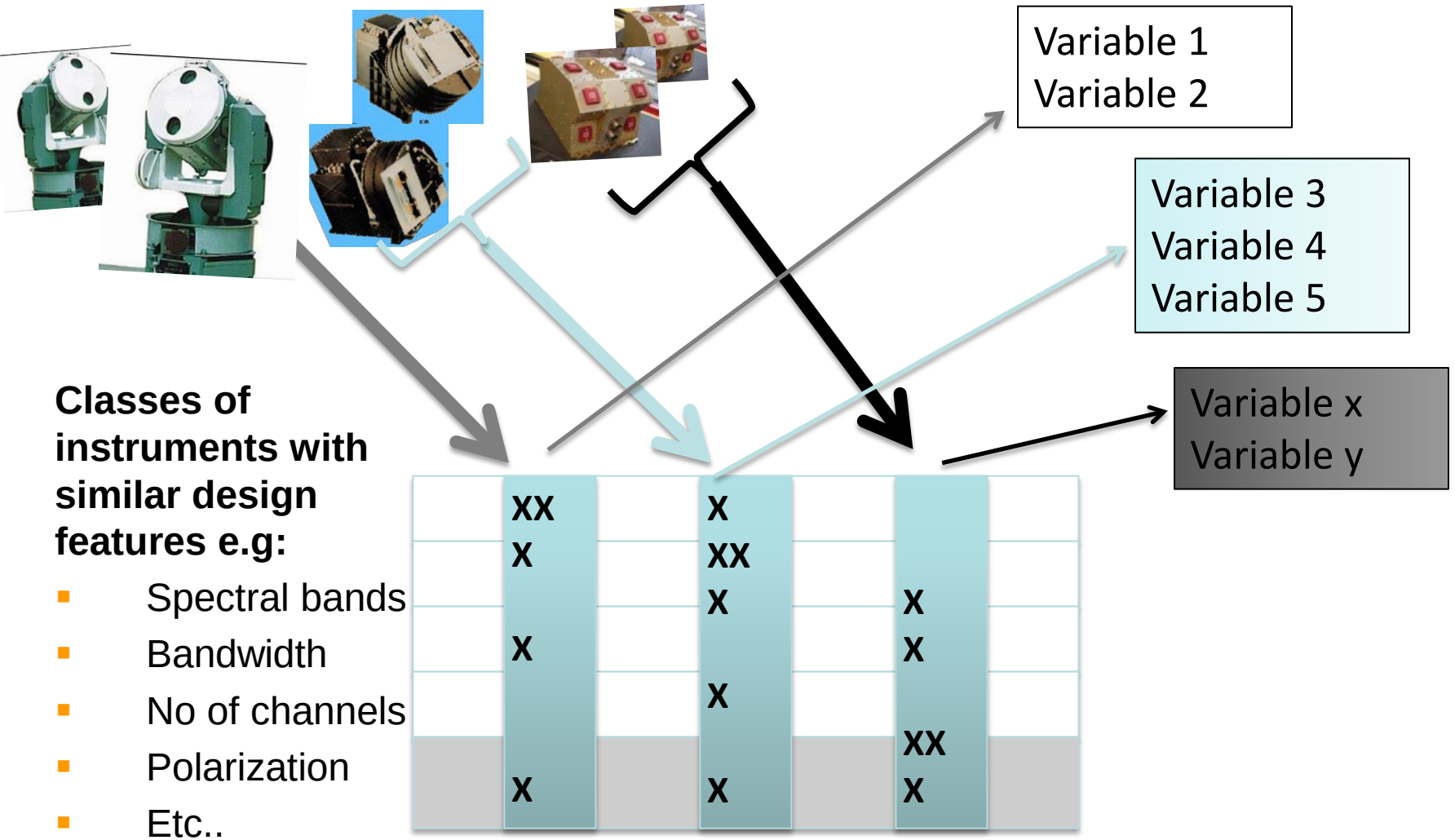
Tentative Evaluation of Measurements

The following list indicates which measurements can **typically** be retrieved from this category of instrument. To see a full Gap Analysis by Variable, click on the respective variable.

Note: table can be sorted by clicking on the column headers.

Variable	Relevance for measuring this Variable	Operational Limitations	Processing maturity
Wind vector over the surface (horizontal)	2-very high	Only over sea	Consolidated methodology
Soil moisture at surface	2-very high	Vegetation dependent	Methodology being tuned
Snow water equivalent	2-very high	Snow-depth dependent	Heavily dependent on external info
Wind speed over the surface (horizontal)	2-very high	Only over sea	Consolidated methodology
Snow status (wet/dry)	3-high	Snow-depth dependent	Consolidated methodology
Sea-ice cover	3-high	Coarse resolution	Consolidated methodology
Leaf Area Index (LAI)	4-fair	No specific limitation	Consolidated methodology
Soil moisture (in the roots region)	4-fair	Highly indirect	Heavily dependent on external info
Snow cover	4-fair	Snow-depth dependent	Consolidated methodology

Current Instrument-variable mapping principle



Classes of instruments with similar design features e.g:

- Spectral bands
- Bandwidth
- No of channels
- Polarization
- Etc..

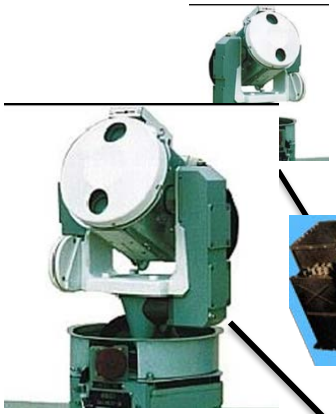
Current Class-based approach

- Instruments are clustered in classes assuming similar design and performances
- Performance of each class based on ***implicit*** scientific rationale
- Black-box
- Heavy to manage with high number of classes
- Excellent results for Earth Observation instruments (~600 instruments, ~200 classes) but unpractical for Space Weather (too diverse).

New expert system approach

- No assumption made about similarity of instruments
- Performance assessment based on ***explicit*** expert rules
- Transparent: the rules can be submitted to external reviews
- Each instrument characterized by fully objective features
- Facilitates scientific maintenance: rules are independent of the software itself
- No limitation in number or diversity of instruments

New instrument-variable mapping principle



Objective assessment

Science-based rules

Variable 1

Variable 2

Variable 3

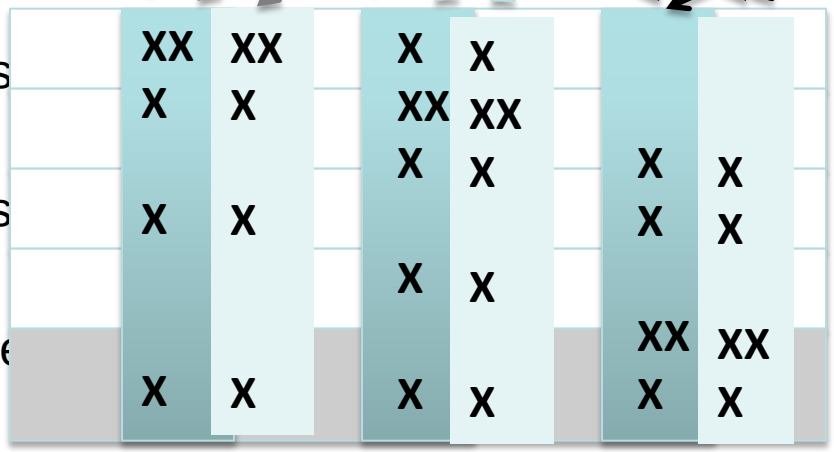
Variable 4

Variable x

Variable y

Instrument design requirements e.g:

- Spectral bands
- Bandwidth
- No of channels
- Polarization
- Scanning mode
- Etc..



Examples of rules

For this Variable	With this type of instrument	If the following conditions are true	Then the relevance is
Sea Surface Temperature	Microwave Radiometer	• >=2 two-polarisations channels in 4-8 GHz • >=1 multi-polarisation channel in 8-12 GHz	Very good
Solar wind velocity	Particle detector	• Detects protons, in 0-10 keV, • Over 2π solid angle, sun pointing • Energy spectral resolution <10% • Angular resolution <0.2π sr • Time resolution <10 s	Excellent

Proof of concept

- A tool has been developed in EXCEL in order to:
  - Demonstrate the method
  - Support the creation of a knowledge basis
  - Refine the specification of the development to be made in OSCAR
- Early results
  - No show-stopper
  - The assessment of all EO instruments can be translated into ~ 2000
    expert rules referring to instrument objective properties
  - A heavy task is to assess all instruments against these properties
  - Preliminary results better than OSCAR with potential for improvement
  - The implementation in OSCAR is being designed

Expected benefits

- Increase the value and reliability of OSCAR/Space as reference tool for RRR, studies and applications
  - Improved relevance assessment, especially for «unique» sensors (incl. Space weather)
  - Will enable engaging expert groups to review the rules related to their fields of competence : collaborative resource, shared ownership
- Enables «interactive capability exploration»
  - Using the instrument properties for search/filter functions
  - Customized gap analysis (e.g. GSICS)
- Potential for training applications
  - working on the rules for a variable, virtual instruments…

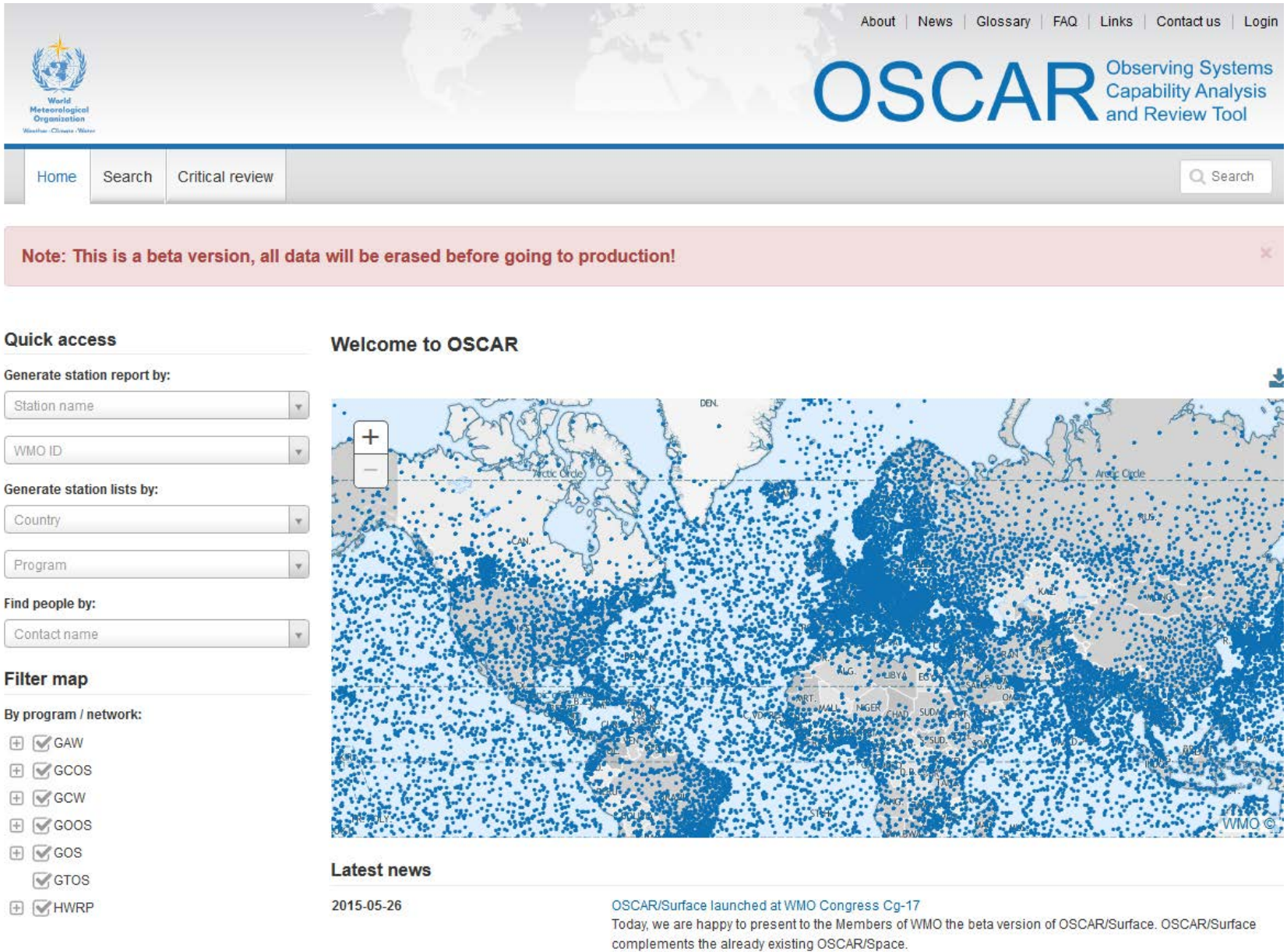
OSCAR/Surface and OSCAR in the WIGOS and CBS frameworks

Presentation by Etienne Charpentier (WMO/OSD)

OSCAR/Surface – oscar.wmo.int/surface

- An evolution/modernization of WMO No. 9, Volume A, Observing Stations and WMO Catalogue of Radiosondes
- Meant to become the official repository of WIGOS Metadata required for international exchange
  - One-stop-shop for surface- and space-based observing instruments & platforms metadata
  - Allows user to understanding observational data
  - Allows to identify potential synergies
  - A tool for developing countries willing to use OSCAR as their primary WIGOS metadata database
- A database for recording surface-based observing systems capabilities for the purpose of the RRR (WIGOS KAA#3)
  - Objective gap analysis / critical review
  - A tool for planning evolution of the observing system
  - Monitoring evolution of capabilities, compare with plans, look at progress

OSCAR/Surface - oscar.wmo.int/surface



OSCAR in the WIGOS Framework

- Contributing to Key Activity Areas (KAA)
  - **KAA#3:** Design, planning and optimized evolution of WIGOS and its regional, sub-regional and national component observing systems
  - **KAA#7:** The WIGOS Information Resource (WIR)
- A component of the WIR – **www.wmo.int/wigos/wir**
  - Goal: Provide single access point for WIGOS stakeholders *(Network decision makers, Implementation Coordinators, Data users etc.)*
  - Shall contain all relevant information on the status and evolution of WIGOS and its components
  - Formally launched at EC-65 (May 2013)

The WIR Components

- The Portal - www.wmo.int/wigos/wir

- The « Standardization of Observations » Reference Tool (SORT)

  Referencing WIGOS related standards and best practices into a database for easy search and access to specific documents and/or sections of documents

- The Observing System Capability Analysis and Review Tool (OSCAR)

  A tool for the WMO Rolling Review of Requirements providing information on (i) observational user requirements, (ii) space-based observing system capabilities, and (iii) surface-based observing system capabilities. Includes a critical review module to compare requirements with capabilities.

The WIR web portal - www.wmo.int/wigos/wir

WIGOS Operational Information Resource

The WIGOS Operational Information Resource (WIR)

Note: *The WIR is currently under construction, and tools and some of the information meant to be delivered here may not be available at this point. These are added gradually, and the plan is to have WIR completed by Cg-17 (2015).*

The WMO Integrated Global Observing System (WIGOS) is an integrated, comprehensive, and coordinated system which is comprised of the present WMO global observing systems, in particular of the in situ and space-based components of the Global Observing System (GOS), the Global Atmosphere Watch (GAW), the Global Cryosphere Watch (GCW), and the WMO Hydrological Observing System (incl. WHYCOS). WIGOS also provides a framework for the contributions of WMO to the co-sponsored observing systems.

The WIGOS Operational Information Resource (WIR) is a network platform and tool designed to provide WIGOS stakeholders with all relevant information on the operational status and evolution of WIGOS and its component observing systems, the operational requirements of WIGOS, including standard and recommended practices and procedures used in the WIGOS framework, and their capabilities to meet observational user requirements of all WMO Application Areas.

The WIR provides information on the following WIGOS topics:

1. WIGOS concept, rationale and benefits
2. Management, and coordination mechanism
3. Design, planning and optimized evolution of WIGOS component observing systems
4. Observing System Operation and Maintenance, and Quality Management
5. Standardization, System Interoperability and Data Compatibility
6. Data Discovery, Delivery and Archival
7. Capacity Development, Communication and Outreach
8. WIGOS component observing systems

WIGOS Tools:

- SORT: "Standardization of Observations" Reference Tool
- OSCAR: Observing System Capability Analysis and Review tool
  - OSCAR/Requirements: Observational User Requirements
  - OSCAR/Space: Space-based capabilities
  - OSCAR/Surface: Surface-based capabilities

The functional requirements of the WIR are available here.

The diagram below summarises the key WIGOS Framework Activity Areas (**click on each activity below for more information**).

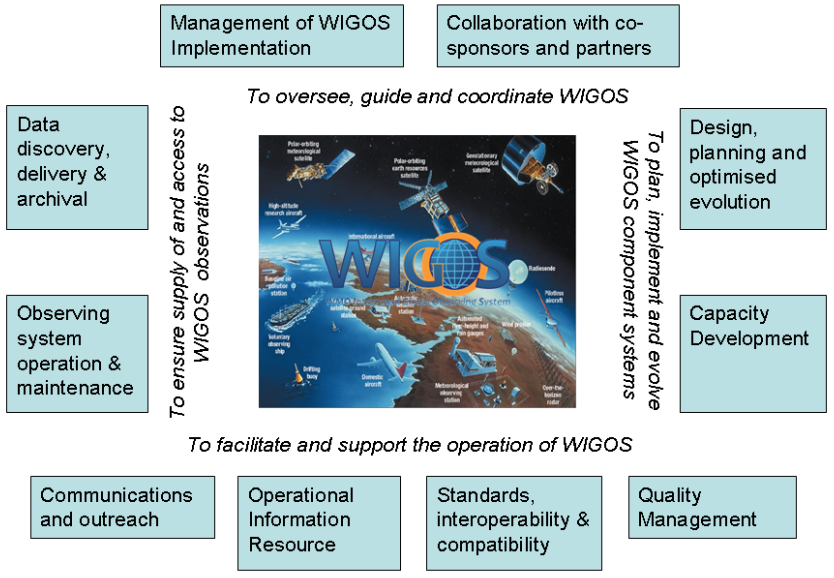
Related items

- Project Office
- Implementation
- RRR
- EGOS-IP
- GOS
- GAW
- GCW
- WHYCOS
- Co-sponsored

Tools:

- WIR
- SORT
- OSCAR
- OSCAR/Requirements
- OSCAR/Space
- OSCAR/Surface

WIGOS Framework: Key activity areas



OSCAR in the CBS framework

CBS Team	Role	Reporting to
ICT-IOS	Lead	ICG-WIGOS
IPET-WIFI	1) Overall coordination and leadership at the technical level 2) Regulatory Materials and metadata required in liaison with ICG-WIGOS and its dedicated Task Teams	ICT-IOS
IPET-OSDE	1) Functional requirements with regard to the tools required for the RRR process 2) Review content required for the RRR process including the observational requirements from application areas	IPET-WIFI
ET-SAT	Space-based observing systems capabilities (programmatic and technical updates)	IPET-WIFI
ET-SUP	Space-based observing systems capabilities (user assessments)	IPET-WIFI
ET-ABO	Aircraft-based observing systems capabilities	IPET-WIFI
ET-SBO	Surface-based observing systems capabilities	IPET-WIFI
ICTSW	Space Weather capabilities (surface- and space-based)	IPET-WIFI

Partnership with MeteoSwiss and status of project

- Partnership with MeteoSwiss (MoU) for OSCAR platform migration and further development
  - Phase 1 (2014/2015):
    - ✓ Adapting OSCAR/Requirements to MeteoSwiss IT infrastructure
    - ✓ Develop OSCAR/Surface with basic observing network types (Annex 1 of doc.) and include it in the MeteoSwiss IT infrastructure
    - ✓ Develop critical review module
  - Phase 2 (2016/2017):
    - ✓ Interfacing OSCAR/Space to MeteoSwiss IT infrastructure
      (user requirements are common to both systems)
    - ✓ Complement OSCAR/Surface with missing observing network types
    - ✓ Integrate Space and Surface into the critical review module ?

OSCAR Platform Project
(Role of WMO for project development)

- Collaborate with MeteoSwiss in further specifying the project goals and functional requirements of OSCAR
- Provide human resources, including project lead and requirements engineer, in support of the project
- Establish the necessary conditions and WMO-internal support for the migration of the “Requirements”, “Space” and “Vol A” components of OSCAR to MeteoSwiss
- Establish agreements with the data owners and/or operators of external data sources regarding operational delivery of metadata needed for OSCAR
- Inform MeteoSwiss on milestones achieved and major deviations from the project plan

OSCAR Platform Project
(Role of WMO for long term maintenance and operations)

- Seek contributions from WMO Members to the WIGOS Trust Fund for OSCAR
- Establish a line item into the WIGOS Trust fund dedicated to the operations, maintenance, and future evolutions of OSCAR
- Establish contract with MeteoSwiss for contributing to the cost of operating, maintaining, and evolving OSCAR
- Maintain the content of the OSCAR system [overall data owner] and provide human resources for quality monitoring of the system, coordination with Members contributing information to the system, reporting, and liaison with MeteoSwiss regarding maintenance, and future evolutions of the system
- Ensure the cooperation of the external (machine-to-machine) data providers
- Propose future evolutions of the system
- Inform MeteoSwiss on any issues concerning this collaboration

Ad hoc Workshop on OSCAR Project requirements (Geneva, 3-4 Sept. 2014)

- Received guidance from ICT-IOS & IPET-OSDE Chairs
- Reviewed obs. Requirements, and WIGOS Metadata Standard
- Agreed on priority for specific platform types
  1. GAW
  2. Vol A (RBCN, RBSN, AWS, Upper Air, aeromet, agromet, radiation stations)
  3. Aircraft
  4. Marine (DB, MB, Profiling floats, Ships)
  5. Surface weather radars
  6. Wind profilers
  7. Aeronautical stations (METAR with ICAO IDs)
  8. Marine (Surface gliders, Tide gauges, Tsunameters)

Ad hoc Workshop on OSCAR Project requirements (Geneva, 3-4 Sept. 2014)

- Agreed on some principles
  - For being representing the capabilities from various types of observing systems in a consistent way, all observations should be represented as virtual observing points
  - Representativeness of an observations is application dependant and can be ignored for assessing the observing systems capabilities in the critical review
  - OSCAR should be able to provide the option of either computing the stated capabilities (i.e. those based on the WIGOS metadata) or the actual capabilities when available (i.e. those based on the monitoring data). However, both sets are not necessarily consistent to each other, and this adds complexity to the system, which will have to be addressed

Ad hoc Workshop on OSCAR Project requirements (Geneva, 3-4 Sept. 2014)

- Action items
  - ET-ABO to finalize and specify the AMDAR metadata required for OSCAR, and the methodology for representing the capabilities

  ⇒ Done
  - ET-SBO to propose to propose simple models (using less than 3 coefficients per platform) for surface weather radars and wind profilers describing the variation of uncertainty, HR, VR, as a function of distance from the observing platform and height

  ⇒ Done (Michelsen et al. model)
  - To discuss with TSMS how to implement the required evolutions of the WRD (i.e. additional metadata), including user interface

  ⇒ Underway
  - To implement the required evolutions of the JCOMMOPS Information System (i.e. additional metadata), including the user interface

  ⇒ Underway

OSCAR Project Teleconference on Surface Weather Radars Requirements (8 sept. 2014)

- Agreed on some principles
  - Quantitative Precipitation Estimation (QPE) products (e.g. Combi-Precip of Switzerland), when available, based on the combination of precipitation observation from various sources (e.g. weather radars, precip. gauges) can be regarded as an additional type of observing system, which metadata should then be recorded in OSCAR. Such QPE shall then preferably be used for the RRR critical review when available as they show the increased performance of such networks when their data are combined. In the contrary, metadata from surface weather radars, and precipitation gauges shall be used individually
  - For RRR gap analysis, it is feasible and accepted to represent the capabilities of a surface weather radar as a cloud of virtual observing points in a 3D shape
  - Each virtual point should be characterized by its Horizontal Resolution, Vertical Resolution, Uncertainty, Timeliness, and Observing Cycle
  - Simple mathematical model could be proposed for deriving the cloud of virtual points on the basis of the surface weather radar capabilities

Status of OSCAR/Surface

Presentation by Jörg Klausen (MeteoSwiss)

Current status of OSCAR/Surface

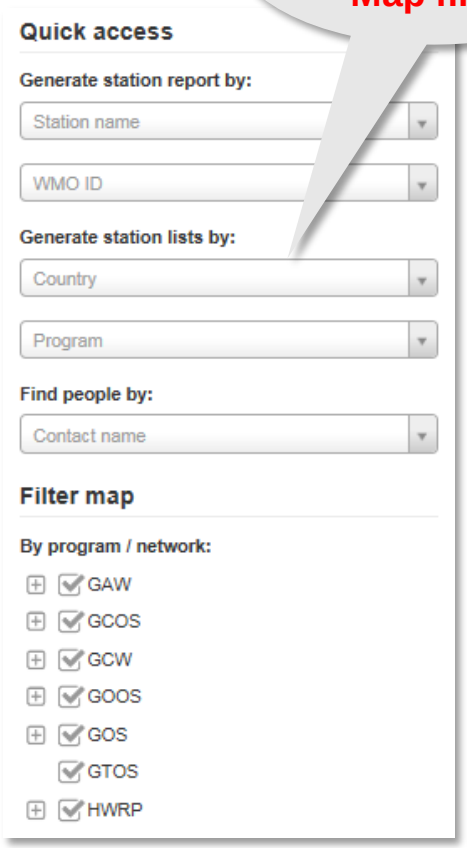
- Successful demonstration of phase 1 prototype at Cg-17 (June 2017)
  - OSCAR Booth
  - OSCAR side Event
  - OSCAR Brochure
  - Members obligations with regard to OSCAR included in Technical Regulations and WIGOS Manual to come into force in July 2016
- Operational as of September 2015

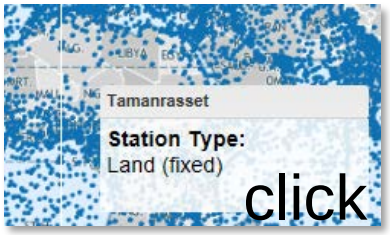
Data integration

	# stations
GAWSIS	
Metadata for the Global Atmosphere Watch	1’053
WMO Pub 9 Vol A	
Catalogue of synoptic and upper-air stations of GOS	13’026
JCOMMOPS	11’387
Marine element of GOS / GOOS	762
WMO Radar DB	
World-wide radars	
Amdar	
Coming soon …	

OSCAR quick access & reports

Quick access & Map filter





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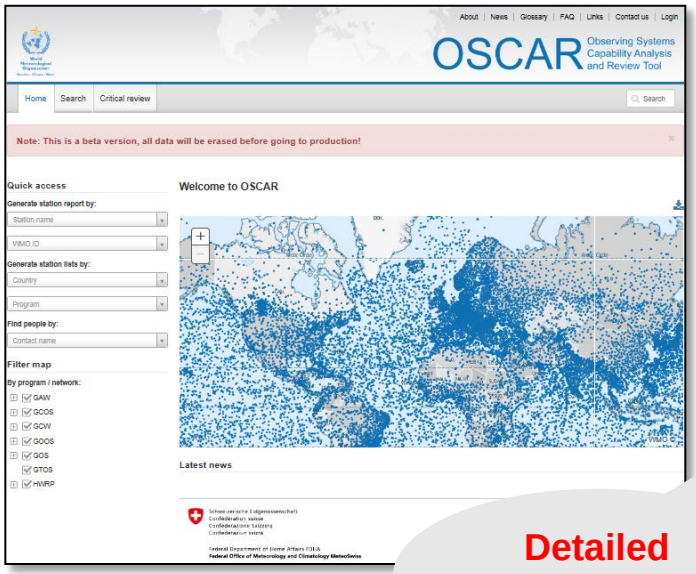

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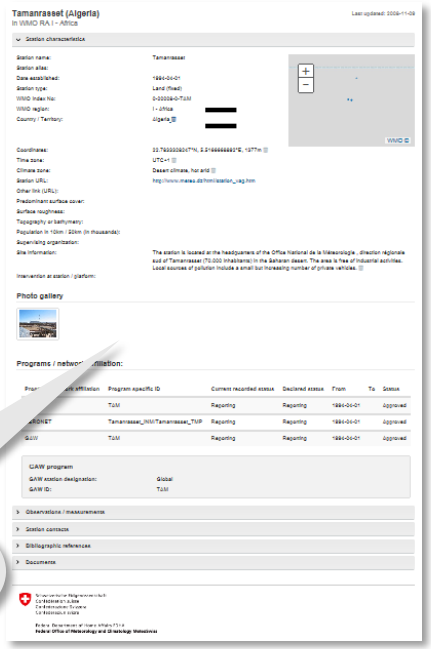


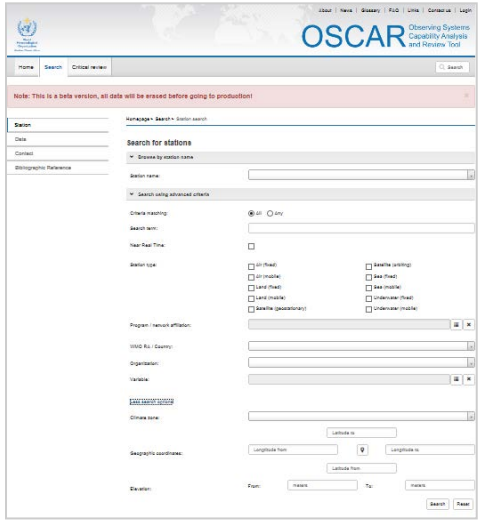
Detailed station report

OSCAR search

Various search targets

- Station
- Data
- Contact
- Bibliographic Reference

Instruments (soon)



Search for stations

Browse by station name

Station name:

Search using advanced criteria

Criteria matching: All / Any

Search term:

Near Real Time:

Station type:
Air (fixed), Air (mobile), Land (fixed), Land (mobile), Satellite (geostationary), Satellite (orbiting), Sea (fixed), Sea (mobile), Underwater (fixed), Underwater (mobile)

Program / network affiliation: RBSN(P), RBSN(SP), RBSN(ST), RBSN(T), WRO

WMO RA / Country: China

Organization:

Variable: Temperature, Air temperature (at specified distance from reference surface), Dew-point ten

More search options

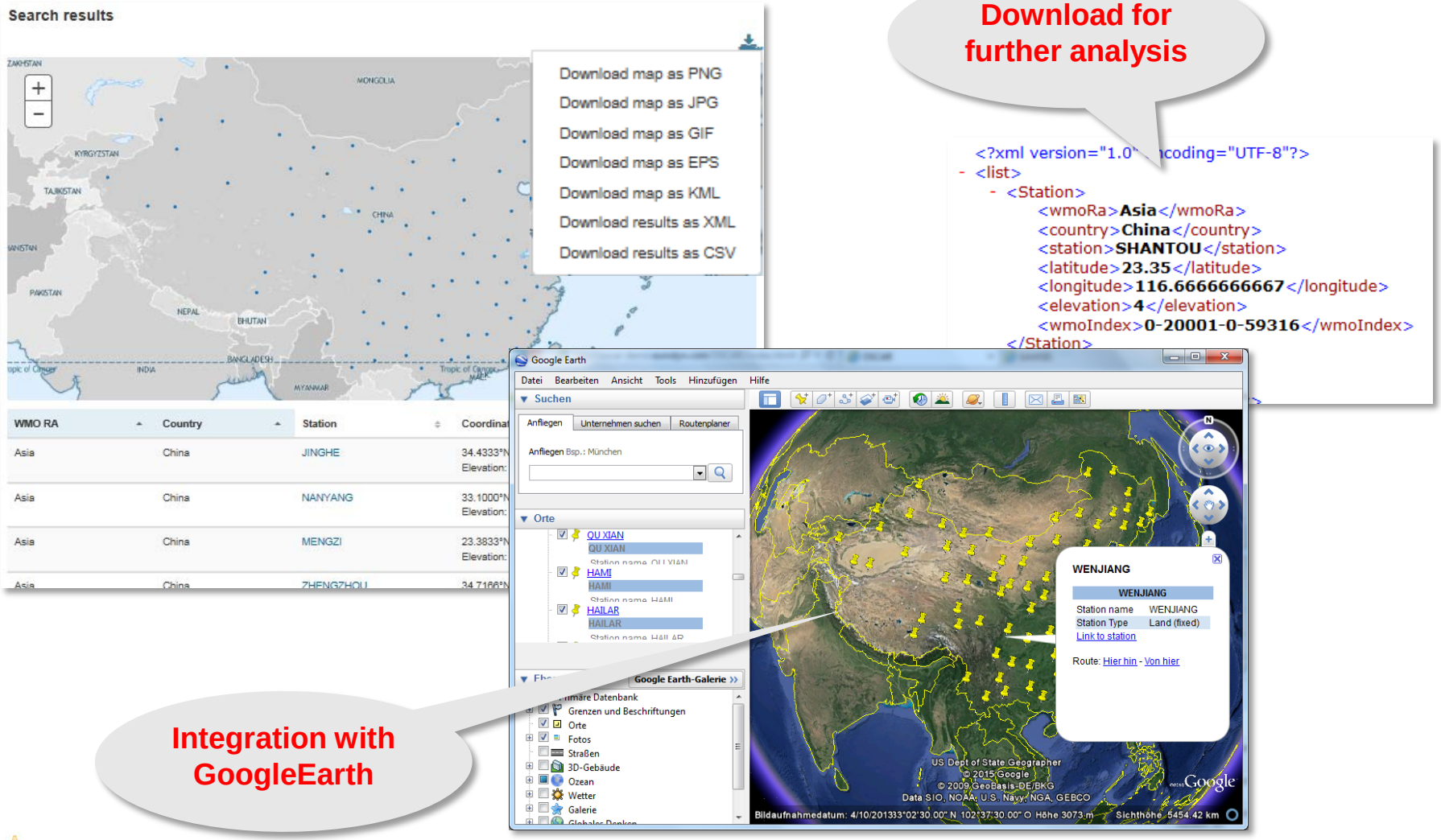
Search | Reset

Finely tuned search

Select program / network affiliation

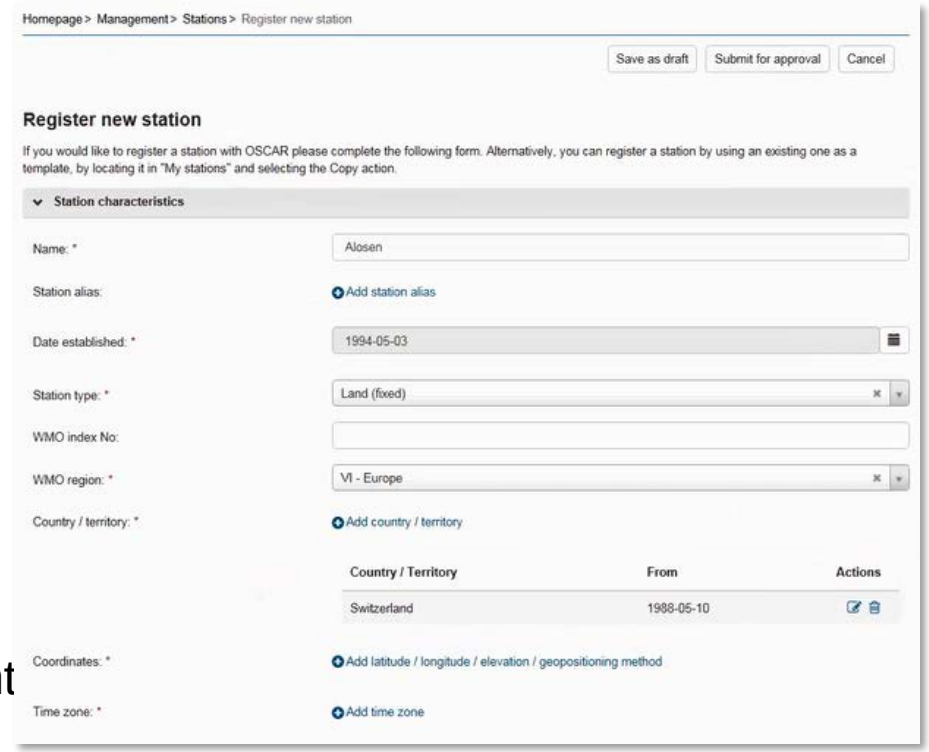
- GAW
- GCOS
- GCW
- GOOS
- GOS
  - AMDAR
  - ANTON
  - ANTON(T)
  - CLIMAT(C)
  - CLIMAT(CT)
  - CLIMAT(T)
  - CTBTO
  - DBCP
  - EOS
  - RBCN
  - RBSN
  - RBSN(P)
  - RBSN(S)
  - RBSN(SP)
  - RBSN(ST)
  - RBSN(T)
  - RCSN
  - SOT/ASAP
  - SOT/VOS
  - WRO
- GTOS
- HWRP

OSCAR search results



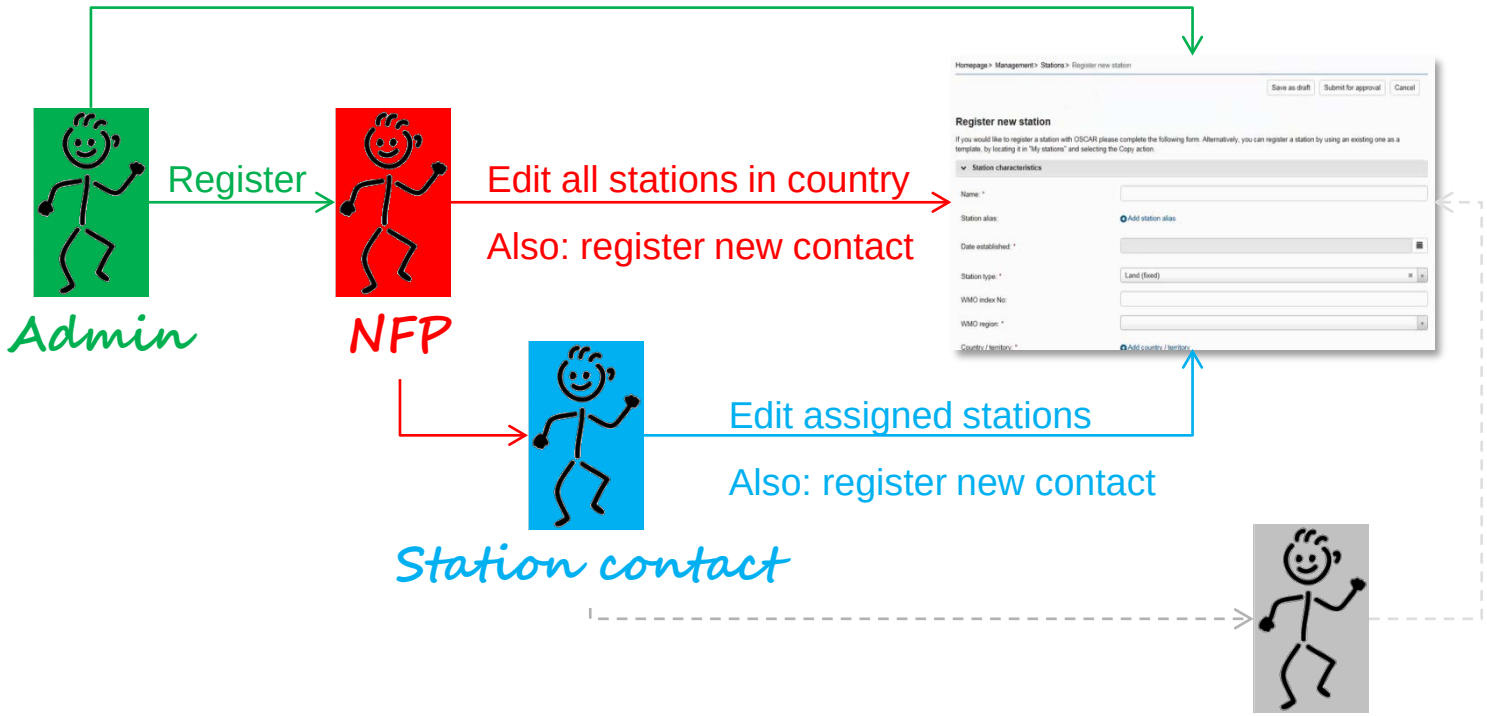
OSCAR management console

- Stations
  - Basic characteristics
  - Photos
  - History
- Observations
  - Location
  - Variable
  - Methods
  - Instruments
  - Quality and uncertaint
  - History
- Contacts
- Bibliographic references



Security and user management

- **Authentification** by identity provider (Swiss Government)
- **Authorization** within application based on «trust-relationships» and various «user roles»



Outlook Phase I (OSCAR/Surface)

- Operational processing of machine-based sources (GAW and related archives, JCOMMOPs, WMO Radar DB)
- Development and implementation of WMDS exchange format for machine-to-machine import/export
  - OGC/ISO-compliant
  - XML, JSON, CSV?
- “Vol A”-legacy export format

- Phase-out of Vol A (by end of 2016)

Outlook Phase II (subject to available resources)

- ABOS/AMDAR interface
- Migration of OSCAR/Requirements
- Interface OSCAR/Space with OSCAR/Surface
- Other data sources for OSCAR/Surface, e.g.

Upper air soundings from ships (ASAP)	Road weather stations	Tide gauges (all)
Remote sensing profiling stations	Urban stations	Aerosol Optical Depth
Lightning detection systems	Research Vessels	Ground-based space weather observing stations
All hydrological Stations (WHOS)	Rigs & Platforms, Automatic Sea Stations	Partner AWS
Ground water stations	Profiling gliders	Webcams

- OSCAR/Analysis (“critical review”) component

World Meteorological Organization

Weather · Climate · Water

Thank you for your attention