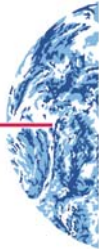







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S P O T
IMAGE



Industrial Direction

Spot catalogue HMA interface ebRIM profile

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Used Abbreviations

ESA	European Spatial Agency
AT	Shift Along the Track
BD	To Be Defined
EO	Earth Observation

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1 Introduction

1.1 Purpose

This document describes the mapping of data and services between wsDali and CSW/ebRim HMA interface.

The document "S-IF-CH/IE-03-SI_MappingHmaSpot" written by Françoise Monge for the HMA ISO proxy development has been widely reused for writing this one.

1.2 Applicable documents

- | | |
|-----|---|
| DA1 | 06-131r5 - OGC™ Catalogue Services Specification 2.0 Extension Package for ebRIM Application profile : Earth Observation Products Version 0.2.2 |
| DA2 | 07-006r1 - OpenGIS Catalogue Services Specification Version 2.0.2 |
| DA3 | 06-080r4 GML Application Schema for EO Products Version 0.9.3 |
-

1.3 Reference documents

- | | |
|-----|--|
| DR1 | S-IF-CH/IE-03-SI Spot Catalogue HMA Interface Ed1 Rev0 |
|-----|--|
-

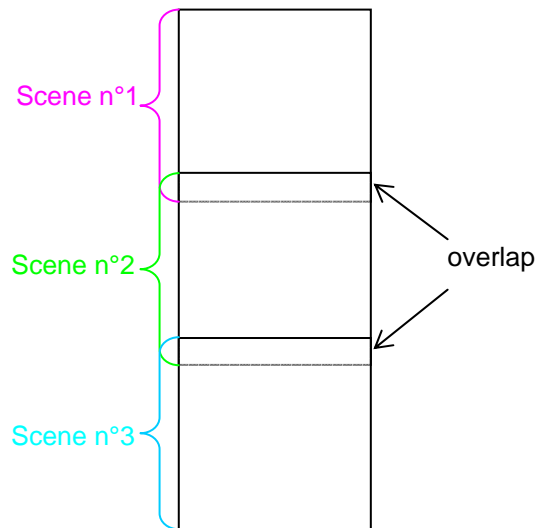
2 Spot Catalogue data

The Spot catalogue includes metadata and preview (so-called Quick Look) of all images acquired by Spot 1 to Spot 5 satellites, from 1986 up to now.

2.1 Metadata

Spot satellites acquire long data strips of 60 kilometers swath at nadir. These data strips are split into 60 kilometers high scenes. There is an overlap between two adjacent scenes of data strip. This overlap depends on the latitude.

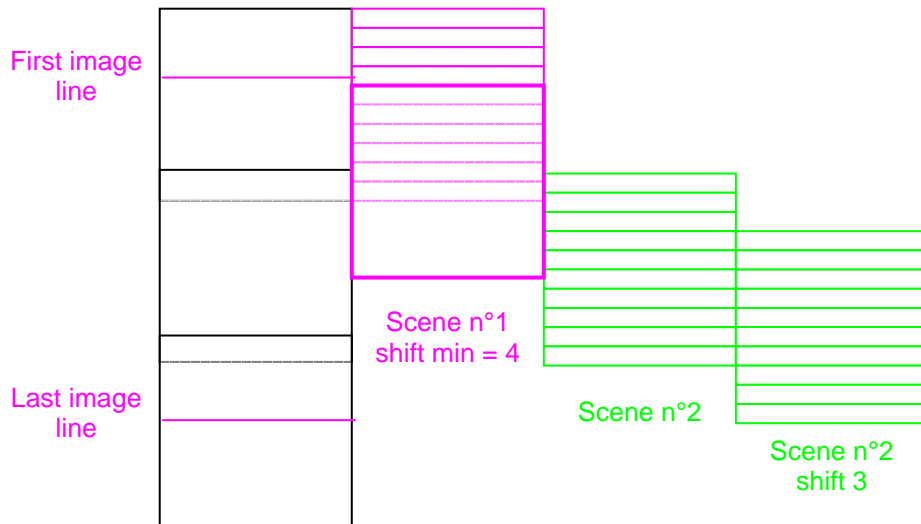
The scene is the order unit. **Spot Image sells only scenes** (full scenes or scenes extracts), the **data strip can not be accessed**.



Data strip cut into 3 scenes

Each scene can be shifted along the data strip by steps of 1/10th of scene. The shift value must be chosen between the min and the max values. The max= 9 indicates that the next scene is full. A shift of 10 is not allowed, but it can be extracted approximately using the next scene.

In the example below, the first scene is incomplete. The first image line starts between shift 3 and shift 4. So, the first scene that can be ordered is scene n°1 with a shift of four. The first scene can be shifted until nine. The next scene is scene n°2 with a shift of one. There is a little overlap between scene 1 with shift 9 and scene 2 with shift 1, because of the size of the overlap between the two scenes.



There are two main receiving stations for Spot data and a worldwide network of receiving stations. They have a particular role in the Spot system.

The Spot catalogue includes Spot data received from all receiving stations. So, a given scene can be referenced several times in the Spot catalogue, because there is an overlap between visibility circles of different stations

However these identical scenes, regarding to their localisation, could have different quality quotation, depending on the environment of the receiving station. e.g. : one scene can be acquired at high elevation by one station while it is acquired at low elevation by an other one.

Metadata describes the condition of acquisition: geographic localisation, temporal range, optical instrument and sensor mode used and the technical conditions of the acquisition (in particular, angles).

The table below presents the optical instruments and sensors of each Spot satellite and their associated characteristics of the previews:

Satellite	Optical instrument	Sensor	Color ?	Resolution in meters
Spot 1 to Spot 3	HRV	P	Black and white	10
		X	color	20
Spot 4	HRVIR	M	Black and white	10
		I	Color with SWIR	20
Spot 5	HRG	A	Black and white	5
		B	Black and white	5
		J	Color with SWIR	10

By combination of several scenes, Spot Image can make products with better resolution as shown in the table below:

Satellite	Optical instrument	Sensor	Color ?	Resolution in meters
Spot 5	HRG	A and B	Black and white	2,5
		A and B and J	color	2,5
		(one of A,B) and J	color	5

Theses scenes are called "combined scenes" and restricted to Spot 5.

Metadata also includes quotation on the cloud coverage, the snow coverage and the technical quality of scenes. For cloud and snow coverage, scenes are virtually cut in 8 pieces as follow:

1	2
3	4
5	6
7	8

For snow coverage, each piece is evaluated according to the following rules :

- ✓ 0 if there is no snow
- ✓ 1 when we notice some snow

For cloud coverage, the evaluation is more precise :

- ✓ A if there is no cloud
- ✓ B if there is between 0% and 10% of cloud (average : 5%)
- ✓ C if there is between 10% and 25% of cloud (average : 17,5%)
- ✓ D if there is between 25% and 80% of cloud (average : 52,5%)
- ✓ E if there is between 80% and 100% of cloud (average : 90%)

The complete quotation of a scene is obtained by concatenation of each evaluation according to the piece order, as shown in the above figure.

A computed note is also stored in the catalogue, representing the percentage of preview covered respectively by snow and cloud. For instance, cloud and snow cover percentage do not represent the exact cover because they are computed from notes.

The quality quotation is obtained in a similar way. The scene are virtually cut in pieces like this :

1
2
3
4

Each piece is evaluated according to the following scale :

- ✓ E for Excellent
- ✓ G for Good
- ✓ P for Poor
- ✓ U for Unusable

The technical quality is completed from quality parameters assessed automatically during the inventory process and included in the inventory results transmitted by SD and TS5.

Scenes are stored in the Spot catalogue as soon as possible with cloud and snow cover notes processed automatically. In order to improve the quality of the Spot Image products, these notes are all controlled by an operator who makes corrections if necessary.

The insertion date of a scene refers to the first recording of the scene in the Spot catalogue. The update date corresponds to the recording of changes made by operators on the scene notes.

Working on insertion date allows to answer the question "What's new on Spot Catalogue since my last request?". Looking for update date is a way to know if a note is a reliable, i.e. if it has been reviewed by an operator.

2.2 Preview

Previews are delivered in jpeg format without any projection. Two different sizes are available depending on the level of details required :

- ✓ Thumbnail : 125 x 125 pixels
- ✓ Quicklook : 500 x 500 pixels

Quicklooks are stored in the catalogue in each acquired spectral band and without any projection. They are returned through the HMA interface after mixing spectral's bands.

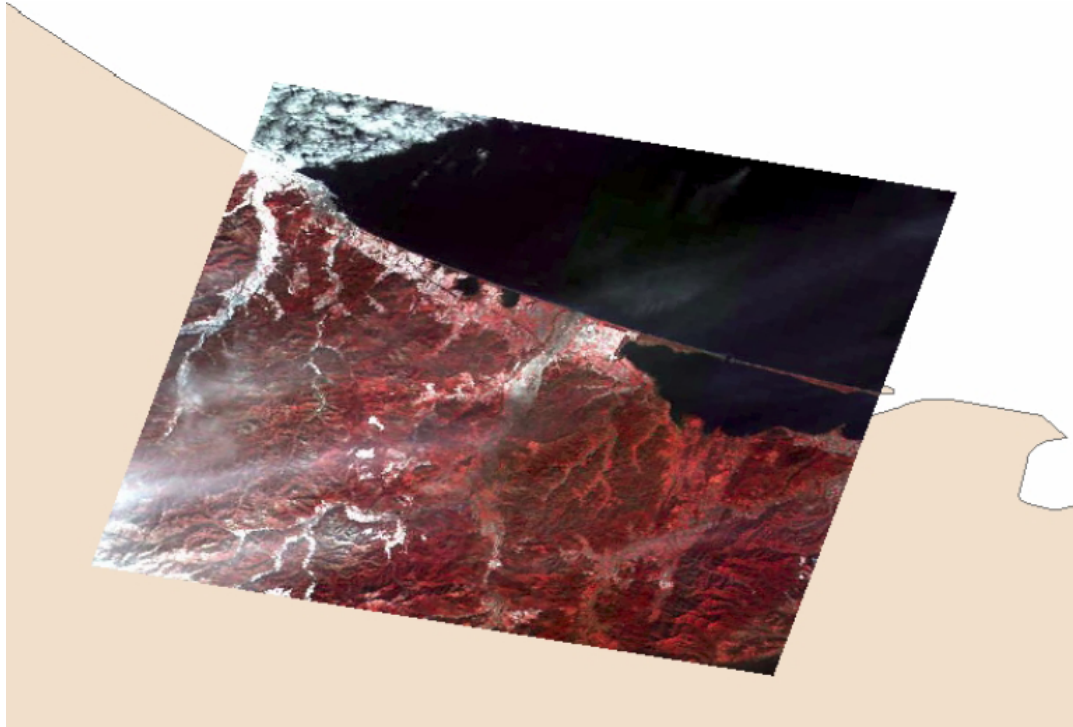
The Spot catalogue also stores a cloud mask in bitmap format, to exactly delimit cloud coverage.

SPOT bands in the visible and short-wave infrared portions of the spectrum are presented in the table below :

sensor	electromagnetic spectrum	pixel size	spectral bands
SPOT 5	Panchromatic	2.5 m or 5 m	0.48 - 0.71 μm
	B1 : green	10 m	0.50 - 0.59 μm
	B2 : red	10 m	0.61 - 0.68 μm
	B3 : near infrared	10 m	0.78 - 0.89 μm
SPOT 4	B4 : mid infrared (SWIIR)	20 m	1.58 - 1.75 μm
	Monospectral	10 m	0.61 - 0.68 μm
	B1 : green	20 m	0.50 - 0.59 μm
	B2 : red	20 m	0.61 - 0.68 μm
SPOT 1	B3 : near infrared	20 m	0.78 - 0.89 μm
	B4 : mid infrared (SWIIR)	20 m	1.58 - 1.75 μm
SPOT 2	Panchromatic	10 m	0.50 - 0.73 μm
SPOT 3	B1 : green	20 m	0.50 - 0.59 μm
	B2 : red	20 m	0.61 - 0.68 μm
	B3 : near infrared	20 m	0.78 - 0.89 μm

2.3 Examples

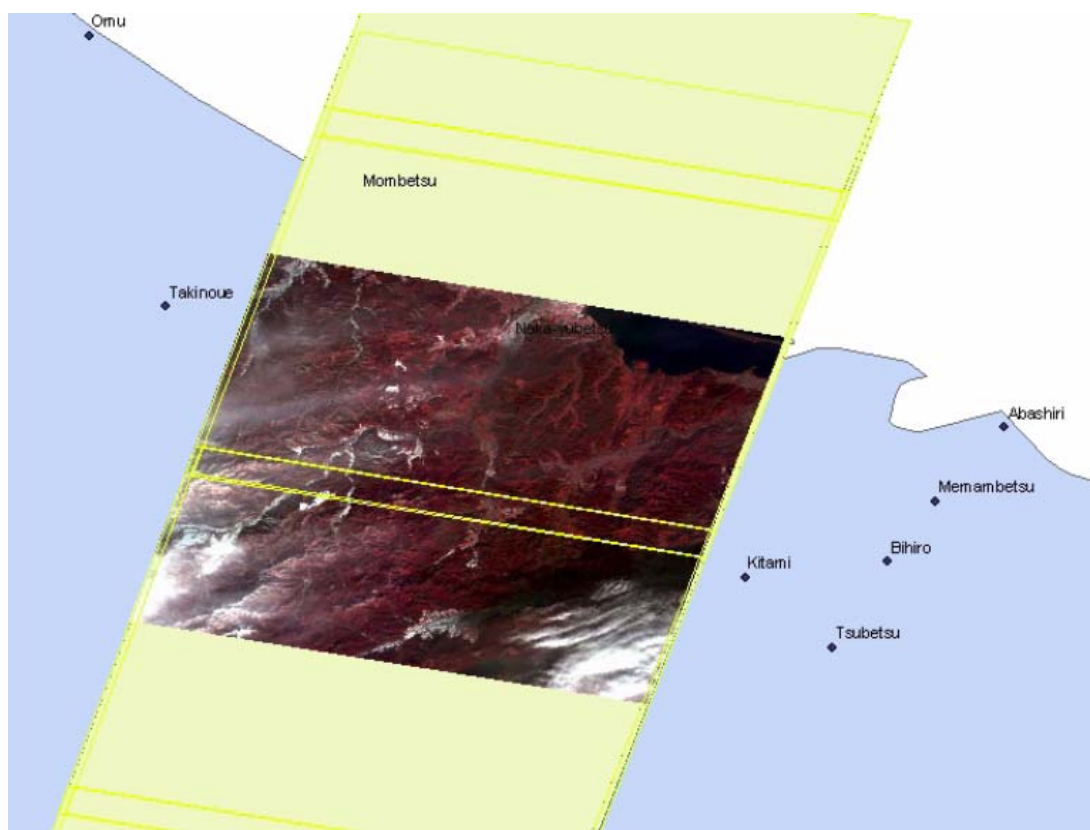
Here is an example of a multispectral scene acquired by Spot 2 in November 2005 over Japan. The quicklook has been projected over the map using ArcMap.



The quicklook returned by the web services is not projected and, according to the need of the user, could be delivered with a non projected cloud mask as described below:



The next scene is a part of a long data strip and can be shifted along the track. Here is the projected quicklook of the same scene with a sat of 4. The land covered by the data strip appears in yellow with the limits of references scenes (scenes on sat 0 with a little overlap).



3 Specificities of wsDali interface and Spot catalogue

3.1 Introduction

The HMA proxy is a front-end application in the point of view of the Spot specific web service ws-dali.

Ws-dali cannot implement the whole functionalities of the HMA specifications. Features like pagination of results, sorting, and some filtering options are not proposed by ws-dali. Implementation of these functions therefore means:

1. **Implement the function in the HMA proxy.**
or
2. Modify ws-dali, which would be more efficient. However, **no evolution of wsDali is considered for the moment** as any modification will have impacts on Spot applications which already use ws-dali.

Considering the very large amount of data into Spot catalogue (several millions of scenes), **queries may return a large number of results, too big to be relevant for the user.** Therefore, the principle of usage of Spot catalogues is in two steps, as follows:

1. Send a search request according to the needs of the user (geographical, temporal, technical characteristics...). This **first request should be done in hits or estimation mode.** So the number of result will be evaluated and presented to the user in order to confirm his query. **If the number of results is too large, the user should restrict his query before extracting the results.**
2. **When the user has confirmed his query, send a request in result mode in order to get scenes metadata.**

The services provided by wsDali are listed below:

Service	Role
getScenesByCriteria()	Search by constraint (criteria) normal or combined scenes.
getScenesByCriteriaEstimation()	Fast estimation of the number of results for given search criteria.
getScenesById()	Returns the scenes corresponding to the given identification. Scenes can be normal or combined, shifted or not.
getScenelmagery()	Returns the images and masks corresponding to the given scene id.
getDataStripsById()	Not used for HMA.
getDataStripImagery()	Not used for HMA.
getVersion()	Information on the version of WsDali server.

3.2 Paginated search

Dali - Spot catalogue - doesn't provide paginated search. To allow a HMA client to perform paginated search, the best technique that could be used is the same as used for Eoli:

1. When a query is done by the HMA user, all the results are extracted from the Spot catalogue and sent to the HMA proxy.
2. All the results are stored into a cache.
3. The results to a paginated search (offset and number of results) are extracted from the cache. Spot catalogue is not used anymore for this search.
4. After a time out, the cache is cleaned.

For instance, a "cacheless" pagination is possible, which means the request is executed for each "page" required.

3.3 “Sort by” function

As for the pagination, the sorting is not handled by ws-dali. If needed, it could be done at the level of the proxy.

3.4 Request’s size limitations

Requests are limited to preserve servers from very large query. So, a client can obtain an incomplete result to his request because of the Spot catalogue limits. In this case, there is no way to obtain missing scenes, even in using the startPosition tag. The user has to review his criteria.

Spot cannot perform a research partially. So the first request message in result mode is completely done. But the next search request could be faster if results are still in memory on Spot catalogue server.

All request messages can be done in hits mode to retrieve the number of results before getting the results.

Spot catalogue limits:

1. on the number of scenes returned in the result message, configured to 1000
2. on the number of imagery returned in the result message, configured to 200

When the number of result is over than the limit, the number of hits returned is estimated. The exact number is given only when the number of result is less than the limit.

The table below shows how the return code and result are evaluated when limits are over:

- E is the exact scene number matching the user criteria
- A is the approximate scene number matching the user criteria.
- SP is the StartPosition requested by the user
- MAX is the MaxRecord elements in the request message
- RR is the number of record returned

Result Type	Spot catalogue content matching the user criteria (E)	StatusCode	NbRecordMatched	NbRecordsReturned (RR)	NextRecord
hits	Less than 1000 scenes	complete	E	0	Not valued
hits	More than 1000 scenes	interim	A	0	Not valued
result	Less than 1000 scenes	Complete (1)	E	Minimum(MAX; E-SP+1)	Not valued if SP+RR > E However, SP+RR
result	More than 1000 scenes	Exception SOAP NoApplicableCode (2)			

- (1) If RR is greater than 200, the first 200 quicklooks are returned but not the others. The application client can't make the difference between an unexisting quicklook in the Spot catalogue and a quicklook not returned because there are more than 200 quicklooks.
- (2) For client applications, it could be interesting to know the approximate number of result. So users can refine their criteria. This is not possible in the actual specification.

3.5 Shifted scenes

Shifted scenes are Spot specific. Incomplete scene couldn't be ordered and produced. So, only complete scene in sat 0 is available. Shifted scene may be taken into account for a Spot specific classification with a shift attribute.

3.6 Cloud, snow and quality percentage

Cloud, snow and quality of Spot scenes are evaluated by portion with letters. Percentages are computed from these notations. So, they are not exact.

3.7 Quicklooks and masks

The images that are associated to Spot products are not always available. The default behaviour we chose is the following: if the image is not available for the MaskInformation or the BrowseInformation, the image will be a “not available” image.

3.8 Identifiers

Each ebRim node of the getRecordResponse is unique and therefore has its own identifier. These objects are:

- The RegistryPackage
- The RegistryObjects:
 - Main ExtrinsicObject: EOProduct
 - Secondary ExtrinsicObjects:
 - EOAcquisitionPlatform
 - EOArchivingInformation
 - EOBrowseInformation
 - EOMaskInformation
- ExternalIdentifier
- The Associations : all the associations between the secondary ExtrinsicObjects and the EOProduct
- The Classification Node

An identifier is constructed from a base identifier and an ebRim object specific id. The base identifier is linked to the Spot product identifier constructed as follow:

BASE ID				SPECIFIC ID
PREFIX	SCENE TYPE	SCENE NUMBER	SAT	EBRIM OBJECT ID
“parentIdentifier”	S : ordinary C : combined	sn:xxxxx:	sat:Shift0:	objectid

Table 1 : ebRim node identifiers construction.

Example:

urn:ogc:def:EOP:SPOT:MULTISPECTRAL_10m_J:S:sn:22356846:sat:Shift0:platform

Note:

1. It is not the A21 code that is used but the scene number. Indeed, the A21 code is not unique in the Spot database.
2. The shift along the track (SAT) is always "Shift0". It is put into the identifier just in case one day it is used.
3. Here bellow are listed the ebRim object names for all supported objects.

OBJECT TYPE	OBJECT NAME	EBRIM OBJECT ID
RegistryPackage	RegistryPackage	registry_package
ExtrinsicObject	EOPProduct	eop
	EOAcquisitionPlatform	platform
	EOArchivingInformation	archive
	EOBrowseInformation	browse_quick
	EOBrowseInformation	browse_thumb
	EOMaskInformation	mask
ExternalIdentifier	ExternalIdentifier	externalid
Association	HasProductInformation	product_association
	ArchivedIn	archive_association
	HasBrowseInformation	browse_association:QL browse_association:QK
	AcquiredBy	platform_association
	HasBrowseInformation	mask_association
Classification	OPT	classification_opt

Table 2 : ebRim nodes specific id list.

4 EOP-wsDali metadata mapping

4.1 General classification

The following table represents the EOProduct Extrinsic object attributes for SPOT catalogue. When possible, the mapping of attribute is done with a corresponding attribute (retrieved with ws-dali) or with a fixed value. If no relevant data corresponds to an EOP attribute, the "exposed" column is set to "no".

Table 3: exposed metadata

Extrinsic Object	Slot name	Exposed	Value
EOProduct	doi	yes	Equals the EOProduct ID
EOProduct	parentIdentifier	yes	Collection identifier (see chapter Erreur ! Source du renvoi introuvable.)
EOProduct	productType	yes	Always = "IMAGE"
EOProduct	status	yes	Always = "ACQUIRED"
EOProduct	vendorSpecificAttributes	yes	Used for presenting Spot specific attributes.
EOProduct	vendorSpecificValues	yes	Used for presenting Spot specific attributes.
EOProduct	multiExtentOf	yes	-
EOProduct	centerOf	yes	-
EOProduct	acquisitionType	yes	Always = « NOMINAL »
EOProduct	acquisitionSubType	no	Not Valued
EOProduct	beginPosition	yes	-
EOProduct	endPosition	yes	-
EOProduct	acquisitionStation	yes	The name of the acquisition station, N/F for combined scenes.
EOProduct	acquisitionDate	no	Not Valued
EOProduct	orbitNumber	yes	-
EOProduct	lastOrbitNumber	yes	Same value as orbitNumber
EOProduct	orbitDirection	yes	Always = « DESCENDING »
EOProduct	wrsLongitudeGrid	yes	-
EOProduct	wrsLatitudeGrid	yes	-
EOProduct	pitch	no	Not valued
EOProduct	yaw	no	Not valued
EOProduct	roll	no	Not valued
EOProduct	ascendingNodeDate	no	Not valued
EOProduct	startTimeFromAscendingNode	no	Not valued
EOProduct	completionTimeFromAscendingNode	no	Not valued
EOProduct	ascendingNodeLongitude	no	Not valued
EOProduct	orbitDuration	no	Not valued
EOProduct	incidenceAngle	yes	-
EOProduct	acrossTrackPointingAngle	yes	Equal to incidenceAngle
EOProduct	alongTrackPointingAngle	yes	Always = 0
EOProduct	imageQualityDegradation	yes	-
EOProduct	imageQualityDegradationQuotationMode	no	Not valued
EOProduct	processingCenter	no	Not valued
EOProduct	processingDate	no	Not valued
EOProduct	compositeType	no	Not valued
EOProduct	method	no	Not valued
EOProduct	methodVersion	no	Not valued
EOProduct	processorName	no	Not valued
EOProduct	processorVersion	no	Not valued
EOProduct	processingLevel	no	Not valued
EOProduct	nativeProductFormat	no	Not valued
EOProduct (OPT)	illuminationAzimuthAngle	yes	-

EOProduct (OPT)	illuminationElevationAngle	yes	-
EOProduct (OPT)	cloudCoverPercentage	yes	-
EOProduct (OPT)	snowCoverPercentage	yes	-
ExternalIdentifier	Name	yes	Always = "SPOT_SCENE"
EOAcquisitionPlatform	Name	yes	Always = "SPOT"
EOAcquisitionPlatform	platformSerialIdentifier	yes	= satellite_number (1 to 5)
EOAcquisitionPlatform	platformOrbitType	yes	Always = "LEO"
EOAcquisitionPlatform	instrumentShortName	yes	-
EOAcquisitionPlatform	sensorType	yes	Always = "OPTICAL"
EOAcquisitionPlatform	sensorOperationalMode	yes	-
EOAcquisitionPlatform	sensorResolution	yes	-
EOAcquisitionPlatform	swathIdentifier	no	Not valued
EOProductInformation	referenceSystemIdentifier	no	Not valued
EOProductInformation	size	no	Not valued
EOProductInformation	version	no	Not valued
EOProductInformation	fileName	no	Not valued
EOBrowseInformation	Name	yes	"QUICKLOOK" and "THUMBNAIL"
EOBrowseInformation	subType	no	Not valued
EOBrowseInformation	fileName	yes	Direct link to the image hosted by Spot URL to construct from scene number
EOBrowseInformation	referenceSystemIdentifier	yes	Always = "urn:ogc:def:crs:EPSG:6.3:4326"
EOArchivingInformation	name	yes	-
EOArchivingInformation	archivingIdentifier	no	Not valued
EOArchivingInformation	archivingDate	yes	-
EOMaskInformation	format	yes	Always = « RASTER »
EOMaskInformation	referenceSystemIdentifier	yes	Always = "urn:ogc:def:crs:EPSG:6.3:4326"
EOMaskInformation	fileName	yes	Direct link to the mask URL to construct from scene number
EOMaskInformation	Name	yes	Always = « CLOUD »

4.2 Spot specific classification

Some attributes returned by ws-dali do not have any equivalent in the general classifications EOP/OPT. It may be interesting to define a Spot specific classification or to return these attributes using the VendorSpecific slots.. The relevant attributes that may be in this classification are listed below:

- saturationPercentage : the percentages of saturation on the image defined
- « quality quotes », « snowCoverQuotes » et « cloudCoverQuotes » : the quality quotes for each criteria. The image is divided in several parts. One quote per part.
- minDynThreshold et maxDynThreshold : the dynamic spread of the image.
- « snowMaskAvailable », « cloudAvailable », « quicklookAvailable » : booleans that indicate if masks and quicklook are available.
- Sensor families: PANCHROMATIC or MULTISPECTRAL. These attributes may be put into collections (parentIdentifier EOP attribute).

5 EOP-wsDali interface mapping

The CSW-ebRim services that require the usage of wsDali are:

- **getRecords**
- **getRecordById**
- **getRepositoryItem**

The services “**getCapabilities**” and “**describeRecords**” are directly managed by the proxy and are not transmitted to wsDali.

The optional service “**harvest**” is not implemented by wsDali, so it is not available.

In this chapter, only used services are detailed (getRecords, getRecordById, getRepositoryItem).

The figure below sums up the mapping of services.

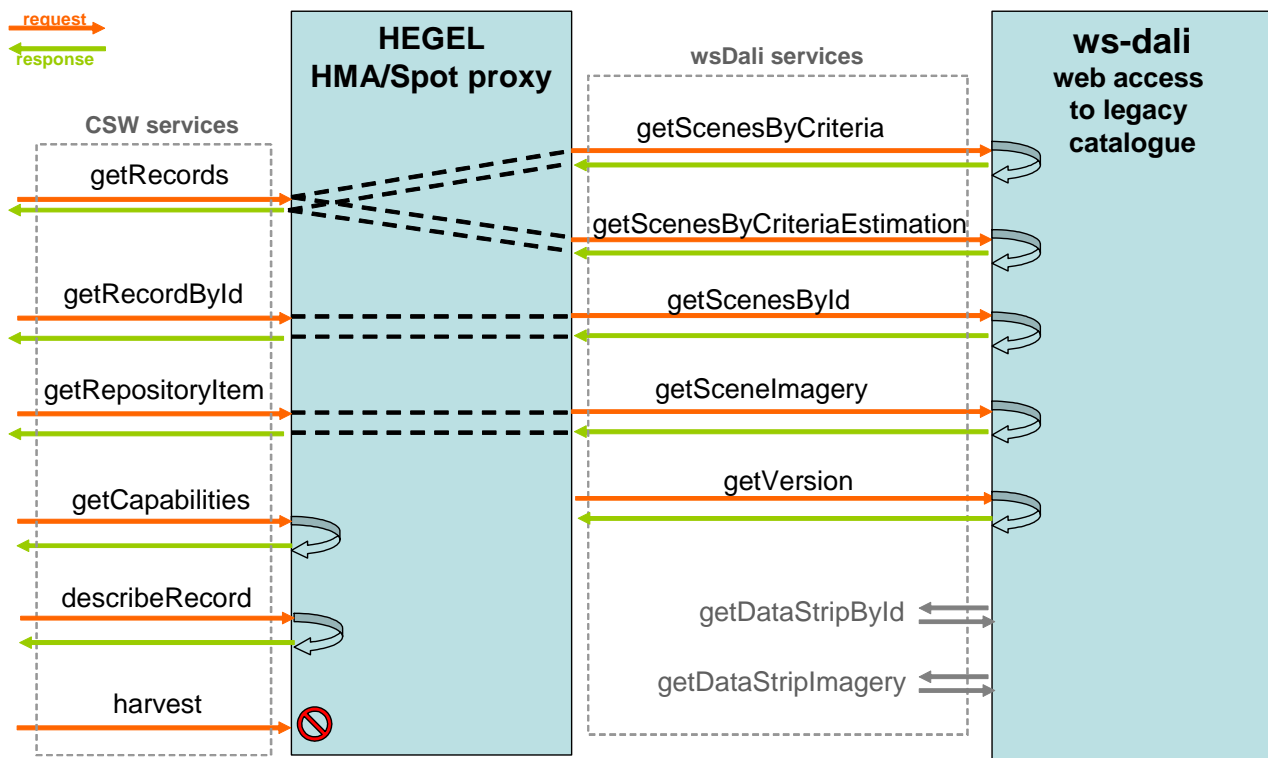


Figure 1 : Mapping of services between HMA and ws-dali

5.1 GetRecords Operation

5.1.1 GetRecords Request

5.1.1.1 Request parameters

Note: when the Spot specificity is not filled for a parameter, it means either the parameter is not supported either the default or fixed value is the one to use.

Parameter	Value	Optional / Mandatory
service	Fixed value of 'CSW'	Optional
version	Fixed value of '2.0.2'	Optional
requestId	-	Optional
resultType	Only supported values: <ul style="list-style-type: none"> 'hits' (default value), 'results' 	Optional
outputFormat	Only supported values: <ul style="list-style-type: none"> 'application/xml' (default value) 'text/xml' 	Optional
outputSchema	Fixed value: <ul style="list-style-type: none"> 'urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0', 'http://www.opengis.net/cat/csw/2.0.2' (not supported) 	Optional
startPosition	Default Value is 1. Error message returned if value less than 1.	Optional
maxRecords	Default Value is 10. Error message returned if value less than 1.	Optional
typeName	The tag "typeNames" is ignored. All ebRim nodes included into the RegistryPackage shall be returned in the response.	Optional
elementSetName	<ul style="list-style-type: none"> 'brief', 'summary', 'full' (default value). 	Optional
ConstraintLanguage	Ignored if present in the request	Ignored
Constraint	See chapter 1.1.1.1	Optional
SortBy	Ignored if present in the request	Ignored
DistributedSearch	Ignored if present in the request	Ignored
HopCount	Ignored if present in the request	Ignored
ResponseHandler	Ignored if present in the request	Ignored

5.1.1.2 Constraint filters

The following table shows the supported filters. The attributes listed in the filter are the attributes flagged as “queryable” in the document “06-131r4 Extension package for ebRIM Application Profile”. When possible, the criteria: of ws-dali in relation with these “queryable” attributes are given.

Queryable attribute	Filter supported at HMA level	Comment	Related criteria in wsDali
doi	PropertyIsEqualTo	Ignored.	-
parentIdentifier	PropertyIsEqualTo	<i>Collection identifier. (see Table 4 : Collections defined for SPOT)</i>	-
productType	PropertyIsEqualTo	Exception when value is not SCENE	productType
status	PropertyIsEqualTo	Exception when value is not “ACQUIRED”	-
Footprint/multiExtentOf	BBOX Intersects	Exception when operator is not BBOX or Intersects	regionOfInterest
Footprint/centerOf	-	Ignored.	-
acquisitionType	PropertyIsEqualTo	Exception when value is not “NOMINAL”	-
acquisitionSubType	-	Ignored.	-
beginPosition	PropertyIsGreatherThan PropertyIsLessThan PropertyIsBetween	To be filtered using scene_center_date. Range of beginPosition should be convert to a center date (adding 4 seconds)	acquisitionDateRange
endPosition	PropertyIsGreatherThan PropertyIsLessThan PropertyIsBetween	To be filtered using scene_center_date. Range of endPosition should be convert to a center date (removing 4 seconds) Note : If both beginPosition and endPosition are filtered, the most restrictive filter is retained.	acquisitionDateRange
acquisitionStation	-	Ignored.	receivingStation
acquisitionDate	-	Ignored.	-
orbitNumber	-	Ignored.	-
lastOrbitNumber	-	Ignored.	-
orbitDirection	PropertyIsEqualTo	Exception when value is not "DESCENDING"	-

Reference : S-IF-CH/IE-04-SI
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 Date : 26/05/2009

SPOT IMAGE

Spot catalogue HMA interface ebRIM profile

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pitch	-	Ignored.	-
yaw	-	Ignored.	-
roll	-	Ignored.	-
ascendingNodeDate	-	Ignored.	-
startTimeFromAscendingNode	-	Ignored.	-
completionTimeFromAscendingNode	-	Ignored.	-
ascendingNodeLongitude	-	Ignored.	-
orbitDuration	-	Ignored.	-
incidenceAngle	PropertyIsBetween	Exception when out of range	incidenceRange
acrossTrackIncidenceAngle	PropertyIsBetween	Equal to incidence angle	incidenceRange
alongTrackIncidenceAngle	-	Ignored.	-
imageQualityDegradation	PropertyIsGreaterThanOrEqualTo	Exception when wrong operator.	minQualityRating
imageQualityDegradationQuotationMode	PropertyIsEqualTo	Indicator to know how the quality quotation has been calculated.	-
illuminationAzimuthAngle	-	Ignored.	-
illuminationElevationAngle	PropertyIsGreaterThanOrEqualTo		minSunElevation
cloudCoverPercentage	PropertyIsLessThanOrEqualTo	Default value : 100	maxCloudCoverPercentage
snowCoverPercentage	PropertyIsLessThanOrEqualTo	Default value : 100	maxSnowCoverPercentage
platformName	PropertyIsEqualTo	Exception when value is not "SPOT"	-
platformSerialIdentifier	Logical or PropertyIsEqualTo	Satellite_number	satellites
platformOrbitType		Exception when value is not "LEO"	-
instrumentShortName	PropertyIsEqualTo	HRV, HRVIR, HRG or HRS	instrument
sensorType	PropertyIsEqualTo	Exception when value is not "OPTICAL"	-

sensorOperationalMode	Logical OR PropertyIsEqualTo	Sensor codes supported are P, X, M, I, A, B, J. THR, HMX and THX (for combined scenes).	sensors
sensorResolution	PropertyIsBetween	2.5 to 20	resolution
swathIdentifier	-	Ignored.	
BrowseSize	-	Ignored.	
BrowseValue	PropertyIsEqualTo	THUMBNAIL QUICKLOOK	URL to be build by the proxy
subType	-	Ignored.	
archivingCenter	-	Ignored.	archivingStation
archivingIdentifier	-	Ignored.	
archivingDate	-	Ignored.	insertionDateRange
format	PropertyIsEqualTo	Exception when value is not "RASTER"	-
NameMaskInformation	PropertyIsEqualTo	Exception when value is not "CLOUD"	-

5.1.2 Request types

In ws-dali, the products researched are a combination of sensors and satellites. Therefore products can be categorized in different ways, in order to ease the research for end users:

- **By sensor code:** a sensor or a combination of sensors defines completely the satellite, the family and the resolution of the image.
- **By product family:** an image can also be defined by 3 parameters (that correspond to given sensors): the satellite number, the resolution and the sensor family.
- **By collection:** as for EOLI, some collection may be defined. Each collection corresponds to a single or a set of sensors.

It is necessary to chose one way of requesting for avoiding incoherent requests. The chosen way will determine the “queryable” attributes for Spot. Indeed one cannot request on a given sensor and given satellite that may not be compatible (e.g. sensor X and Spot 1).

The choice of the request type should be “client driven”. The client may propose several way of searching as for the client “http://sirius.spotimage.fr”, which would make the client more complex and less generic.

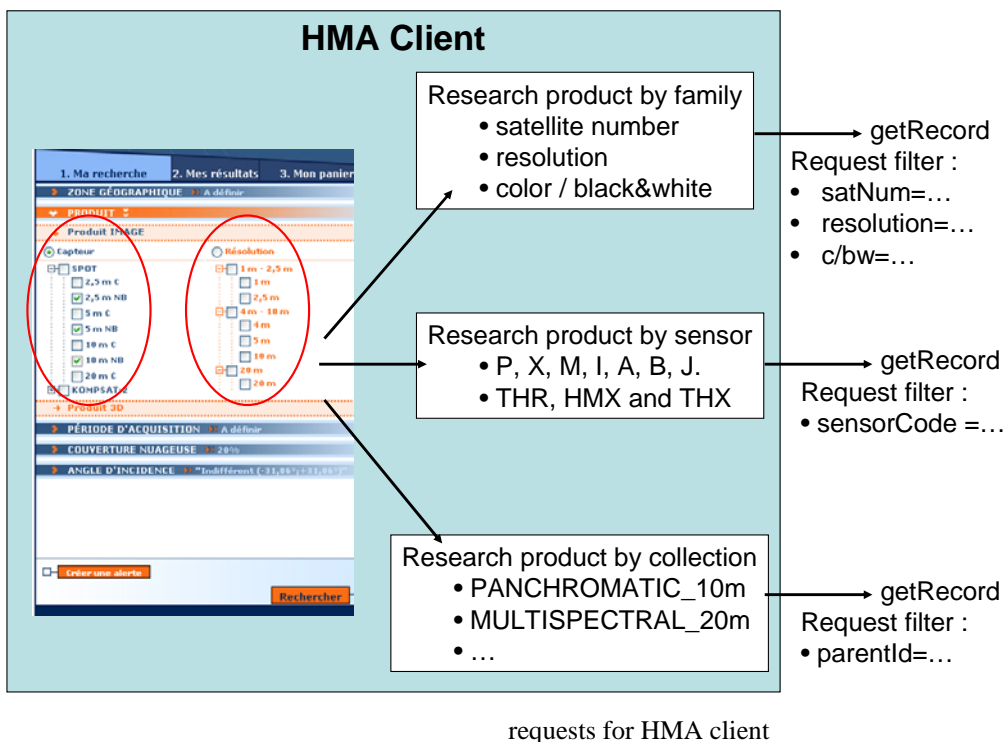


Figure 2 : Different types of

In addition, **request types are not equivalent**. Indeed, sensors, families or collections do not contain the same information exactly. The most precise information is the sensor type or combination: a given sensor corresponds to a single satellite, a single resolution and a single sensor family (panchromatic or multispectral). Any other request than “by sensor” (“by product family” or “by collection”) will be converted in a request “by sensor” in the end for requesting the legacy database Dali (see Figure 3).

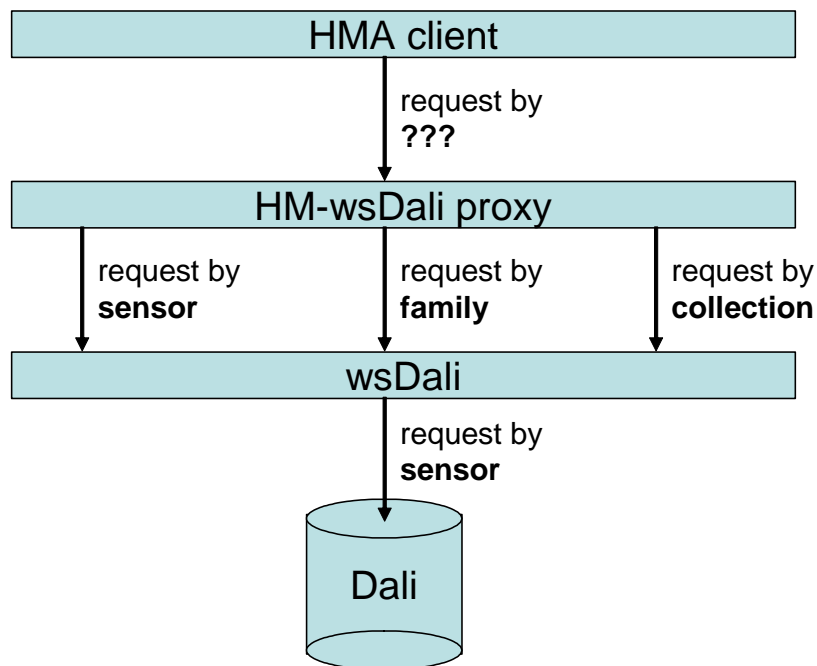


Figure 3 : Different types of requests through the different systems

5.1.2.1 Request by sensor code

A product of the SPOT catalogue can be retrieved by requesting its sensor code. In ws-dali, this code may indicate a single sensor or a combination of several sensors. Up to now, the only sensor codes supported are P, X, M, I, A, B, J for normal scenes and THR, HMX and THX for combined scenes.



This way of requesting is the most precise, as the information is stored in the Dali database only with its sensor code attribute and not with the resolution or the family. Therefore, no information will be lost during the mapping of the request



Nevertheless, it must be kept in mind that searching by sensor code requires that **the end user has a good knowledge of the Spot system**.

5.1.2.2 Request by product family

In ws-dali, products may be retrieved by family, what corresponds to a set of 3 criteria:

- the satellite number (spot 1, spot 2, spot 3, spot 4, spot 5)
- the resolution range (between 2.5 and 20 meters)
- the sensor family (panchromatic or multispectral)

Some combinations between these 3 criteria may return no result because they correspond to no sensor (example: no sensor with a resolution of 2.5m, multispectral, on spot 1).

In addition, the attribute "sensor family" (panchromatic or multispectral) does not exist in the OPT classification. If this type of request is chosen, this attribute should be created in a SPOT specific classification. Another solution is to use the parentIdentifier attribute (aka collection) for panchromatic or multispectral.



This way of requesting is **easy to understand for the end user and close to its needs.**



Some combinations of criteria have no result.

5.1.2.3 Request by collection

This type of request is a compromise between the research by sensor and the research by product family. After defining a number of collections, the end user only has to choose one or more collection for his research.

This is the type of request chosen for EOLI. Indeed, this type of request had been defined because of the miss of criteria in Eoli interface specification.



This way of requesting is **easy to use.**
It is very **simple to implement on the HMA client** (genericity)



It is **not very flexible** for the end user.

For example, the following table shows the Spot collections inherited from EOLI¹:

Collection	satellite	instrument	Sensor	productId (prcTypeCode.identCode)
urn:ogc:def:EOP:SPOT:ALL	1,2,3,4,5	HRV(Green Red NIR) HRVIR (Green Red NIR SWIR) HRG (Visible)	P,X,M,I,A,B, J and combined sensor	ALL
urn:ogc:def:EOP:SPOT:PANCHROMATIC	1,2,3,4,5	HRV, HRVIR, HRG	P,M,A,B	Pan10mP or Pan10mM or Pan5mA or Pan5mB or Pan2,5m
urn:ogc:def:EOP:SPOT:PANCHROMATIC_10m	1,2,3,4	HRV, HRVIR	P,M	Pan10mP or Pan10mM
urn:ogc:def:EOP:SPOT:PANCHROMATIC_10m_P	1,2,3	HRV	P	Pan10mP
urn:ogc:def:EOP:SPOT:PANCHROMATIC_10m_M	4	HRVIR	M	Pan10mM
urn:ogc:def:EOP:SPOT:PANCHROMATIC_5m	5	HRG	A,B	Pan5mA or Pan5mB
urn:ogc:def:EOP:SPOT:PANCHROMATIC_5m_A	5	HRG	A	Pan5mA
urn:ogc:def:EOP:SPOT:PANCHROMATIC_5m_B	5	HRG	B	Pan5mB
urn:ogc:def:EOP:SPOT:PANCHROMATIC_2.5m.A+B	5	HRG	A+B	Pan2,5m
urn:ogc:def:EOP:SPOT:MULTISPECTRAL	1,2,3,4,5	HRV, HRVIR, HRG	X,I,J	Mul20mX or Mul20ml or Mul10mP+X or Mul10mM+I or Mul10mJ or Mul5m or Mul2,5m
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_20m	1,2,3,4	HRV, HRVIR	X,I	Mul20mX or Mul20ml
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_20m_X	1,2,3	HRV	X	Mul20mX
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_20m_I	4	HRVIR	I	Mul20ml
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_10m	1,2,3,4,5	HRV, HRVIR,HRG	P+X, M+I, J	Mul10mP+X or Mul10mM+I or Mul10mJ
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_10m_P+X	1,2,3	HRV	P+X	Mul10mP+X
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_10m_M+I	4	HRVIR	M+I	Mul10mM+I
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_10m_J	5	HRG	J	Mul10mJ
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_5m_HM+J	5	HRG	(A ou B) + J	Mul5m
urn:ogc:def:EOP:SPOT:MULTISPECTRAL_2.5m_A+B+J	5	HRG	A+ B+ J	Mul2,5m

Table 4 : Collections defined for SPOT

¹ Collections in grey are not supported for the moment.

5.1.3 GetRecords Response

Restrictions for Spot implementation	
07-006r1_ OpenGIS_Catalogue_Services_Spec ification	Spot value
version	
SearchStatus	
timestamp	Not valued
SearchResults	
resultSetId	Not valued
elementSet	Same as request
recordSchema	
numberOfRecordsMatched	Exact number of results or approximate number, depending on the size of the result set. See chapter Request's size limitations for details.
numberOfRecordsReturned	Equal to the minimum between "numberOfRecordsMatched" and "MaxRecords" (attribute from the request)
nextRecord	0 if no more records otherwise equal to (startPosition+maxrecord)
expires	Not valued

5.2 getRecordsByld Operation

5.2.1 GetRecordsByld Request

The GetRecordByld request operation is merely a getRecord where the only criteria is the id of the requested object.

Supported parameters are the same as for the getRecords operation, except those not requested by the standards.

Parameter	Value	Optional / Mandatory
service	Fixed value of 'CSW'	Optional
version	Fixed value of '2.0.2'	Optional
outputFormat	Only supported values are 'application/xml'(default value) and 'text/xml'.	Optional
outputSchema	Always 'urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0',	Optional
elementSetName	<ul style="list-style-type: none"> • 'brief' • 'summary' • 'full' (default value) 	Optional
Id	The ID of the RegistryPackage requested	Mandatory
SortBy	Ignored if present in the request	Ignored
DistributedSearch	Ignored if present in the request	Ignored
HopCount	Ignored if present in the request	Ignored
ResponseHandler	Ignored if present in the request	Ignored

Table 5 : getRecordByld CSW parameters

5.2.2 GetRecordsByld Response

The GetRecordByld response operation returns an ebRim representation of the object with the given Id. If the object is not present in the database, an empty response is returned.

The whole RegistryPackage is returned in the mode corresponding to the elementSetName (default mode is "full").

5.3 GetRepositoryItem Operation

5.3.1 GetRepositoryItem Request

The GetRepository request operation has the same syntax as the GetRecordByld. The only criteria is the id of the requested gml object.

5.3.2 GetRepositoryItem Response

The GetRepository response returns the gml representation of the object. The only attributes returned are those mapped for the ebRim representation. As it exists a full correspondence between the ebRim returned attributes list and the gml returned attributes list, it is not necessary to implement a specific mapping for this operation. A getRecordByld is performed, and the given ebRim object is fully translated in gml and then returned.

The versions of the used schemas are gml.xsd v3.1.1 and eop.xsd v1.2.1

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