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COMMISSION FOR BASIC SYSTEMS
OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS

ITEM: 10.1

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PRODUCT ACCESS GUIDE (PAG)

(Submitted by N Hettich, WMO Secretariat)

Summary and Purpose of Document

This document describes an improved concept of the web-based Product Access Guide (PAG) to guide users to quality-controlled selection of (satellite) products. The new concept introduces a multi-dimensional classification system for uniquely identifiable product collections (using "tags"), allowing more flexibility on the provider side, as well as different presentation options and search possibilities for the user interface.

A mockup of one possible user-interface is available under

<http://app.maqetta.org/maqetta/user/Fnr/ws/workspace/PAG%20Mockup/pag.html>

ACTION PROPOSED

The seventh session is invited to provide guidance on the concept, format and implementation of the proposed PAG concept.

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- Appendices:**
- A. Example Screenshot of the [PAG concept mockup](#)
 - B. New PAG draft concept v.0.7

DISCUSSION

Introduction

Facilitating access to satellite-based products, and providing guidance to users (including those from developing countries) on such products is one of the objectives of the WMO Space Programme. The need for guidance and improved access tools has been expressed through ET-SUP, the Coordination Group for Meteorological Satellites (CGMS), the Polar Space Task Group (PSTG), WMO regional associations and other user groups.

The goal of the Product Access Guide is to provide convenient and user-friendly guidance on how to access a quality-controlled selection of products. This will be achieved by linking to targeted product collections made available by product providers (initial focus is on satellite-based products; later expansion to other product families is possible).

The goal of the Product Access Guide is NOT to duplicate the developments in the context of the WMO Information system (WIS) nor other comprehensive metadata-based portals such as the GEO Portal. It aims to be a guidance material, and would be registered as a service in the WIS.

With ET-SUP guidance, two prototype versions of product access guides were developed by the WMO Space Programme office, one for Earth Observation satellite products (http://www.wmo.int/pages/prog/sat/product-access-guide_en.php), and the other for space weather products (http://www.wmo.int/pages/prog/sat/spaceweather-productportal_en.php).

Innovation in the refined concept

In 2013, based on input by ET-SUP and other experts, the WMO Secretariat reviewed the PAG concept (See Appendix B) taking into account the following issues:

- An investigation of product providers' catalogues showed that these are all structured in different ways or use different semantics for the product categories, making it difficult to find an agreement on a common organizational structure of categories.
- A strictly hierarchical taxonomy may not be suitable, as some product collections will fit into more than one category (e.g. products mixing 2 variables, or variables being at the boundary of 2 geophysical domains).
- With the perspective of the WMO Integrated Global Observing System (WIGOS), the concept should be broad enough to integrate the scope of the existing prototypes (initial PAG and Space Weather Product Portal) and address the needs of other communities such as regional projects and e.g. the cryosphere community.

To respond to these issues, a flexible and multi-dimensional classification is introduced (using "tags" to classify product collections). The presentation would no longer be determined by one hierarchical structure of categories, thus allowing searching and presenting the results in different ways, for instance:

- by (geophysical) domain (Atmosphere, Land, Ocean, Space)
- by theme (Cryosphere, Tropical Regions, Space Weather, Agriculture...),
- by region (Africa, Asia, N/C/S America, Oceania, Europe, Arctic, Antarctica, Sun..)

The concept is illustrated by a user-interface mock-up that has been only partly populated for demonstration purposes:

<http://app.maqetta.org/maqetta/user/Fnr/ws/workspace/PAG%20Mockup/pag.html>

Requirements on the provider side

To be eligible for entry in the PAG, product providers would basically need to ensure the following: *(detailed requirements on product quality and metadata are explained in the concept paper in Appendix B)*

1. Product providers need to provide **unique and stable** URLs linking directly to individual product collections (and not to an overview/portal page).
2. These product collections must be structured in a way that they can be **comprehensively** described with at **least 1 and at maximum 3 tags** of the main tag tree (Domain).

Proposed work plan

The concept foresees a dynamic, database-driven web application initially hosted by the WMO secretariat. An iterative process with close involvement of the satellite data providers and envisaged users is proposed.

Upon:

- approval of the concept, and
- commitment of at least some product providers to comply with the stated requirements.

a first version of the PAG could be implemented within 1-2 months. Based on the availability of content (i.e. compliant links of provider catalogues) and user feedback, a second version with improved and additional functionality could be made operational in 2014.

Conclusion

Even though the new PAG concept allows for more flexibility on the provider side in terms of structure and wording, the overall success of the PAG depends on the ability, willingness and technical means of providers to comply with the functional requirements. This requests good communication and collaboration between the WMO Space Programme office and points of contact to be designated by the satellite operators.

Mockup of one possible PAG user interface

PAG Interface Mockup

Search (not active)

Search by Theme | Search by Domain | Search by Region

- Cryosphere
- Tropical Regions
- Agriculture

Results for "Cryosphere"

Source	Product collection	Other semantic tags
NOAA	NOAA National Ice Center	Sea Ice, Snow, Ice Sheets, RA 4, RA 2
ESA	ESA Snow and Ice product collection	Sea Ice, Snow, Glaciers & Ice caps
JMA	JMA Snow Ice Products	Snow, RA 2
NASA	Nasa Earthdata Snow Cover Products	Snow, Global
NASA	Nasa Earthdata Land-Ice Products	Glaciers&Ice caps

Note: This mockup only contains some links to product collections which fulfil the concept requirements

The mockup only shows some of the planned functionality.

The concept also foresees the option to make advanced queries, e.g. "show all Vegetation related products in Region 4, used for Agriculture" etc.

For each link to a product collection, additional info can be saved and displayed, such as related training material, provider information etc.

In a later version, information from other WMO sources such as OSCAR could be linked with the information here , e.g. instruments relevant to a specific product category.

**Product Access Guide (PAG)
Concept and Specifications
V 0.7.1**

DOCUMENT CHANGE RECORD

Date	Author, Nature of Change	Version
20.01.13	N Hettich - Initial draft	v0.1
12.02.13	J Lafeuille – re-structured	v0.2
13.02.13	N Hettich re-draft	v0.3
22.02.13	J. Lafeuille	V0. 4
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01.03.13	N Hettich, re-formulated, examples	V 0.4.2
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04.03.2013	J. Lafeuille – S. Bojinski - clarifications	V 0.4.4
08.03.2013	J. Lafeuille, S. Bojinski	V 0.5
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23.04.2013	N Hettich - Changes of M Drinkwater, back to 4 main domains, additional user view example	v 0.7
24.04.2013	S. Bojinski – copy editing	V 0.7.1

1. INTRODUCTION

1.1 Purpose and scope of the document

This document describes the planned functionalities of the online Product Access Guide (PAG), an online resource maintained by WMO to facilitate access by users to satellite-based¹ geophysical products, with a view:

- To seek endorsement by the appropriate bodies and stakeholders
- To provide then a firm basis for the development
- To provide a firm basis for agreeing the interfaces with the data providers
- To inform the WIGOS project on progress of the related WIGOS Action

1.2 Document structure

- Section 1 introduces the document
- Section 2 introduces the specific terminology used in the document
- Section 3 describes the goal of the PAG
- Section 4 describe the specifications related to the main functionalities, the user interface, the data provider interface
- Section 5 addresses the maintenance and security.
- Section 6 discusses the risks, and relevance of the PAG to other applications.
- Examples are provided in the Annexes.

1.3 Assumptions

- The products of interest are listed and described in online catalogues maintained by the provider organizations (e.g., satellite operators; meteorological services).
- The providers retain full ownership and responsibility for their product catalogues.
- Although harmonization will be encouraged, it is assumed that provider catalogues are structured in different ways and use different semantics for the product categories.
- The PAG shall be part of the WMO website, and be included in the future WMO web infrastructure, based on a Content Management System (CMS). The migration of the WMO web to the CMS architecture is planned for end 2013.
- It is assumed that the specifications of the CMS-based WMO web infrastructure will allow to directly edit the PAG code base or, alternatively, create a custom PAG plugin for direct inclusion of the PAG user interface on the WMO SP page.

1.4 Open issues

- What degree of structural harmonization will be necessary between the providers' product catalogues and the PAG in order to make the PAG an effective search tool? The maximum number of tags² relevant for each product collection is TBC.
- Will the scenario and timeline for the migration to a new CMS be compatible with the implementation scenario outlined in Section 6.3?

¹ Eventually, non-satellite-based datasets and products can also be included in the PAG.

² See section 3.2 for details.

- Which entities are eligible to contribute product collections to the PAG (satellite operators of WMO Members; other national/regional entities collaborating with these satellite operators and acknowledged in the satellite scientific or operational community; others)?

These open issues are expected to be closed in a revised version of this document, at an early stage of the development.

1.5 Applicable and reference documents

Applicable documents

- [A1] WMO web security standards and procedures..([reference needed])
- [A2] WMO web editorial policy ([reference needed])
- [A3] [WMO Core metadata profile](#)

Reference documents

- [R1] [ET-SUP-6 Final Report](#), Section 14.1
- [R2] [Prototype PAG](#)
- [R3] [CGMS-39 Final Report](#) (Action 39.53)
- [R4] [RA II Pilot Project for the development of support for National Meteorological and Hydrological Services \(NMHSs\) in the areas of](#)
- [R 5] [RA-II Pilot Project Data and Products website](#)
- [R 6] [ICTSW-3 Final Report](#) (Section 5)
- [R 7] [Space Weather Product Portal concept and status](#) (ICTSW-3/Doc.5.1)
- [R 8] Space Weather Product Portal (http://www.wmo.int/pages/prog/sat/spaceweather-productportal_en.php)
- [R9] [GSICS product catalogue](#)
- [R10] [PSTG-2 Final Report \(Appendix III, p18 – identifying demand for inventory of satellite products for the cryosphere\)](#)
- [R11] WIGOS Implementation Plan Ver.0.1, Action 7.1.2
- [R12] Group on Earth Observations [GEO portal](#)
- [R13] QA4EO principles (http://qa4eo.org/docs/QA4EO_Principles_v4.0.pdf)
- [R14] Climate and Forecast (CF) Convention and mapping to PCMDI variable names <http://cf-pcmdi.llnl.gov/documents/cf-standard-names/pcmdi-name-cf-standard-name-mapping>
- [R15] [Del.icio.us website](#) (Example of a tagging concept for organizing URLs)
- [R16] [WMO OSCAR tool](#)
- [R17] [Inspire GeoPortal](#)
- [R18] [WIS GISCs](#)

TERMINOLOGY USED IN THIS DOCUMENT

Domain	High-level classification of the natural environment, e.g. Land, Ocean, Atmosphere, Space
Application	Application area for earth observation products, e.g. Agriculture, Disaster Risk Reduction, Cryosphere
Portal	A comprehensive online resource for the discovery of information on a specific topic
Product	Dataset containing environmental information based on observations, usually at the level of geophysical variables ³
Product collection	An online resource, accessible through a unique URL with information, metadata and access to 1 or more individual satellite products
Region	A geographical region
Tag	Piece of semantic information (e.g., keyword) that can be attributed to an item stored in the PAG, such as a URL
Tag tree	The hierarchical structure in which tags are logically classified

³ I.e. data processing level 2 or higher following the terminology of [CEOS \(2008\)](#)

2. GOAL OF THE PAG

Goal of the Product Access Guide (PAG), an online resource maintained by WMO, is to facilitate access by users to satellite-based⁴ geophysical products⁵, and to provide guidance on products where possible.

2.1 Expression of needs

Several requests have pointed to the need for a PAG:

- User enquiries to WMO Members have regularly indicated the lack of awareness on availability and accessibility of products;
- Satellite user representatives in ET-SUP have expressed the need for easily accessible information on what satellite-derived products are available, and how to access them. The ET-SUP-6 meeting advised on the scope of a PAG and the information to be included, and agreed two actions (ET-SUP 6.2 and 6.3) [R 1]. A concept of PAG was discussed and a prototype set up [R 2];
- CGMS-39 was introduced to this development and gave action to WMO to present a refined concept [R3];
- Within WMO RA II, a similar need has motivated the RA-II Pilot Project on supporting NMHSs for the use of satellite data [R 4], which coordinated a regional Data and Products portal demonstrator, hosted by the WMO SP web site [R 5] ;
- At a side event of 16th World Meteorological Congress in 2011, Space Weather stakeholders have requested the development of a Space Weather Product Portal in order to provide visibility on, and access to, available products, as a sort of demonstration for potential new users. The concept of a Space Weather product portal [R 6] was discussed at ICTSW-2 and ICTSW-3 [R 7] and a first version of a Space Weather product portal was set up in January 2012 [R 8]. EC-64 welcomed this portal and urged Members to provide input to expand it;
- The GSICS Executive Panel requested to implement a GSICS product portal. The GSICS Product Catalogue was developed and implemented on line [R 9]
- The Polar Space Task Group identified the need for an inventory of satellite-based products for the cryosphere [R 10]

In parallel with these converging requests and actions, several constraints were highlighted:

- Not to duplicate the developments engaged in the context of WIS, but build on them when relevant;
- Not to duplicate other efforts facilitating access to data, such as the GEO Portal
- To unify these different Space Programme product portals if relevant
- To unify all the observation product portals within WIGOS, if relevant.

⁴ Eventually, non-satellite-based datasets and products can also be included in the PAG.

⁵ Data processing level, defined as “Geophysical value at instrument pixel resolution”; see terminology proposed by [CEOS \(2008\)](#)

Subsequently, the following action was defined in the WIGOS Implementation Plan [R 11]:
WIP Action 7.1.2 : to investigate the need for a database describing the Global Observations Products (Satellite Data, Weather Radar).

Description: Experience with user communities shows their need for high level guidance on accessing satellite products; the Activity will refine these needs and devise a way forward, building on experience with the Product Access Guide and other online portals, thereby avoiding duplication with WIS and ensuring sustainability. WIS catalogues maintained by GISCs will provide, ultimately, extensive reference information on satellite and radar data and products; Implementation is anticipated for late 2013 and 2014.

2.2 Goals and Objectives

The PAG is not meant to become another comprehensive Product portal such as the [GEO portal](#) [R 12], the INSPIRE-GEO portal [R17], or the WIS portals [R18].

The goal of the PAG is to provide convenient and user-friendly guidance on how to access a quality-controlled selection of products. This will be achieved by linking to targeted product collections made available by product providers.

One key target audience are the least-experienced satellite data users, in particular from developing countries.

The more specific objectives of the PAG are:

- To guide users in their search for products, by offering different views/entry points to the PAG, e.g. by domain, application or region ;
- To enhance the visibility of products provided by the various providers and facilitate increased usage of those products;
- To provide, where possible, guidance to users on the quality and applicability of products, for example by linking to international scientific expert groups;
- To encourage harmonization of providers' product catalogue structures and of the documentation associated with the products.

3. PAG SPECIFICATIONS

3.1 Scope of the PAG

S1: The PAG is an online tool, hosted by WMO, providing links to selected online resources containing product descriptions and—if available- links to online products.

S2: The PAG does not link to **individual products**, but to **collections of products** (e.g. global fire products, products related to the cryosphere, regional product collections etc.), each collection being provided by one organization.

Two steps are envisaged, in a first step the PAG will guide to product collections responding to priority needs, and enabling to validate the PAG concept. These priorities will be developed with the groups having expressed the need for a PAG listed in section 3.1. In a second step, the scope of PAG will be reviewed and possibly extended based on user feedback, feasibility, operational experience, and management guidance.

S3: In the first version, the scope of the PAG shall be limited to collections of near-real-time products.

S4: The extended scope in the second step could include collections of archived data sets, training material, scientific guidance on product utilization, calibration information.

3.2 Conceptual Architecture of the PAG

An investigation of product providers' catalogues (such as those maintained by satellite operators) showed that these are all structured in different ways or use different semantics for the product categories, and have different sets of metadata to describe the products. This supports the assumption that an agreement on all these points across all product providers is unlikely.

In addition, a strictly hierarchical taxonomy may not be suitable, as some product collections will fit into more than one category (e.g. products mixing 2 variables, or variables being at the boundary of 2 geophysical domains). Instead of a static hierarchical structure, a flexible system shall be designed: the PAG shall use semantic pieces ("tags") which are attributed ("tagged on") to product collections of providers (see for example [R15]).

This has driven the overall concept, as detailed below.

S5: The PAG shall be a dynamic web directory structured according to the principle of attributing pieces of semantic information ("tags") to the URLs of providers' product collections.

S6: Tags are organized in a "tree" structure, with different trees corresponding to different types of criteria: DOMAIN, Application, Geographical Area, Source, Timeliness, etc (see Figure 1).

S7: DOMAIN shall be the principal tree, every item in the PAG (i.e., every link to a product collection) has to be associated with at least one tag from the DOMAIN tree; tags from the other trees are optional.

S8: Tags are based on a controlled vocabulary which can be adapted to users' and providers' needs, using existing standards where possible [R14].1`

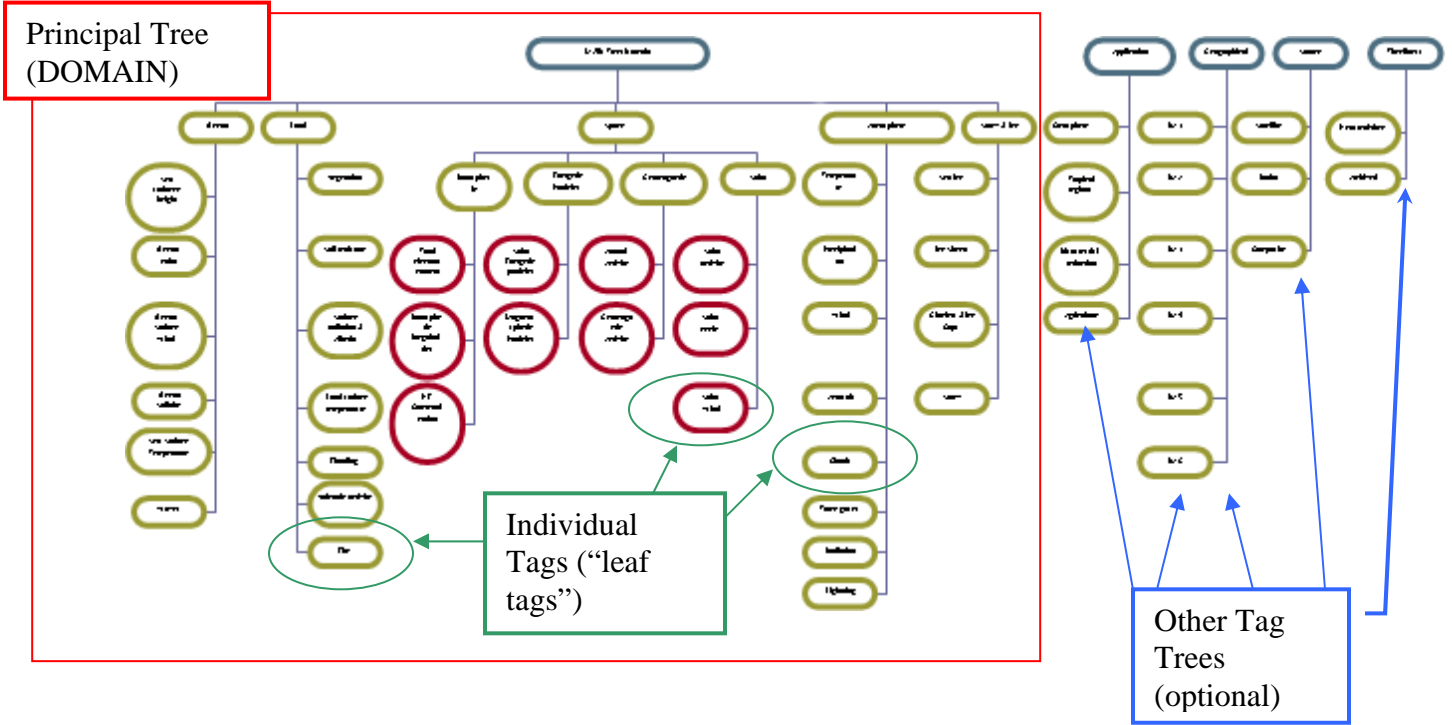


Figure 1: Schematic view of the tag tree structure used for describing and selecting PAG entries
 (Note: An enlarged version of this Tag tree is provided in Annex 1)

3.3 Specifications of providers' input

Users can only take full advantage of Products if these products are adequately documented and accessible. It is also the responsibility of WMO to ensure that the information provided through the portal meets minimum quality criteria, and respects the ownership of the providers.

S9: The minimum metadata that shall be associated with each product in a product collection are:

- Point of contact (for information on the product collection),
- Product identifier,
- Providing organization
- Data source
- Information on access (e.g., online, DVB-S broadcast, ...)
- Applicability domain (targeted use, for which it has been validated)
- Geographical region (if applicable)
- Resolution (horizontal, vertical)
- Update frequency
- Quality indication (e.g., in accordance with QA4EO principles [R13])

(Note: if products are registered in the WIS, all this information is normally available and included in the WIS metadata).

S10: The ownership of the products and its accessibility shall be guaranteed by the providing organizations. If there are legal restrictions to the use of the products, these shall be specified by the providing organization and recorded in the appropriate field, otherwise the product is deemed to be usable without legal restriction.

S11: All information on the products is managed directly by the providers who retain full control and visible ownership of their products.

S12: Product collections can be submitted by official satellite operators of WMO Members, and other national/regional entities collaborating with these satellite operators and acknowledged in the satellite scientific or operational community [TBC]

3.4 Pre-requisites on providers' catalogue structure

S13: An essential requirement to enable this concept to be effective is that **stable URLs** are provided ; these URLs should **link directly to individual product collections** (not to an overview/portal page).

This pre-requisite can be achieved either through static web pages with a stable URL, or through a dynamic, database driven catalogue where all necessary parameters for accessing a specific collection can be parsed through a unique URL .



Figure 2: Example for a static webpage used by [NOAA OSPO](http://noaa.gov)

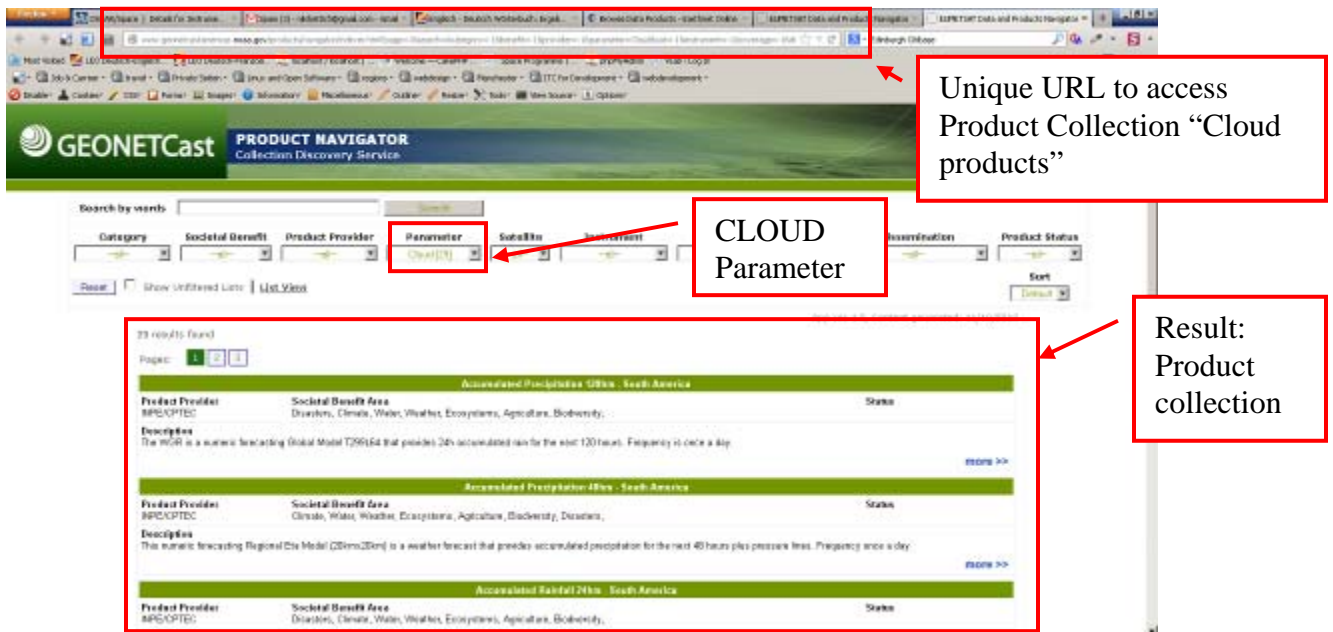


Figure 3: Example of a dynamic system where individual product collections can be accessed through a unique URL used by the [Geonetcast Product Navigator](#)

Each product collection must be described by one, or a combination of several, tags. In order to ensure efficient search through the PAG, the Providers product collections must be targeted. This would be facilitated if the provider’s catalogue structure did not depart too much from an agreed tag tree structure. The tag trees may evolve with time. This entails further prerequisites on the product collections that will be linked to the PAG, as indicated below:

S14: Product collections shall use at **the minimum 1 and at the maximum 3 tags** of the main tree (Domain). If this is not possible, the product collection would not be eligible for entry in the PAG.

S15: The number of product collections associated to one individual tag of the main tree **shall not exceed 20 [TBC]**.

S16: For tags from each of the optional tag trees (Application, Geographic area, Source, etc) there is no minimum number (since these tags are optional); the maximum number is **[TBD]**.

S17: Only “leaf tags” (the lowest level on each tree) may be attributed to product collections. (The higher level tags are only used for searching)

3.5 *PAG public user interface and functionalities*

S18: The user interface shall offer multiple ways and criteria to select the product collections linked through the PAG. This shall include:

- A hierarchical tree-based view, to select Product collections by Domain and Parameter, e.g. Land-> Land Surface Temperature
- Direct search possibilities based on the tag keywords
- Possibility to query and filter data based on the semantic tags attached.

S19: In the user interface, a query using a combination of tags within one tree (principal or optional trees) shall mean a logical “OR” that widens the search to any of the selected tags. (Example:”Show all product collections classified as SOIL MOISTURE or FLOOD products”).

S19bis: In the user interface, a query using a combination of tags from different trees (principal and optional trees) shall mean a logical “AND” that narrows down the selection. (Example: “Show all LAND product collections which are used for AGRICULTURE”).

4. MAINTENANCE AND SECURITY SPECIFICATIONS

4.1 Maintenance of the PAG structure

S20: The classification structure (tag tree) must be flexible to take into account changing product collections and user needs. The following functionality must be available to an Administrator:

- Modify, add and delete tags, and re-classify attached product collection URLs if necessary
- Modify constraints for the data entry (Number of tags possible per URL and tree branch, Maximum number of entries in the PAG)

4.2 Maintenance of content

S21: In order to keep the regular maintenance sustainable, the total number of links to product collections is limited to 300.

S22: Before inclusion of a URL, every product collection it refers to shall be checked with respect to the conditions outlined in **3.3** and **3.4** above. Additionally, duplicate URLs are not allowed. The results of the check shall be recorded.

S23: A procedure (TBD) will be defined to check on a regular basis, (e.g., once a year) that the product collections are compliant with the conditions outlined in **3.3** and **3.4** above, qualitatively and quantitatively. Tools shall be made available to regularly check for dead URLs (Links)

S24: Peer-review (e.g., including advice on acceptance of products) and overall annual evaluation of the PAG shall be provided by expert team representatives, including from ET-SUP, supported by the WMO Secretariat.

4.3 IT security considerations

S25: The Web application must comply with WMO web security standards and procedures.

S26: A procedure for regular backups of the content and application must be defined.

S27: Provisions shall be made to make the PAG interoperable with other WMO SP and WIGOS tools and information systems such as OSCAR [R16]

5. DISCUSSION

5.1 Challenges

The flexible tag system of the PAG avoids any redundancy when storing data items. However, if the provider catalogue structure deviates much from the structure used in the tag tree, there will be a high probability of duplicate entries on the presentation side, i.e. when displaying the results of a query. Furthermore, a link will be less relevant to one specific tag, i.e. if the product collection it links to is not defined with an appropriate granularity. (See example in Annex 2)

Deprecated/broken links are also a problem that needs to be addressed. It could also be possible that provider pages are re-structured so that their “tags” no longer match. Automated technical checks might help here, but regular manual maintenance of the PAG will be required.

The relevance and functionality of the PAG depends on the interface of the PAG with the respective providers catalogues. The overall success of the PAG is therefore dependent on the ability, willingness and technical means of providers to comply with the functional requirements, and to make changes if necessary to achieve such compliance. This requests good communication and collaboration between the WMO Space Programme office and points of contact to be designated by the satellite operators

5.2 Other considerations

This proposed tag system can also be relevant beyond the PAG. It can be used to classify and semantically enrich other information provided and maintained by the WMO Space Programme and in the wider WIGOS context, such as physical variables, satellites, instruments etc. This opens a very interesting potential to link related information.

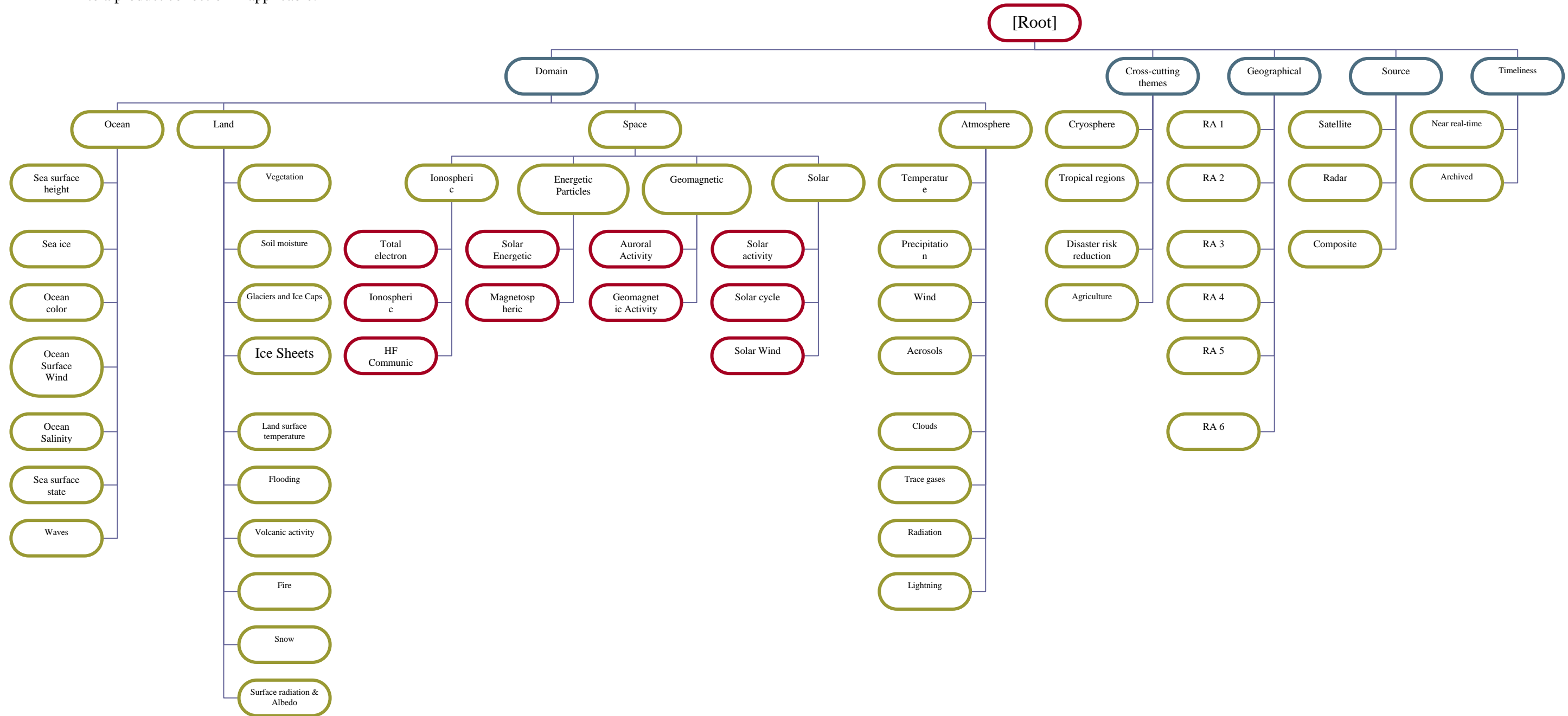
5.3 Implementation scenario

The following steps are proposed:

- May 2013: Review/validation of the PAG Concept and Specifications by ET-SUP
 - July 2013: Validation of the PAG Concept and Specifications by CGMS-41 WG-IV
 - July 2013: Internal kick-off of the development
 - October 2013 (TBC) migration to CMS web offering expected functionalities (TBC)
 - July-November 2013: interaction with product providers
 - December 2013: prototype available, report to WIGOS Project Office on Action 7.1.2
 - July 2014: Review by CGMS-42, internal kick-off of the operational implementation
-

ANNEX 1: Preliminary tag tree (used internal to the PAG)

Note: The main tree is the DOMAIN one. Tags from other trees are optional and should only be attached to a product collection if applicable.



Annex 2: Process Example

As an example, we take 6 links from different providers with product collections related to the Snow & Ice domain to show how the concept could work. These links are then semantically tagged and saved (using tags from the example tag tree above):

- [NOAA National Ice Center Snow and Ice Products](#) SEA ICE SNOW ICE SHEETS Cryosphere RA4, RA6, RA2
- [ESA Snow and Ice product collection](#) SEA ICE SNOW GLACIERS&ICE-CAPS Cryosphere
- [JMA Snow Ice Products](#) SNOW RA2 Cryosphere
- [GeonetCAST Sea Ice Products](#) SEA ICE Cryosphere
- [Nasa Earthdata Snow Cover Products](#) SNOW Cryosphere
- [Nasa Earthdata Land-Ice Products](#) GLACIERS&ICE-CAPS Cryosphere

It can be noted that there are different levels of granularity used in these product collections, which is why some are tagged with multiple tags from the branch. Note that the limit of tags that can be attached from the main tree (in green) is 3, which is met by the first 2 links.

Stored in such a way, these entries can be presented in numerous ways, e.g. in a Regional Portal, in a thematic context, e.g. Cryosphere, or in a hierarchical browsing taxonomy using the domain sub-tree as shown below. Search and filter possibilities, e.g. by topic, application or region could also be offered (depending on implementation details)

PAG User Interface examples

This first example shows a view of the user interface when selecting a cross-cutting theme, such as “Cryosphere”:

Cryosphere

- [NOAA National Ice Center Snow and Ice Products](#)
- [ESA Snow and Ice product collection](#)
- [JMA Snow Ice Products](#)
- [GeonetCAST Sea Ice Products](#)
- [Nasa Earthdata Snow Cover Products](#)
- [Nasa Earthdata Land-Ice Products](#)

The second example shows how the same links would be presented in a domain-based view

- **Ocean**
 - **Sea Ice**
 - [NOAA National Ice Center Snow and Ice Products](#)
 - [ESA Snow and Ice product collection](#)
 - [GeonetCAST Sea Ice Products](#)
- **Land**
 - **Snow**
 - [JMA Snow Ice Products](#)
 - [ESA Snow and Ice product collection](#)
 - [NOAA National Ice Center Snow and Ice Products](#)
 - [Nasa Earthdata Snow Cover Products](#)
 - **Ice Sheets**
 - [NOAA National Ice Center Snow and Ice Products](#)
 - **Glaciers & Ice caps**
 - [Nasa Earthdata Land-Ice Products](#)

In this example, some entries will be visible in more than 1 category, as the tagged links do not always exactly correspond to the tags used by the PAG. Depending on the envisaged usage, this might not be an issue. To minimize such redundancies, the matching of data entries with categories has to be improved.

Two approaches are possible to achieve this matching:

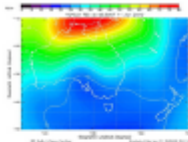
- Providers adapt the structure of their product catalogue along the lines of the PAG tag tree structure,
- And/or the PAG tags (and hence its tree structure) are adapted to better suit the various sources it links to. (In our example, this could mean to reduce the granularity)

Annex 3 Product Collection Example

[Example for product collection](#), associated with the “Total electron content” tag, which fulfils metadata requirements (Description, Data Source, Timeliness, Product Link...)

Total Electron Content

Australian region Total Electron Content map



[Product Link](#)

Product Description

2D map showing near real-time ionospheric Total Electron Content (TEC) conditions. Map produced by combining regional GNSS data with the IRI-2007 ionospheric model driven by real-time foF2 observations from IPS ionosondes distributed throughout the region. The ionosphere is modelled as a thin shell at a fixed height of 400km. Slant delay from GPS satellite to GPS receiver can be estimated from this map, for ionospheric correction.

Target Users

Include industries relying on high-accuracy GNSS positioning: agriculture, surveying, construction, drilling.

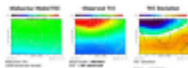
Data Source

Australian GPS data

Cadence

Hourly

Current regional map compared with Klobuchar model



[Product Link](#)

Product Description

A near-real-time comparison of the current (observed) regional TEC map with that of the Klobuchar ionospheric model using the latest coefficients broadcast by GPS satellites. The Klobuchar model is widely used to correct for the ionosphere in single frequency GPS applications, and hence the difference between the observed and modelled TEC is an indicator of the degree to which the ionospheric effect has been corrected for in single frequency GPS applications.

Target Users

Key product users include industries relying on high-accuracy GNSS positioning: agriculture, surveying, construction, drilling.

Data Source

Australian GPS data

Cadence

Hourly