HR Image Acquisition Specifications for the CAP checks (CwRS)
-
HR profile-based specifications including HHR profiles

Campaign 2015

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## Document history

| Version | Date | Comment | Author |
|---|---|---|---|
| 1.0 | 01/03/2008<br><br>01/05/2008 | 1st 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 |
| 2.2 | 12/11/2012 | Unit name updated. SPOT4 sensor will not be available after 10/01/2013; RapidEye not available for CwRS 2013. Addition of Resourcesat-2. Changes to previous versions in RED. Image request - shps. Changed text in IPR paragraph 14.1.2. Copyright terms updated. | CA, EG, PA, CD |
| 3.0 | 20/02/2013 | Rework of document to fit the Framework Contract for supply of Satellite Remote Sensing (SRS) data and associated services in support to checks within the Common Agricultural Policy (CAP) - HR profile tender: High Resolution (HR) sensor independent 'profile' | PA |
| 3.1 | 04/07/2013 | Final review | PA, EG, BV, ISM, AB, CD, CW |
| 3.2 | 28/08/2013 | Edited feasibility chapter (5), and reintroduced ortho image return (13). | PA, CW |
| 3.3 | 13/02/2014 | Introduction of G-LIO.NET as workflow management tool for 2014 campaign | GDM |
| 4.0 | 16/03/2014 | Final review after HR profile KO meeting held 17-18/02/2014 | PA, ISM, CW, JB |
| 4.1 | 17/11/2014 | Airbus review for Campaign 2015 | Airbus |
| 5.0 | 01/12/2014 | Check, acceptance, and insertion of certain elements regarding iteration of specified area/shapefile/corrections (see chapter 2)); update of profiles (chapter 16), and complete check of document for the 2015 Campaign | JRC |
| 5.1 | 17/12/2014 | Minor updates based on Airbus comments (eg. Haze flag as from HR-1), update of HR profiles | JRC |

## 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 suitable to checking if aids are correctly granted. On the basis of the Council Regulation (EC) 1306/2013 [ref 1)] and of the Commission Implementation Regulation (EC) 908/2014 [ref 1)], the Commission Services are required to centralize the Satellite Remote Sensing (SRS) image acquisition. This task was transferred to DG JRC in 1998  (September 1998/VI/34942) and it is managed through a cross delegation (sub-delegation of signature) by DG AGRI to DG JRC (JRC).

1.1.2. HR imagery may be used in the CwRS Programme (in addition to VHR imagery) for crop, and/or land use identification, checking if the requirement of keeping the land in Good Agricultural and Environmental Conditions (GAEC) is maintained and further checks of the new 'greening' requirements defined in the CAP reform implemented as of 2015. A series of images over the control zones suitably acquired during the crop cycle is supplied to the MS Administrations (or their contractors), in order for them to fulfil their area-based subsidy control in accordance with EC Regulation 809/2014 [ref 1)]. The control methods are further described in the "Guidance for on the-spot checks and area measurement" [ref 2)].

1.1.3. As from the 2014 Campaign the detailed management of HR image acquisitions - to cover the correct areas required for the CAP checks at the correct times of the growing season - has passed to industry to enact under the quality control of the JRC. This choice has been made since there are today several suppliers of Satellite Remote Sensing (SRS) imagery having a proven competency of supplying efficiently the imagery needed for the CAP checks, adhering to JRC quality specifications.

1.1.4. There may be one or more FW contractor/s appointed by the Contracting Authority (CA) JRC, to perform the HR image acquistion management. In these specifications the Image Provider (IP) therefore refers to the FW contractor/s with whom the JRC has signed a Framework Contract (FWC). At the moment Airbus DS GEO SA holds one contract [ref 4)], while another for the supply of HHR (see chapter 16.1) imagery is being tendered.

### 1.2. Objectives and structure of the document

1.2.1. This document constitutes the HR profile-based specifications to be used within the CAP checks programme. Its objective is to give the stakeholders[1] clarity regarding the technical details of the process of SRS image acquisition (see **Figure 1**)

1.2.2. There is a substantial change in the roles of the stakeholders as from Campaign 2014 compared to earlier Campaigns, as mentioned above (§ 1.1.3,). The JRC has now an overarching role as responsible for the Quality Control (QC) of the operations, while most of the interaction necessary within the image acquisition process

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[1] Stakeholders, or actors are the JRC, the FW Contractor and the Member State (MS) Administrations (or their contractor performing the CAP Checks).

takes place between the FW contractor/s and the MS Administrations (or their Contractor/s performing the CAP checks). These specifications intend to describe these interactions.

1.2.3.   This document is available at the G-LIO[2] website, and will be available from the documentation page of the new NG-LIO.NET[3] website.

1.2.4.   Several references are made here: to "Guidance for on the-spot checks and area measurement" [ref 2)]; to the Guidelines for Best Practice and Quality Checking of Ortho Imagery (ref 10)); to the VHR profile-based specifications [ref 3)], that shall be used in conjunction with the present document. Reference is also made to the terms and conditions of the Framework Contracts (FWCs) for image procurement to the EC Services [ref 4)].
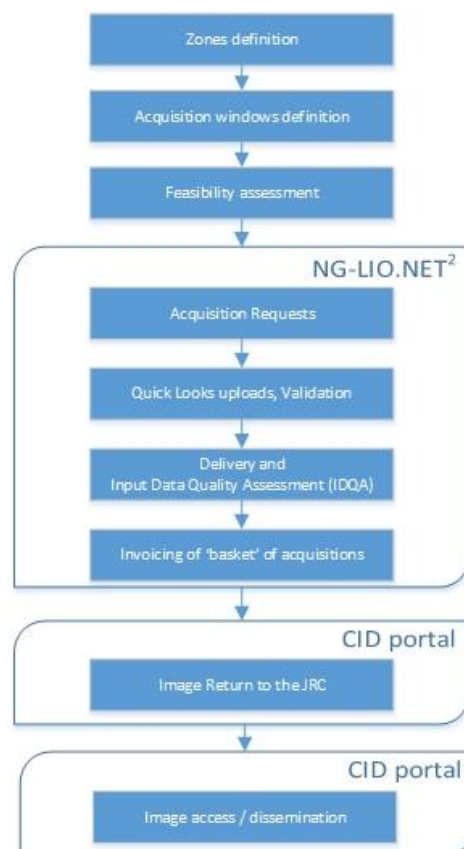


Figure 1 - **Figure showing structure of this document and the SRS image acquisition process**

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[2] G-LIO is a Web application, implemented with Microsoft.NET technology used in 2014 Campaign and to be phased out in favour of NG-LIO.NET (New Generation- LIO.NET) ; http://g-lio.jrc.ec.europa.eu/G-LioDotNet/ will be: https://www.ng-lio.eu/ (see ref. 9)

[3] NG-LIO.NET (New Generation LIO.NET) and the NG-QL Browser (New Generation Quick Look Browser) is a Live Image Ordering system developed within Microsoft .NET domain [ref 15]. This system will be phased in after G-LIO.NET and will compulsory be used thereafter in the 2015 Campaign.

## 2. **Image Requests**

2.1    All MS Administrations participating in the CAP Checks Campaign receive from the JRC a request for planning and budgeting purposes before the start of the Campaign. The MS Administrations in this way provide a forecast to the JRC on their "basic zone parameters". The forecast is normally inserted on-line[4]

2.2    The basic zone parameters for each MS will be provided by the EC Services (JRC) to the FW contractor/s. These are:
- relevant control method description;
- number and sum area to be acquired (rounded to whole km², UTM); for each type of prime profile (see Chapter 16);
    a) CwRS: [std]
    b) CwRS: [HHR], [ortho];
- number and type of window/s;
- shapefiles of the control zones (files with extensions .shp, .shx, .dbf, .sbx, .sbn, .prj (Lat/Long, WGS84)).

2.3    It is the FW contractor/s responsibility to finalise the remaining zone parameters (see § 2.4 below) in its contacts with the MS Administrations (or their Contractors). The NG-LIO.NET web application shall be used for this purpose where all relevant parameters shall be inserted as Image Requests by the MS Administrations. i.e. the FW contractor/s is responsible for this process and the check on completeness of all the parameters serving his feasibility assessment (see Chapter 5), and his future delivery of correct imagery. When the FW contractor/s has completed this task, he shall report to the JRC who will validate final results inserted in NG-LIO before the feasibility starts.

2.4    The remaining zone definition parameters are:
- zone name (≤ 5 characters), it needs to be unique for the whole Campaign;
- zone (AOI) area (rounded to whole km², UTM) in accordance with the shapefile area handled to the FW contractor/s by the JRC;
- requested acquisition window (from and to dates), and relevant window parameters (e.g. dead period, earliest start date, latest start date etc. if applicable);
- product - bundle, multispectral, or pansharpened; primary or orthorectified level;
- delivery - DVD or FTP;

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[4] https://marswiki.jrc.ec.europa.eu/cwrs/index.php

## 3. Zones definition

### 3.1 General

3.1.1    The regulatory basis for the CwRS programme is given in Council Regulation (EC) 1306/2013 (Horizontal Issues), 1307 (Direct Payments)/2013 [ref. 1)] and Delegated and Implementing Regulations 639/2014, 640/2014, 641/2014 that allow MS to use remote sensing techniques as a means of carrying out On The Spot (OTS) checks on agricultural parcels. These are further described in the "Guidance for on the-spot checks and area measurement" [ref 2)]. The guidance document describes that a "control zone" is a geographical area defined on the basis of GIS analysis, taking account of technical constraints (e.g. standard satellite 'scenes'). These technical constraints, which are further detailed below, include: swath widths, elevation angles, Area Of Interest (AOI) definition, window adjustments, feasibility assessment, etc.

3.1.2    Reference is also made to the VHR profile based image acquisition specifications for the CAP checks [Ref. 3)] regarding the definition of a CwRS zone or AOI.

3.1.3    The swath of the HR satellite sensors is usually not a constraint in the HR image acquistion since scene sizes are significantly larger than the control zones.

3.1.4    The MS Administrations are required to appoint one contact person (name and email) of the Administration for interfacing with the FW Contractor/s in all communications. It is also of utmost importance that the MS Administrations communicate one contact person for their contractors to the FW Contractor/s as soon as the contractors are appointed.

## 4. Acquisition Windows

4.1    For HR imagery, acquisition windows, dead periods (minimum time between the last acquisition in the previous window and the starting date of the current one) and earliest/latest start dates are defined. Acquisition windows are the time intervals in which the HR satellites are programmed. One or two windows after the VHR window are normally defined within the crop season. More windows may be defined in accordance with the JRC if Cross-compliance and Good Agricultural and Environmental Condition (GAEC), or 'greening' requirements need to be controlled. The methodology must be justifiable by the MS Administrations.

The minimum HR window length is **four weeks**, and HR windows must have at least **one week** dead period.

4.2    The number of multi-temporal HR images programmed over a control zone may vary depending on MS control strategy and agriculture. JRC needs to accept this information at the beginning of each Campaign (ref 2.1).

4.3    It is to be noted that for the 2015 campaign, 2 new HR periods will be added between the two VHR periods. These periods are called HRB1 and HRB2.

4.4    The HR windows are named as follows: *autumn*, *winter*, *HR-1*, *HRB1, HRB2, 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).

HRB1 and HRB2 windows can only be defined if there are two VHR windows. The possible sequence of windows in this case is: *autumn*, *winter*, *HR-1*, *VHR1*, *HRB1*, *HRB2*, *VHR2*, *HR+1*, *HR+2*, *HR+3*. If there is only one VHR window than the possible sequence of windows is as follows: *autumn*, *winter*, *HR-1*, *VHR1*, *HR+1*, *HR+2, HR+3*.

4.5     For autumn/winter and early spring (HR-1) windows, the JRC suggests acquisition only if the sun angle is higher than 20 degrees to ensure sufficient contrast and to minimize the effect of shadows. The FW Contractor/s is informed that validated imagery, i.e. cloud cover ≤1%, will not be accepted if quicklooks are not interpretable (e.g. too dark), or show an amount of snow-cover making the image unusable for control purposes.

4.6     In case of overlap between HR-1 and VHR windows occurs after import of final dates after feasibility, (due to e.g. the possibility of ±3 days to adjust the passes) HR-1 will be shifted to prevent overlap. The shift will also imply modifying the starting date of the HR-1, so that the length of window remains as before. In case the AR for the HR-1 has been already opened it will close and open again according to the shifted dates. The same operations may be made for the ending dates when therefore the start of the HRB1, HRB2 or HR+1 window is delayed by VHR feasibility - the HRB1, HRB2 or HR+1 window end date will also be delayed with same number of days. This process will be automatically checked in NG-LIO.NET, reducing all the e-mails iterations that were necessary in the previous 2014 campaign

4.7     Also, if the VHR window is extended by the MS Administration (or its contractors) due to no acquisition (e.g. adverse weather conditions), the subsequent HR window opening will slide and the HR window closing date will slide by same number of days, in order to leave the HR window last as much as it was originally defined. Also this process will be automatically checked in NG-LIO.NET, reducing all the e-mails iterations that were necessary in the previous 2014 campaign.

4.8     In case of aerial VHR it is important that the MS Administration (or its contractors) informs the HR FW Contractor about the acquisition date, in order to define the starting date of any subsequent HR window. The acquisition date of the VHR aerial acquisitions should be inserted in NG-LIO by the HR FW Contractor based on the information received by the MS Administration. MS Administrations (or their contractors) should indicate the earliest/latest possible starting date of the HRB1, or the HR+1 window. The HRB2, or the HR+2 window will open after HRB1, or the HR+1 and is defined by adding the dead period to the date of acquisition of the HRB1, or the HR+1 image. The same applies for the HR+3.

4.9     Please refer to the VHR profile based specifications [ref 3], §3.1.3.] for details regarding window change due to climatic conditions.

4.10    When an HR image has been acquired by the FW Contractor and has been accepted by the MS Administration (or its contractors) for a given acquisition window, the window will be closed automatically in NG-LIO. The opening of the next window will be defined automatically by taking the dead period into account. The dead period must be a minimum of 1 week (see §0).

4.11    If no image has been acquired at the end of the HR-1 window, MS Administration (or its contractors) can request an archive search for the period of the window, or the HR-1 window may be extended up to the opening of the VHR window or the start date of the aerial photo flight. The MS Administration (or its

contractors) can request that HR+1 and HR+2 windows are extended until the image has been acquired or until the MS Administration (or its contractors) indicates that the acquisition request should be considered failed.

4.12    If the VHR image is acquired late in the window, the MS Administration (or its contractors) may request an archive search for a suitable HR image acquired during the first part of the VHR window. The FW Contractor should obtain permission from the JRC before such SRS image is approved, and may be delivered.

4.13    MS Administrations (or their contractors) are required to communicate to the FW Contractor requests for changes, such as extensions or closure of Acquisition Requests (ARs), as soon as possible, no later than 3 days before the end of the window.

4.14    MS Administration (or its contractors) is notified about windows coming to an end by selecting the Mail Selection feature in NG-LIO.NET. If no request for the extension of a window is received by the FW Contractor, the window will close at planned closure (end date window)

## 5.  Feasibility

5.1    The FW Contractor/s will need much less iteration with the MS Administrations (or their contractors) for the HR image acquisition feasibility, compared to the VHR procedure. In the HR case the FW Contractor/s will receive the parameters defining the zone (see § 2.2) from the JRC. The FW Contractor will thereafter in accordance with 2.3, and 2.4 be responsible for finalisation of the NG-LIO.NET insertion (i.e. interface with the MS Administrations (or their contractors)) and also perform completeness check on these parameters (e.g. on consistency, formats, product type, delivery mode, etc.), and that the Image Requests are ready for feasibility and/or subsequent image acquisition. All tasking is placed at the higher level of standard programming.

5.2    The final scenario should be submitted for validation by the JRC.

## 6.  G-LIO.NET and NG-LIO.NET

6.1    G-LIO.NET will be replaced by NG-LIO.NET from the 15th of January, 2015. The improvements of NG-LIO.NET stand in the renewal of the application, concerning particularly the Image Requests module and Acquisition Request module. A new e-mail notification system as well as an automatic calculation of start and end date of acquisition windows are integrated. A user dashboard will be available on the home pages, showing all tasks to be performed by the current user and displaying information dedicated to this account. The QL Browser functionalities will also be improved allowing to pan and zoom on the displayed images and change the order of layers arrangement. An OpenStreetMap layer will be served as background layer.

6.2    It is compulsory to use G-LIO.NET and NG-LIO.NET by all stakeholders involved in the CAP checks 2015.
   –   G-LIO.NET will only be used for Autumn and Winter periods within HR Campaign 2015
   –   NG-LIO.NET will be used for the rest of the HR Campaign 2015

Hereafter when reference is made to NG-LIO.NET it is implicit that G-LIO.NET will be used before it is operational.

## 7. Acquisition Requests

7.1    Reference is made to the VHR profile based technical specifications for the CAP checks (ref. 3); §5).

7.2    Acquisition Requests (ARs) will be opened when the relevant zone definition parameters are complete (see Chapter 2.4)

## 8. QL (browse image) upload

8.1    Reference is made to the VHR profile based technical specifications for the CAP checks (ref. 3); §6) regarding the QuickLook (QL) upload and relevant messaging triggered.

8.2    The geo-referenced QLs of all imagery within the specifications are uploaded by the FW Contractor/s in NG-LIO.NET. The geo-referenced QLs are visible through the NG.LIO-QL Browser.

8.3    The use of the haze flag is mandatory also for HR images (see ref. 3); §7) as from HR-1 period.

8.4    The FW Contractor/s is requested to upload SRS imagery to best fit the shape file provided by the MS Administrations (or their contractors), with the minimum possible surface excess.

## 9. Validation

9.1    The evaluation of the quality of an SRS image (cloud cover, haze, snow, etc.) made by FW Contractor/s always refers to the AOI defined by the shape files.

9.2    If an AOI is covered only partially, while awaiting complete AOI coverage in a later upload, validation criteria described in the VHR profile based technical specifications for the CAP checks (Ref. 3); §7) are valid.

9.3    For a HR zone and each open window, the HR profile image uploaded by the FW Contractor/s with cloud cover ≤1% is considered as **Validated**. For Autumn/Winter imagery, please refer also to point 4.5.

9.4    If the AOI has cloud cover > 1%, dense haze, etc., then:

- if cloud cover over the AOI is ≤ 5%, the QL of the HR profile image is uploaded as **Proposed** in NG-LIO.NET by the FW Contractor/s. Upon accept by MS Administration (or its contractors) the FW Contractor/s may close the AR, upon reject the FW Contractor/s shall continue programming;

- if 5% < cloud cover ≤ 20%, the image is **Retained**. The MS Administration (or its contractors) shall accept the image as soon as possible if it is usable for the CAP checks, but the FW Contractor/s will continue programming until such acceptance is received;

- if cloud cover > 20%, the FW Contractor/s should not upload the QLs. In exceptional cases, only upon request of the MS Administration (or its contractors), such QLs may be uploaded (e.g. when a window has come to an end without a validated acquisition).

9.5     MS Administrations (or their contractors) should accept/reject proposed/retained SRS imagery in NG-LIO.NET within 2 working days after upload.

## 10. <u>Ordering</u>

10.1    Ordering of imagery is done in accordance with the FWC signed between the HR Profile FW Contractor/s and the JRC [Ref. 4)].

## 11. <u>Delivery</u>

11.1    Reference is made to the VHR profile based image specifications for the CAP checks (ref. 3), §8.).

11.2    The contractual delivery period (production, internal QC, and ex-works availability) is 6 working days after acquisition for HR SRS imagery.

11.3    If there is a delay in the nomination of the MS Administration contractors, the MS Administration will act as contractor in NG-LIO.NET, in order not to delay delivery, and subsequent invoicing (see Item 3.1.4).

## 12. <u>Pricing and Invoicing</u>

### 12.1 Pricing

12.1.1  Pricing for products will be in accordance with the FWC signed between the HR Profile FW Contractor/s and the JRC [Ref. 4)].

### 12.2 Invoicing

12.2.1  Reference is made to the VHR profile based image specifications for the CAP checks (Ref. 3), §10.2.) regarding details on invoicing the VHR basket – rules will be identical for the HR basket.

## 13. <u>Image data provision to JRC and image access</u>

13.1    The MS Administration (or its contractor) needs to provide all SRS HR imagery to the JRC. This will be organised by, and of the responsibility of, the FW Contractor. This applies to both source imagery and orthorectified imagery. Reference is made to VHR profile based image specifications for the CAP checks (Ref. 3), §11.1).

13.2    FW contractor/s will provide a template (XML) to be fulfilled by contractor for each ortho returned in order to harmonize metadata (Ref. 3), §11.1).

13.3    When using the imagery the Licensee needs to refer to the supplier with the exact display of the credits as specified in the product's metadata which will take the form:

"© owner or supplier name or mission name (year of acquisition, or validity of Framework Contract), all rights reserved)"

In addition, the End User should indicate the following information:

"Data received via the Joint Research Centre of the European Commission under FWC xxx.yyy" where the FWC number is available from the EC Services (JRC)

For the presently running FWC 389.912 [ref.4)] with Airbus DS GEO SA the first sentence above shall be substituted with:

Spot 5 © CNES (year of acquisition), Distribution Airbus DS

Spot 6/7 © Airbus DS (year of acquisition)

© DMCii (year of production), Distribution Airbus DS

"© DEIMOS IMAGING (year of production), Distribution Airbus DS, all rights reserved

13.4    Regarding further details on image data access, reference is made to the VHR profile based image specifications for the CAP checks (Ref. 3), §11.2).


## 14. <u>Quality Assurance / Quality Control</u>

14.1    Reference is made to the VHR profile based image specifications for the CAP checks (Ref 3), §13).


## 15. <u>Risk of satellites failures</u>

15.1    Reference is made to the VHR profile based image specifications for the CAP checks [Ref 3], §14].

# 16. HR profile products

## 16.1 Profiles

16.1.1    Satellite sensors are divided into HR profiles as follows:

- HR prime - CwRS [std] (multispectral, pansharpened); validated, proposed, retained;

- HR archive - CwRS [std] (multispectral, pansharpened), upon request as Campaign requires.

- HHR prime - CwRS [HHR], HHR (std. ortho], (bundle, multispectral, pansharpened), validated, proposed, retained

- HHR archive ortho - CwRS (multispectral, pansharpened, bundle), upon request as Campaign requires.

16.1.2    A summary of the profile characteristics is given in the table below.

| Image Profile ID | Description | Spatial Resolution | Radiometric resolution (*) and spectral bands | | abs. 1-D rmse | Cloud Cover (CC) over AOI | Acquistion programming | Remarks | Example of sensors |
|---|---|---|---|---|---|---|---|---|---|
| **F0. HR prime - CwRS [std]** | Multispectral | GSD≤25m | 3 bands at least including G, R, NIR (preferrably also B, and SWIR) | | x,y ≤ 1.5 x GSD | ≤ 1% validated (profile F01) ≤ 5% proposed (profile F02) ≤ 20 % retained (profile F03) | Priority programming | | SPOT5**/6/7, UK-DMC2, DEIMOS-1 |
| | | | | | | | | | |
| | Pan-sharpened | GSD≤5m | | | | | | | SPOT5**/6/7 |
| **F1. HHR prime - CwRS [HHR]** | Pan+Multispectral (Bundle) | GSD≤3m | 4 bands including B, G, R, NIR | > 50 deg | x,y ≤ 5m | ≤ 1% validated (profile F11) ≤ 5% proposed (profile F12) ≤ 20 % retained (profile F13) -archive (profile F14) | Priority programming (excl F14) | new profile | SPOT 6/7, and any other not benchmarked sensor |
| | | GSD≤12m | | | | | | | |
| | | | | | | | | | |
| **F2. HHR prime - CwRS [ORTHO]** | Pan+Multispectral (Bundle) | GSD≤3m | 4 bands including B, G, R, NIR | > 50 deg | x,y ≤ 5m | -≤ 1% validated (profile F21) -≤ 5% proposed (profile F22) -≤ 20 % retained (profile F23) -archive (profile F24) | Priority programming (excl F24) | new profile; ortho rectified using Ref3D | SPOT 6/7, and any other not benchmarked sensor |
| | | GSD≤12m | | | | | | | |
| | Multispectral | GSD≤12m | | | x,y ≤ 1.5 x GSD (MSP) | | | | |
| | Pan-sharpened | GSD≤3m | | | x,y ≤ 5m | | | | |
| **G. HR archive - CwRS [std]** | Multispectral | GSD≤25m | 3 bands at least including G, R, NIR (preferrably also B, and SWIR) | | x,y ≤ 1.5 x GSD | archive | archive | | SPOT5**/6/7, UK-DMC2, DEIMOS-1 |
| | | | | | | | | | |
| | Pan-sharpened | GSD≤5m | | | | | | | SPOT5**/6/7 |

*(\*) - minimum 8 bits/pixel, preferrably 11-12.*
*(\*\*) - SPOT5 will be de-commissioned in March 2015*

**Table 1 - HR profiles adopted within the CAP checks**

16.1.3    As the MS Administration selects his profile in NG-LIO.NET he/she will therefore choose HR prime, or HHR prime - CwRS 'validated' (primary/ortho – multispectral/pansharpened/bundle) profile[5], and he will be served by the following sensors:

- Multispectral will be served by Spot 5[6], 6, 7, UK-DMC2, or Deimos-1
- Pansharpened will be served by Spot 5, 6, 7
- Bundle will be served by Spot 6 and 7
- Ortho - will be served by Spot 6 and 7

16.1.4    Technical details of the sensors fitting into above profiles are explained in Annex1.

16.1.5    For a complete description of image processing levels and data formats, please consult the technical documentation regarding respective sensors.

# 17. JRC responsibles and e-mail addresses

17.1      IES / image acquisition:

par-johan.astrand@jrc.ec.europa.eu

17.2      IES / CAP related issues:

philippe.loudjani@jrc.ec.europa.eu

# 18. References

1) EUR Lex Access to European Union law: http://eur-lex.europa.eu/homepage.html

2) GUIDANCE FOR ON-THE-SPOT CHECKS AND AREA MEASUREMENT - CLAIM YEAR 2015 http://mars.jrc.ec.europa.eu/mars/content/download/3472/17236/file/DS-2014-32_OTSC%20guidelines%202015%20.pdf –final version (REV 3) will be discussed at the Direct Payment Committee in Brussels on the 9th of December

3) VHR profile based Technical Specifications (see link) (ref. file://S:\FMPArchive\C\17359.docx).

4) FWs for SRS imagery purchase administered by the JRC IES:

- FWC for supply of SRS data and associated services in support to CAP checks, VHR (FWC 389.911) and HR profiles (FWC 389.912)
- Framework contract for supply of Satellite Remote Sensing Data; broker (no award as of this document last edit)

5) Benchmarking THEOS

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[5] The proposed, retained, and archive profiles are accepted by the MS Administration (or their contractors) own judgment in NG-LIO as they are uploaded, otherwise programming continues. For the case of retained, and archive profiles this area cannot exceed 10% of the requested specific profile HR area of the MS Administration.

[6] Until March 2015, thereafter only archive; satellite will be de-commissioned

a) WorldView-2, GeoEye-1, Cartosat-2, Kompsat-2, RapidEye and <u>THEOS</u> image [JRC Oral presentation Cat3.4 JRC60286 JRC 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].

b) <u>THEOS</u> Geometric Image Quality Testing – Initial Findings - JRC Scientific and Technical Report Category 2.2 no.24655 EN, ISSN 1831-9424, ISBN 978-92-79-18908-1. JRC PUBSY No. JRC61992, Int. ref: file://S:\FMPArchive\C\12154.pdf, Authors: Walczynska, A, Nowak Da Costa, J.K., 2010].

c) Nowak Da Costa J.K., Walczynska A. Evaluating the WorldView-2, GeoEye-1, DMCII, <u>THEOS</u> 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 JRC (Organiser). 2010. JRC61995.

d) <u>THEOS Geometric Quality Assessment for use in the Common Agricultural Policy Control</u> – Scientific poster for the 16th Conference on 'Geomatics in support of the CAP" in Bergamo, Italy, 24-26 November 2010. [JRC PUBSY No. JRC61994, Poster Presentation Category 3.5, Authors: Nowak Da Costa, J.K., Walczynska, A., 2010]. PUBSY: <u>http://publications.JRC.ec.europa.eu/repository/</u>.

6) Benchmarking SPOT7: <u>http://mars.jrc.ec.europa.eu/mars/News-Events/20th-MARS-Conference-19-20-November-2014-Dresden-Germany/pres-11</u>

7) End User License Agreement (EULA), CID Portal EULA: <u>http://cidportal.jrc.ec.europa.eu/home/idp/licensing/eula</u>.

8) G-LIO.NET manual   JRC IES/H06/C/PAR/par D(2014)(17242); (See under manuals in G-LIO.NET: <u>http://g-lio.ejrc.ec.europa.eu/g-liodotnet</u>)

9) URL to NG-LIO.NET will be <u>https://www.ng-lio.eu/</u>

10) Guidelines for Best Practice and Quality Checking of Ortho Imagery [Issue 3.0 available at: <u>http://mars.jrc.ec.europa.eu/mars/News-Events/New-version-of-the-Guidance-for-Best-Practice-and-Quality-Checking-of-Ortho-Imagery</u>

## 19. Abbreviations, Acronyms & Terms

| Abbreviation/Term | Explanation |
|---|---|
| AOI | Area Of Interest (of a control zone) |
| AR(s) | Acquisition Request(s) |
| Arid | Identifier of an Acquisition Request |
| CA | Contracting Authority |
| CAP | Common Agricultural Policy |
| CAPI | Computer Assisted Photo Interpretation |
| CC | Cloud Cover |
| CfT | Call for Tender |
| CID portal | Community Image Data portal |
| COTS | Commercial Off-The-Shelf software |
| CwRS | Control with Remote Sensing |
| DEM | Digital Elevation Model |
| DG AGRI | The Directorate General for Agriculture and Rural Development |
| DRA | Dynamic Range Adjustment |
| EC | European Commission |
| EC Services | in this text: Joint Research Centre of the European Commission |
| EFA | Ecological Focus Area |
| EPSG | European Petroleum Survey Group |
| EU | European Union |
| EULA | End User Licence Agreement |
| FC(s) | Framework Contract(s) |
| FW Contractor | The successful tenderer who is awarded the present FWC |
| FWC | Framework Contract |
| GAEC | Good Agricultural and Environmental Condition (CAP Cross Compliance) |
| GCP | Ground Control Point |
| GEO/GEOSS | Group on Earth Observations / Global Earth Observation System of Systems |
| GSD | Ground Sampling Distance, the nominal size of one sensor pixel projected onto the imaged surface |
| HR | High Resolution (SRS imagery) |
| IACS | Integrated Administration and Control System (CAP) |
| ICP | Independent Check Point (used in ortho image external QC) |
| ICT | Information and Communication Technology |
| IDQA | Input Data Quality Assessment |
| IES | Institute for Environment and Sustainability, Joint Research Centre |
| INSPIRE | Infrastructure for Spatial Information in the European Community |
| IP(s) | Image Provider(s), in this document considered the successful IP or successful consortium of Image Providers who has signed a FC with the JRC as of Ref 4) – in the text referred to as FW Contractor |
| JRC | Joint Research Centre of the EC |
| LioDotNet | JRC web-based software for the management of image acquisition |
| LPIS | Land Parcel Identification System |

| Abbreviation/Term | Explanation |
|---|---|
| LPIS QA | Land Parcel Identification System Quality Assurance |
| MARS | Monitoring Agricultural ResourceS Unit, JRC IES |
| MS | Member State(s) |
| MS Administration ( or its contractor) | A contractor of the MS Administration responsible for the CAP subsidy diagnosis of the MS using the SRS imagery. |
| MS Contractor | Terms used in the CwRS community for a contractor of the MS Administration responsible for the CAP subsidy diagnosis of the MS using the SRS imagery delivered by this framework contract |
| MSP | Multispectral |
| OTSC | On-The-Spot checks |
| PAN | Panchromatic |
| PSH | Pansharpened |
| QA | Quality Assurance |
| QC | Quality Control |
| QL(s) | Quick-Look (s) |
| SMR | Statutory Management Requirement (CAP Cross Compliance) |
| SPS | Single Payment Scheme |
| SRS | Satellite Remote Sensing |
| UTM | Universal Transverse Mercator |
| VHR | Very High Resolution (SRS imagery) |
| WGS 84 | World Geodetic System 1985 |

Annex1:

## 1. <u>SPOT</u>

1.1  SPOT5 features:

- GSD: 5m PAN, 10m MSP, 20m SWIR (2 PAN bands can generate 2.5m panchromatic product, and if merged with the MSP also the COL 2.5 m product);

- Image swath; 60km;

- Spectral bands; 1 PAN, 4 MSP (including 1 SWIR);

- Operational altitude: 832 km.

- Acquisitions will be possible until March 31st, 2015, after this date, only archive requests will be available

1.2  SPOT6/7 features:

- GSD: 1.5m PAN, 6m MSP;

- Image Swath; 60km;

- Strip length; up to 600 km;

- Spectral bands; 1 PAN, 4 MSP;

- Operational altitude: 694 km;

- Same orbit as PL1a, and PL1b.

1.3  SPOT products:

- Pre-processing: 1A (S5), Primary (S6/7), Ortho[7] (S5, S6/7);

- Format SPOT5: DIMAP, SPOT6: DIMAP V2 (containing a GeoTIFF image file);

- Resampling: NN / CC;

- Footprint: SPOT 5: 60x60km;

- Products: S5 Xi, S6/7(Multispectral, Pansharpened, Bundle).

## 2. <u>DMC2 and Deimos-1</u>

DMC 2nd generation constellation composed of two satellites: UK DMC2, Deimos-1. These satellites have the following features:

- GSD: 22m MSP;

- image Swath: 660km;

- spectral bands: 3 MSP (2 visible, 1 nIR);

- operational altitude: 659 km;

- daily revisit.

2.1  The DMC constellation control zone - this constellation is composed of a number of coordinated earth observation satellites to provide daily revisit capability. Considering the very large swath width, DMC can

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[7] The SPOT6 ortho is produced semi-automatically using Ref3D, and no GCPs. See Astrium product sheets. Pls. check JRC benchmarking of this product.

acquire more zones at a time (up to 8 zones captured in a single image in 2011). All sensors (UK DMC2, Deimos-1) are calibrated within 1% for interchangeable satellite use.

2.2 DMC constellation products have the following characteristics.

- pre-processing: L1R (source data) or L1T (ortho-rectified);

- format: DIMAP;

- resampling: Cubic Convolution;

- footprint: up to 650x1.000km per image, configurable according to AOI. Large images are divided into tiles for processing and convenient delivery

- smallest tile used in the CwRS 80x80.

(end document)