



Specifications

**HR Image Specifications for the CwRS
Programme**

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<p>Date: 19/12/2011</p>	<p>Int. ref: file://S:\FMPArchive\C\12923.doc</p>

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Document History

Version	Date	Comment	Author	Modified Pages
1.0	01/03/2008 01/05/2008	1 st release; information taken from CTS FMP 8451 (chapters 4, 4.3, 4.4, 4.6), Recs 1 FMP 5608 (chapters 2.4, 2.5, 5, 6), Recs 2 FMP 7658 (chapters 2.3), Selection of Control sites and Risk Analysis FMP 8218 (chapter 2.4), Geom. Guidelines FMP 2402 and from Ref. 3: VHR Image Specifications for the CwRS Programme	ME, PA	
1.1	30/05/2008	Final version after draft revision deadline 30/05/2008	ME, SPOT	
1.2	02/04/2009	2009 Campaign update, introduction of Rapideye	ME, Rapideye	
1.3	20/06/2009	Final review; edits Fig. 2, Introduction of RE Fig. 4, and completion of text for RE.	PA	
2.0	11/11/2011	Updates to EU legislation references and to the administrative requirements (restriction to the use of circles for zone identification; insertion and updates of sensor features and products for Theos, DMC (constellation), Formosat2 and RapidEye, sensor benchmarking references.	PA, CA, EG, BV, SG, CA	

1. Introduction

1.1. HR Image Acquisition for the CwRS Project

- 1.1.1. Since 1993, DG AGRI has promoted the use of “Controls with Remote Sensing” (CwRS) as an appropriate control system to check if European Union aids are granted correctly. On the basis of the Council Regulation (EC) 165/94 and of the Commission Regulation (EC) 601/94, the Commission Services are required to centralize the acquisition of satellite images. This task was transferred to DG EC SERVICES in 1998 (ref. 17 September 1998/VI/34942). This is managed through a sub-delegation of signatures by DG AGRI to DG EC SERVICES.
- 1.1.2. HR imagery may be used in the CwRS Programme (in addition to VHR imagery) for crop, and/or land use identification. A series of images over the control zone suitably acquired during the crop cycle is supplied to the MS Administrations or their contractors by the EC Services in order for them to fulfil their area-based subsidy control in accordance with EC Regulation (Ref 1). The control methods are further described in the Common Technical Specifications (CTS) for the Campaign of Remote-Sensing Control of area-based subsidies (Ref 2).

1.2. Objectives and structure of document

- 1.2.1. This document constitutes the specifications for HR imagery to be used within the CwRS Programme. Its objective is to give the stakeholders¹ in the image acquisition management chain clarity about the technical details of the process. This document is available on the EC, EC SERVICES, Institute of Environment and Sustainability (IES) MARS Unit, Community Image Data portal (CID) web site: http://mars.EC_Services.ec.europa.eu (or directly http://mars.EC_Services.it/mars/About-us/CID/Image-Acquisition).
- 1.2.2. Reference is made to the CTS (Ref 2), and to the WikiCAP (Ref 4) for further information.
- 1.2.3. Reference is also made to the VHR Image Specifications for the CwRS Programme (Ref 3) which should be used in conjunction with this document.
- 1.2.4. Reference is also made to the terms and conditions of the Satellite Remote Sensing (SRS) data Framework Contracts (FCs) for image procurement to the EC Services signed with image providers (Ref 5).

¹ stakeholders, or actors = JRC, Image Provider, Administration/Contractor performing the CwRS

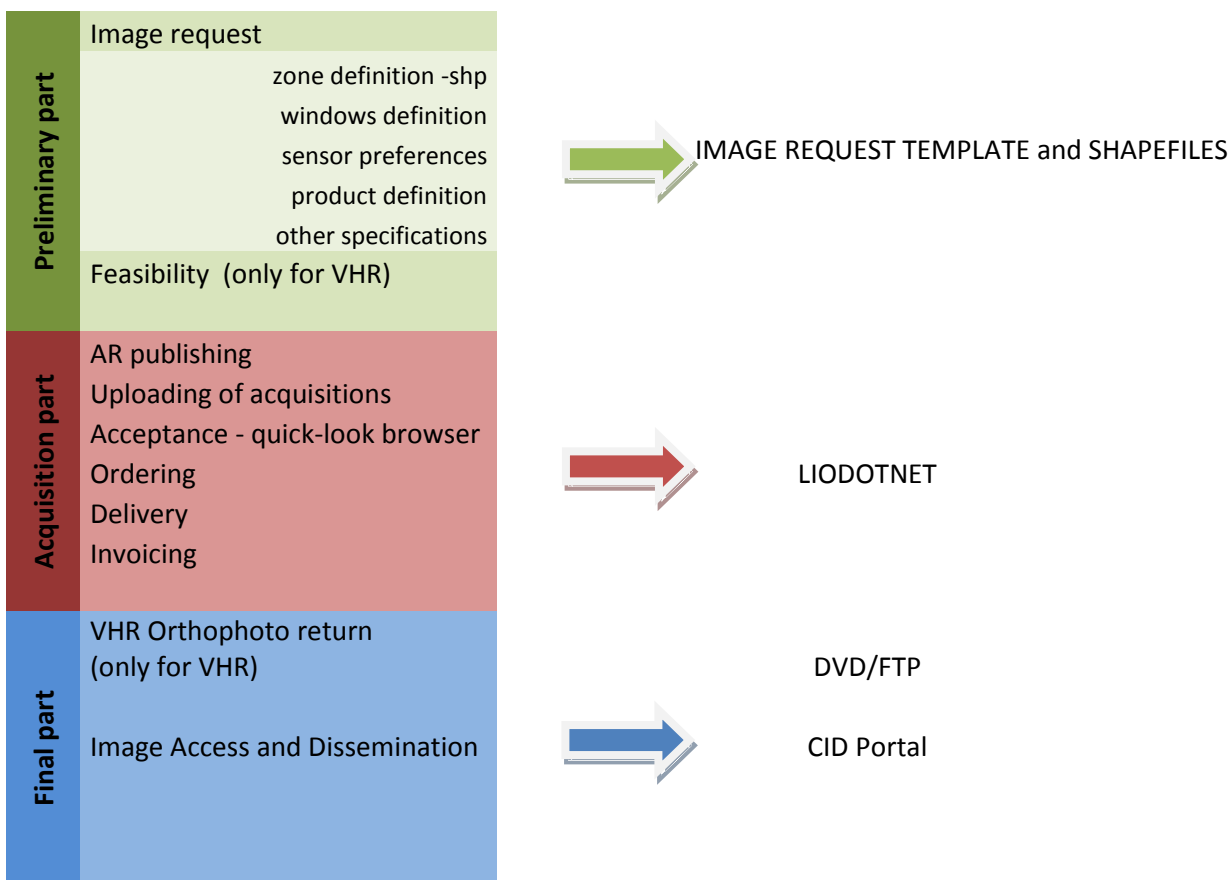


Figure 1 - Figure showing the image acquisition process flow

MS Administration	Contractor	EC SERVICES-CID	Provider
Image request submission	Cooperation on image request submission	Collecting image request	
Confirmation of final scenario		Perform feasibility request with Image providers (VHR only)	Feasibility assessment
	React in case of proposed / retained acquisitions	AR publishing	Acquiring and uploading of acquisitions
	Filling IDQA	Acceptance of acquisitions	Delivery
	VHR Orthophoto return	Ordering Invoicing	Invoicing
		Image storage and dissemination	

Figure 2 - Figure showing responsibilities of each actor within the CwRS

2. **Image request**

2.1.1. All MS administrations participating in the CwRS Campaign receive a preliminary image request for planning and budget purposes from the EC Services before the start of the Autumn HR campaign. MS provide a forecast of what is needed for VHR zones and surface area, for HR zones and windows. After the approval of the preliminary request, MS will be requested to enter details of their request for the Campaign directly into LIODOTNET, including sensor and product preferences (see LIODOTNET Manual). MS will also send to EC Services the control zones' shape files.

2.1.2. The template contains all zones' definition parameters:

- Member State
- Zone name (1-5 uppercase alphanumeric characters)
- Contractor responsible for the zone
- Sensors and product preference
- HR window(s) (start date, length and dead period from acquisition date to the next window opening)
- Delivery: CD/DVD or FTP

2.1.3. Shape files need to be provided as follows:

- Accepted formats: .shp, .shx, .dbf, .sbx, .sbn, .prj
- Shape file must be in geographic lat/long WGS84 coordinate system (decimal degree)
- Shape for a specific HR zone must correspond exactly to its corresponding VHR zone
- Circles (centroids) will be accepted only for Autumn zones definition
- Each zone in the shape file's database must be correctly named and be in accordance with the image request mentioned at point 2.1.1.

3. Zone Definition

3.1. General

- 3.1.1. General principles and Regulatory basis for selecting the zones to be checked by Remote Sensing are laid down in Commission Regulation (EC) No. 73/2009 (Ref.1). These are further described in the CTS (Ref. 2). The WikiCAP website (Ref. 4) on “selection of control zones” recommends that “whether the control zones are selected on the basis of a risk analysis or at random, the technical constraints of satellite remote sensing sensors should be taken into account to optimize the probability of acquisition”. These technical constraints, further described in Chapter 17, include: footprints, programming options, swath widths, elevation angles, Area of Interest (AOI) definition, window adjustments, feasibility assessment, etc.
- 3.1.2. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3) regarding the definition of a CwRS zone or AOI.
- 3.1.3. MS can request to exclude sensors with a lower resolution (in case of small parcel sizes), or sensors lacking the wave-length bands necessary for their image processing.
- 3.1.4. The number of multi-temporal HR images programmed over a control zone may vary depending on MS control strategy and agriculture.
- 3.1.5. The swath of the HR satellite sensors is usually not a constraint since scene sizes are significantly larger than the control zones. Each HR control zone should be no larger than 60 x 60 km.

4. Acquisition Windows

- 4.1.1. For HR imagery, “acquisition windows” and “dead periods” (separating acquisition windows) or earliest/latest opening dates will be agreed between the Administration/Contractor and the EC Services before the start of the campaign. The acquisition windows are calendar periods during which the HR satellites are programmed. Two or three windows after the VHR window are normally defined during crop season (more windows may be defined in accordance with the EC Services if cross-compliance and GAEC requirements have to be controlled). These data will be introduced by MS into LIODOTNET (see chapter 6).
- 4.1.2. The window length is a minimum of 2 weeks, but preferably 3-4 weeks.
- 4.1.3. Window opening dates for a MS must differ significantly from each other, i.e. at least one week.
- 4.1.4. The HR windows are named as follows: autumn; winter; HR-1; HR+1; HR+2 and HR+3. The names of the HR windows indicate season or their position in relation to the VHR window (satellite or aerial VHR).
- 4.1.5. For autumn/winter HR images or images in early spring, the Commission suggests acquisition only if the sun angle is higher than 20 degrees, to ensure sufficient contrast and to minimize the effect of shadows.
- 4.1.6. HR-1 opens before the VHR window and can be extended up to, but not beyond the opening of the VHR.
HR+1 opens after the VHR window and its opening date is defined by adding the dead period defined by the MS to the acquisition date of the satellite or aerial VHR image. In case of aerial VHR it is

important that MS informs the EC services of the acquisition date to define the starting date of the HR+1 window. MS can indicate an earliest/latest possible starting date of the HR+1 window. The HR+2 window opens after HR+1 and is defined by adding the dead period to the date of acquisition of the HR+1 image; the same applies to HR+3.

- 4.1.7. For a window change due to climate conditions, please refer in the VHR Image Specifications to the CwRS Programme (Ref. 3).
- 4.1.8. When an HR image has been acquired and accepted by the EC Services for a given acquisition window, the window will be closed. The opening of the next window will be defined by taking the dead period into account. The dead period must be a minimum of 2 weeks.
- 4.1.9. If no image has been acquired at the end of the HR-1 window, MS or Contractors can request the HR-1 window be extended up to the opening of the VHR window or the start date of the aerial photography flight. MS or Contractors can request that HR+1 and HR+2 windows are extended until the image has been acquired or until the contractor indicates that the acquisition request should be considered failed.
- 4.1.10. If the VHR image is acquired late in the window, and if budget is available, the contractor may request an archive search for a suitable HR image acquired during the first part of the VHR window.
- 4.1.11. Request for changes, such as extension or closure of ARs must be communicated by MS Administrations as soon as possible to the EC SERVICES, at the latest 3 days before the end of the window. EC Services will inform IPs about MS requests to close ARs.

5. **Feasibility**

- 5.1.1. The platforms' programming is competitive and therefore no feasibility assessment from image providers is needed for the HR programme.
- 5.1.2. Image providers will receive a list of zones for which their platforms have been requested by MS Administrations, the windows planned and the corresponding shape files as soon as available from MS and checked by EC Services.

6. **LIODOTNET**

- 6.1.1. LIODOTNET is a WEB application developed by the EC Services to manage Acquisition Requests (AR), browse and display images upload, validation, ordering, delivery, invoicing and return/archiving of satellite images.
- 6.1.2. LIODOTNET is the main communication tool between the CwRS actors during the Campaign; its automatic email exchange can be used to synchronize actions between different actors.
- 6.1.3. Web address is <http://lio2.ECservices.it/LioDotNet/Default.aspx>. More information about the application can be found by downloading the manual in the Documentation section of LIODOTNET. As from the 2012 Campaign, MS will introduce their image request details into LIODOTNET.

7. Acquisition Requests

- 7.1.1. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3).
- 7.1.2. Acquisition Requests (AR) can be opened only if all necessary specifications are provided – i.e. zone name, contractor, windows, sensor and product preference, and delivery media.
- 7.1.3. HR control zones are programmed on a competitive (“first come, first served”) basis. Priority for acceptance is given to the first validated image uploaded in LIODOTNET, or to the first proposed or retained image accepted by the national contractor (see also Chapter 6). With the acceptance of an uploaded acquisition all other ARs are automatically closed.
- 7.1.4. One AR is published per sensor/product fitting to the control zone.

8. QL (Browse Image) Upload

- 8.1.1. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3) regarding the Quicklook (QL) upload and relevant messaging triggered. The QLs of all the images acquired must be uploaded by Image Providers in LIODOTNET. The geo-referenced QLs are visible through the QL Browser in LIODOTNET, while non-geo-referenced QLs (IRS-P6, DMC) can be downloaded and viewed with image viewers installed on the user’s computer.
- 8.1.2. The use of the haze flag is not mandatory for HR images.
- 8.1.3. Image Providers are requested to upload imagery to best fit the shape file which has been provided by EC Services, with the minimum possible surface excess. The EC Services will check whether this provision is applied before proceeding to the ordering.

9. Validation

- 9.1.1. The evaluation of the quality of an image (cloud cover, haze, snow, etc.), made by Image Providers, always refers to the AOI as defined by the shape files.
- 9.1.2. For each HR zone and each open window, the first image uploaded by an image provider with $\leq 1\%$ cloud cover is “validated”. After acceptance by the EC Services the AR is closed for the other providers.
- 9.1.3. If the HR area of interest contains $> 1\%$ cloud cover, dense haze, etc., then:
 - If cloud cover is $\leq 5\%$: the image is “proposed”, a quicklook is uploaded in LIODOTNET by the IP. The contractor should accept or reject the image in LIODOTNET as soon as possible. If accepted, the EC Services will accept and close the AR and order the image. The IPs should continue programming until the AR is closed.
 - If cloud cover is $> 5\% \& \leq 20\%$: the image is “retained”.
 - $> 20\%$ of cloud cover: it is not foreseen that image providers send QLs in such cases. In exceptional cases, only upon request of the EC services, such QLs may be uploaded (e.g. when a window is coming to an end without a validated acquisition).
- 9.1.4. If an image does not completely cover a zone, this should be uploaded as “proposed” in LIODOTNET.

10. QL Imagery acceptance

- 10.1.1. When “proposed’ or “retained” images are uploaded, Contractors must react in LIODOTNET, within 3 working days, accepting or rejecting the images.
- 10.1.2. In the case where several validated images are uploaded the same day, the MS contractors will choose the most suitable one. EC Services maintain the right of final decision.

11. Ordering

- 11.1.1. Ordering of all imagery is made by EC Services using LIODOTNET; the order is scanned and sent to the Image Provider in digital form. The order contains all relevant acquisition details including:
- European Commission - Joint Research Centre (EC SERVICES), Institute for Environment and Sustainability, IES order #, Acquisition Request ID (ARid) for each image.
 - HR: country, zone, period, acquisition date, product, cloud cover, where applicable (shift, custom id, path, row, etc.), delivery media
 - delivery address
 - any other order parameters according to Chapter 18 Products.
- 11.1.2. An order letter is prepared for imagery acquired over all zones with the same Contractor/IP and period of acquisition. During the autumn/winter seasons one order per IP/Contractor/window will be prepared to reduce administration.
- 11.1.3. In case images which partially cover the AOI have been ordered, the EC Services can, upon request, also buy the missing part to complete the zone/window.

12. Delivery

- 12.1.1. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3) regarding the receipt of imagery and completing the IDQA.
- 12.1.2. The contractual delivery period (production, internal QC, and ex-works availability) agreed with the EC services from the date of ordering is 6 working days.
- 12.1.3. Images (after validation according to procedure in § 9) are delivered directly to the contractor after having passed through the internal Quality Control (QC) of the IP.
- 12.1.4. If the Contractor has not been named, upon request, the imagery could be delivered to the National Administration. It is of the utmost importance that the MS communicate the name and all contact details of the Contractors as soon as they are appointed.
- 12.1.5. The Contractor receives a delivery note via LIODOTNET and an automatic e-mail from LIODOTNET as soon as the product is shipped by the image provider. Data delivered by ftp is available on IPs’ server for 8 working days. Contractors who have requested delivery via ftp must ensure that the data are downloaded during this time frame.

12.1.6. To avoid possible data integrity issues related to service and connection interruptions and ensure the correct and complete download of files, a checksum should be used (see VHR specifications Ref. 3).

13. Invoicing

13.1.1. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3) regarding details on invoicing.

13.1.2. Pricing for products is defined according to Framework Contracts (FC) stipulated with the 5 Image Providers: SPOTImage for SPOT imagery, Euromap for IRS-P6 imagery, RapidEye for RE imagery and DMCii for DMC imagery, Swedish Space Corporation for Theos imagery.

14. Image Data Return

14.1.1. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3) regarding details on Image Data Return and Image Data Access. There is no need to return any HR images.

14.1.2. It should be mentioned that the EC Service purchases a right to the use of the images, but not the IPR, which remains the property of the Image Providers. Imagery must be used following the End User Licence Agreement (EULA) and references must be quoted, according to the case:

- ✓ SPOT: “Distributed by SPOTImage S.A. (© SPOTIMAGE) [year of the image]”
- ✓ IRS-P6: “Original data provided by EUROMAP GmbH, © Antrix [year of the image]”.
- ✓ DMC – DMCii Copyright © DMCii [date of image] All Rights Reserved.
- ✓ RapidEye: “Original data provided by RapidEye AG, © RapidEye [year of the image]”.
- ✓ Theos: © GISTDA [year of the image], Distributed by SSC

15. Quality Assurance / Quality Control

15.1.1. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3).

16. Risk of Satellite Failure

16.1.1. Reference is made to the VHR Image Specifications for the CwRS Programme (Ref. 3).

17. Technical specifications of sensors

17.1. DMC

DMC 2 (2nd generation constellation of 3 satellites)

- GSD: 22m MSP
- Image Swath; 660km
- Spectral bands; 3 MSP (2 visible, 1 NIR)
- Operational altitude: 659 km
- Daily revisit

17.1.1. The DMC constellation control zone

Internal ref: JRC IES/H04/C/PAR/cas(2011)(12923)

DMCii satellite constellation is composed of a number of coordinated earth observation satellites to provide daily revisit capability. Considering the very large swath width, DMC can acquire more zones at a time (up to 8 zones captured in a single image in 2011). Satellites to be used in the CwRS are UK DMC2, Deimos-1, Nigériasat-X. All are 22 m GSD 2nd generation sensors with 650 km swath, identical G,R,NIR bands radiometrically calibrated within 1% for interchangeable satellite use. .

17.1.2. DMC constellation products

- Preprocessing: L1R (source data) or L1T (orthorectified)
- Format: DIMAP
- Resampling: CC
- Footprint: up to 650 x 1.000 km per image, configurable according to AOI. Large images are divided into tiles for processing and convenient delivery – normally 330 x 330 km.

17.2. Formosat 2

17.2.1. Features

- GSD: 2m PAN, 8m MSP
- Image Swath: 24km
- Spectral bands: 1 PAN, 4 MSP
- Operational altitude: 891 km

17.2.2. The Formosat2 (F2) control zone

The nature of the satellite being geo- and sun- synchronous permits a daily revisit time of locations on earth which can be reached from its orbit.

The quality and efficiency of the F2 data has been evaluated by the EC Services (Ref. 7).

The necessary overlap (N-S or E-W) between subsequent acquisitions should be a minimum of 0.5km in order to ensure the ortho-rectification process.

17.2.3. Red and blue programming also apply to F2 (see SPOT 17.1.4.).

17.2.4. Formosat-2 products

- Preprocessing: 1A
- Format: DIMAP
- Resampling:CC
- Footprint:24x24km

17.3. IRS P6 (LISS - III)

17.3.1. Features

- GSD: 23,5m MSP resampled to 20 m.
- Image Swath: 141km

- Spectral bands: 4MSP (including 1 SWIR)
- Operational altitude: 817 km

17.3.2. The IRS P6 control zone

The logic to place zones in a 60-70 km wide corridor, which fits to a SPOT swath, also fits with the IRS-P6 nominal coverage; especially in areas above Lat. 43.5° where this could double the frequency of IRS since it would allow the use of the overlap area of the passes. The nominal coverage for P6 is available at http://www.euromap.de/products/prod_029.html.

17.3.3. IRS-P6 products

- The default recommended by the image provider for IRS-P6 data is SuperStructure format, UTM WGS84, CC & Ortho-kit with RPC-file.
- Orientation: North / Path
- Duplo – two or more zones in one scene
- Footprint: 140x140km, 70x70km

17.4. RapidEye

17.4.1. Features

- GSD: 6,5m MSP (Orthoproduct 3A resampled to 5 m)
- Image Swath: 77km
- Spectral bands: 5MSP (including 1 red edge, 1 nIR)
- Operational altitude: 630 km

17.4.2. The RapidEye (RE) control zone

Rapideye is mainly devoted to its background mission and used mainly for image archive search, but the background mission often coincides with MS image requests and therefore participates in the competitive “1st come 1st served approach”. In fact, with 5 satellites RE has revisits the whole world daily, which fits very well to the CwRS scenario. However, being less agile, the off-nadir view angle is set only once per orbit which reduces collection capacity/orbit.

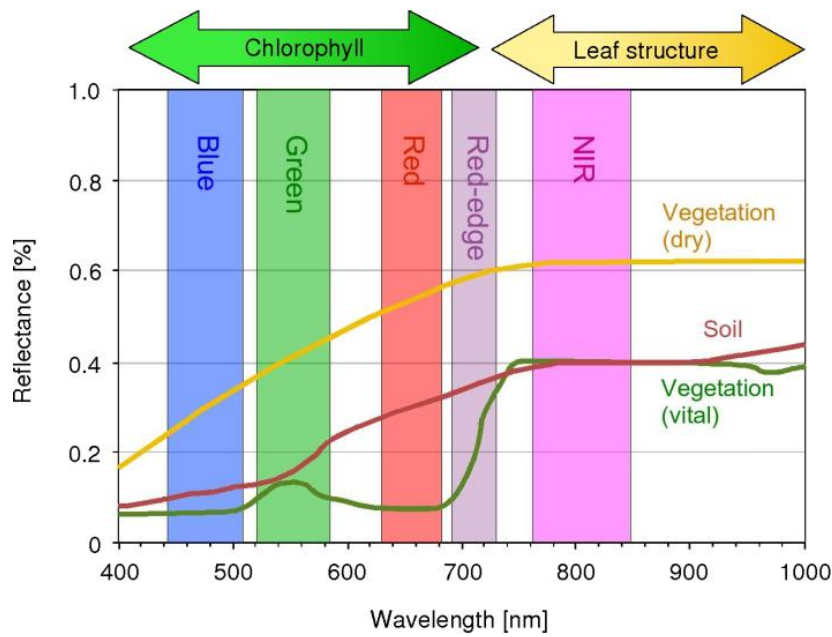


Figure 3 - The 5 MSP bands of RapidEye

17.4.3. RapidEye products

- Preprocessing: 1B or 3A
- Format: NITF 2.0 with RPC
- Resampling: CC
- Footprint: 77x50-300km

17.5. SPOT

17.5.1. Features

SPOT 4

- GSD: 10m PAN, 20m MSP
- Image Swath: 60kmx60km to 80km
- Spectral bands: 1 PAN, 4 MSP (including 1 SWIR)
- Operational altitude: 822 km

SPOT 5

- GSD: 5m PAN, 10m MSP, 20m SWIR (2 PAN bands can generate 2,5m product)
- Image Swath; 60kmx60km to 80km
- Spectral bands; 2 PAN, 4 MSP (including 1 SWIR)
- Operational altitude: 822 km

17.5.2. The SPOT control zone

17.5.3. The sensor footprints depend on the respective satellite orbits. For most sensors, it is possible to compose an image from two pieces of successive images frames along the orbit (“shift along track” or “SAT”). The footprint can therefore be moved along the track towards the North or the South.

17.5.4. Figure 4 - Examples of control zone configuration and location constraints

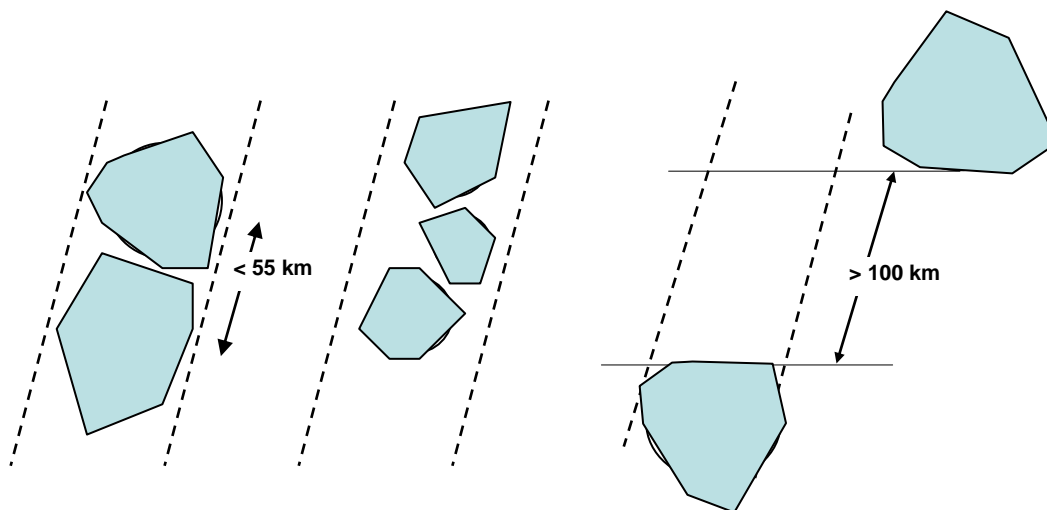


Figure 4 - Examples of control zone configuration and location constraints

Case a: Example of two control zones which are “contiguous”: a single programming fee is due in this case

Case b: Same case, for three contiguous control zones

Case c: Non-aligned zones: programming will be more difficult in the same satellite pass if the distance between the sites is less than 100 km (SPOT case).

17.5.5. For Spot there should be an indication of “best fit” or sub-image needed to cover the zone (e.g. 60 x 60, 40 x 40, 30 x 30, 20 x 20 - see 17.1.1). This will be agreed upon by the EC Services and the Image Provider.

17.5.6. For Spot there should be an indication of type of programming necessary: red/blue. In accordance with SPOTImage the ARs are published with priority (red) programming or (blue) programming, depending on number of possible statistical attempts and on conflicts.

17.5.7. SPOT products

- Preprocessing: 1A
- Format SPOT4: CEOS (BIL) or DIMAP
- Format SPOT5: DIMAP
- Resampling: NN / CC
- Footprint: SPOT 4: 60x60km
- Footprint: SPOT 5: 60x60km, 40x40km, 30x30km, 20x20km

17.6. Theos

17.6.1. Features

- GSD: 2m PAN, 15m MSP
- Image Swath: 22km PAN, 90km MSP
- Spectral bands: 1PAN, 4MSP
- Operational altitude: 822 km

17.6.2. The geometric quality of Theos data has been assessed by the EC Services (Ref 6).

17.6.3. The THEOS control zone

The 90 x 90 km scene is enough to cover 1 zone. For zones above 60° Latitude only 22 x 22 km pan sharpened scenes can be produced and will therefore be used.

17.6.4. Theos products

- Preprocessing: 1A (PSH 2A – this product is used above 60deg latitude only)
- Format: DIMAP
- Resampling: CC
- Footprint: 90 x 90km MSP, 22x22km PAN

18. Products used in CwRS

18.1.1. For a complete description of image processing levels and data formats, please consult the technical documentation of the image providers.

18.1.2. Semi-automated ortho-rectified data is available from EC Services for download upon request for most HR sensors.

18.1.3. All data delivered to the contractors are uploaded and made available in accordance with valid licensing terms through the CID portal.

19. EC Services responsible and e-mail addresses

19.1.1. IES / CID Action

Responsible for the CID (Community Image Data portal) Action par-johan.astrand@jrc.ec.europa.eu

Responsible for the CwRS work package eugenio.gervasini@jrc.ec.europa.eu

Email to all (< 500 Kbyte) cid-iat@jrc.ec.europa.eu

Contact persons for CwRS and CID portal:

blanka.vajsova@jrc.ec.europa.eu responsible for the VHR acquisition

eugenio.gervasini@jrc.ec.europa.eu responsible for the HR acquisition

cherith.aspinall@jrc.ec.europa.eu co-responsible for the HR acquisition

cherith.aspinall@jrc.ec.europa.eu image ordering, image invoicing

simone.gentilini@ext.jrc.ec.europa.eu responsible for LIODOTNET development

juergen.breunig@ext.jrc.ec.europa.eu responsible for image return and image upload to CID Portal;

armin.burger@jrc.ec.europa.eu responsible CID portal development

joanna.nowak@jrc.ec.europa.eu :responsible for image benchmarking

lio.net@jrc.ec.europa.eu functional inbox for LIODOTNET issues/requests", e.g.: creation/updates of users, acquisition upload problems, and visualization issues

19.1.2. IES / GEOCAP Action

Contact persons for CwRS at GEOCAP

philippe.loudjani@jrc.ec.europa.eu, paolo.pizziol@jrc.ec.europa.eu

20. References

- 1) Commission Regulation (EC) No 1122/2009 of 30 November 2009 laying down detailed rules for the implementation of Council Regulation (EC) No 73/2009 as regards cross-compliance, modulation and the Integrated Administration and Control System (IACS), under the direct support schemes for farmers provided for that Regulation, as well as for the implementation of Council Regulation (EC) No 1234/2007 as regards cross-compliance under the support scheme provided for the wine sector.
- 2) European Commission (2011), Common Technical Specifications (CTS): <http://marswiki.jrc.ec.europa.eu/wikicap/index.php/Category:CTS>
- 3) VHR Image Specifications for the CwRS Programme JRC IES/H04/C/PAR/par D(2011)(13923) , <file:///S:/FMPArchive/C/13923.doc>
- 4) WikiCAP: <http://marswiki.EC.Services.ec.europa.eu/wikicap/index.php> (requires user/password). This wiki allows access to information concerning the CAP Control with Remote Sensing.
- 5) The satellite remote sensing (SRS) data Framework Contracts (FCs) for image procurement to the EC Services signed with image providers e-Geos (# 255756 for Landsat5), SPOTIMAGE (# 386747 for SPOT4 & SPOT5), EUROMAP (# 256396 for IRS-P6), DMCii (# 256418 for DMC) RapidEye (# 256394 for RE products), SSC (# 386601 for Theos), and any specific ad hoc agreements on top of these FCs valid for the CwRS programme.
- 6) Benchmarking Theos

WorldView-2, GeoEye-1, Cartosat-2, Kompsat-2, RapidEye and THEOS image [EC SERVICES Oral presentation Cat3.4 EC SERVICES60286 EC SERVICES IPSC/G03/C/JNO/jno D(2010)(12136), Int. ref file:///S:/FMPArchive/C/12136.ppt – Presented at the MARS Unit's GEOCAP Action's Control Methods Workshop - 2010 campaign; 13-14 April 2010; Ispra (Italy); Authors: Nowak Da Costa J.K, Åstrand P.J].

THEOS Geometric Image Quality Testing – Initial Findings - EC SERVICES Scientific and Technical Report Category 2.2 no.24655 EN, ISSN 1831-9424, ISBN 978-92-79-18908-1. EC SERVICES PUBSY No. EC SERVICES61992, Int. ref: file:///S:/FMPArchive/C/12154.pdf, Authors: Walczynska, A, Nowak Da Costa, J.K., 2010].

Nowak Da Costa J, Walczynska A. Evaluating the WorldView-2, GeoEye-1, DMCII, THEOS and KOMPSAT-2 Imagery for use in the Common Agricultural Policy Control with Remote Sensing Programme. Oral presentation in: 16th Conference on `Geomatics in support of the CAP'; 24 November 2010; Bergamo (Italy); GeoCAP Action of the MARS Unit, IPSC, DG EC SERVICES (Organiser). 2010. EC SERVICES61995.

THEOS Geometric Quality Assessment for use in the Common Agricultural Policy Control – Scientific poster for the 16th Conference on 'Geomatics in support of the CAP" in Bergamo, Italy, 24-26 November 2010. [EC SERVICES PUBSY No. EC SERVICES61994, Poster Presentation Category 3.5, Authors: Nowak Da Costa, J.K., Walczynska, A., 2010]. PUBSY: <http://publications.EC.Services.ec.europa.eu/repository/>

7) Benchmarking Formosat-2

Orthorectification of Formosat-2 data for use in the Common Agricultural Policy Control with Remote Sensing Programme – Title of paper: "Orthorectification Tests Continued..." [EC SERVICES IPSC/GO3/C/PAR/D(2008)(9233 V 1.1)]

8) End User License Agreement (EULA)

CID Portal EULA: <http://cidportal.jrc.ec.europa.eu/home/idp/licensing/eula>

21. **Abbreviations & Acronyms**

AOI	Area of Interest
AR(s)	Acquisition Request (s)
CTS	Common Technical Specifications
CwRS	Control with Remote Sensing (Campaign)
DEM	Digital Elevation Model
FC(s)	Framework Contract (s)
GCP	Ground Control Point
GSD	Ground Sampling Distance
HR	High Resolution imagery
IES	Institute for Environment and Sustainability- Joint Research Centre
IP(s)	Image Provider(s)
IPR	Intellectual Property Right
EC SERVICES	Joint Research Centre of the European Commission
LIODOTNET	EC SERVICES web-based software for the management of HR and VHR images acquisition
SRS	Satellite Remote Sensing data
VHR	Very High Resolution Imagery

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