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Linking Early Warning Systems with Rapid Mapping

*Procedure for pre-
tasking of satellites for
disaster impact mapping*

*Copernicus Emergency
Management Service*

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Contents

- Abstract 3
- Introduction..... 4
- 1 Pre-tasking request based on early warning (Step 1) 5
 - 1.1 Issue pre-tasking request based on early warning (Step 1a) 5
 - 1.2 Inform Early Warning System partner about the availability of Rapid Mapping (Step 1b)..... 7
 - 1.3 ERCC informs the Mapping Authorised User in general about the pre-tasking activity (Step 1c)..... 7
- 2 Image pre-tasking (Step 2) 9
 - 2.1 Request a new image acquisition to REACT (Step 2a) 9
 - 2.2 Communicate scheduled acquisition time and area to ERCC (Step 2b) 9
- 3 Inform Mapping Authorised User about the image acquisition (Step 3) 10
- List of abbreviations and definitions 11

Document change log

Issue	Date	Author	Modifications
2.0	02/12/2016	JRC	Consolidated draft
2.1	07/12/2016	JRC	Update including integration of comments from ECHO, GROW; drafts for email templates added
2.2	16/12/2016	JRC	Integrated further comments from ECHO, GROW, JRC; replaced EFAS with Early Warning Systems for applicability to other EWS; changed document layout
2.3	09/02/2017	JRC	Minor changes
2.4	10/02/2016	JRC	Version sent to Rapid Mapping service provider for comments
2.5	02/05/2017	JRC	Integrated modifications following the comments received from the Rapid Mapping service provider (SP confirmed modifications mid-June)
3.0	11/07/2017	JRC	Final version released after presentation at Mapping User Workshop on June
3.1	23/08/2017	JRC	Updated ECHO PoCs (replaced Mazzara with Sorensen) and EFAS email address; in step 2a resolution class HR2 was added

Abstract

This is a technical document describing the step-by-step procedure for pre-tasking of satellites for disaster impact mapping in the frame of the Copernicus Emergency Management Service (CEMS). Pre-tasking is done following alerts for upcoming disasters issued by early warning systems (in this case by the European Flood Awareness System) which are either operated under CEMS or under other frameworks. Disaster impact mapping is performed under Rapid Mapping, the 24/7/365 on-demand service of CEMS. The procedure has been integrated into the standard operating procedures of the Emergency Response Coordination Center of DG ECHO.

Introduction

This document describes the procedure for pre-tasking of satellites for disaster impact mapping in the frame of the Copernicus Emergency Management Service (CEMS). Pre-tasking is done following alerts for upcoming disasters issued by early warning systems which are either operated under CEMS or under other frameworks. Disaster impact mapping is performed under Rapid Mapping, the 24/7/365 on-demand service of CEMS. The procedure was defined based on the experience of EFAS alerting for flood in Europe but aims at being applicable to other disaster events and early warning systems.

The procedure defined hereafter is limited to the steps until submission of an image tasking request to the Rapid Emergency Activation for Copernicus Tasking REACT (Figure 1).

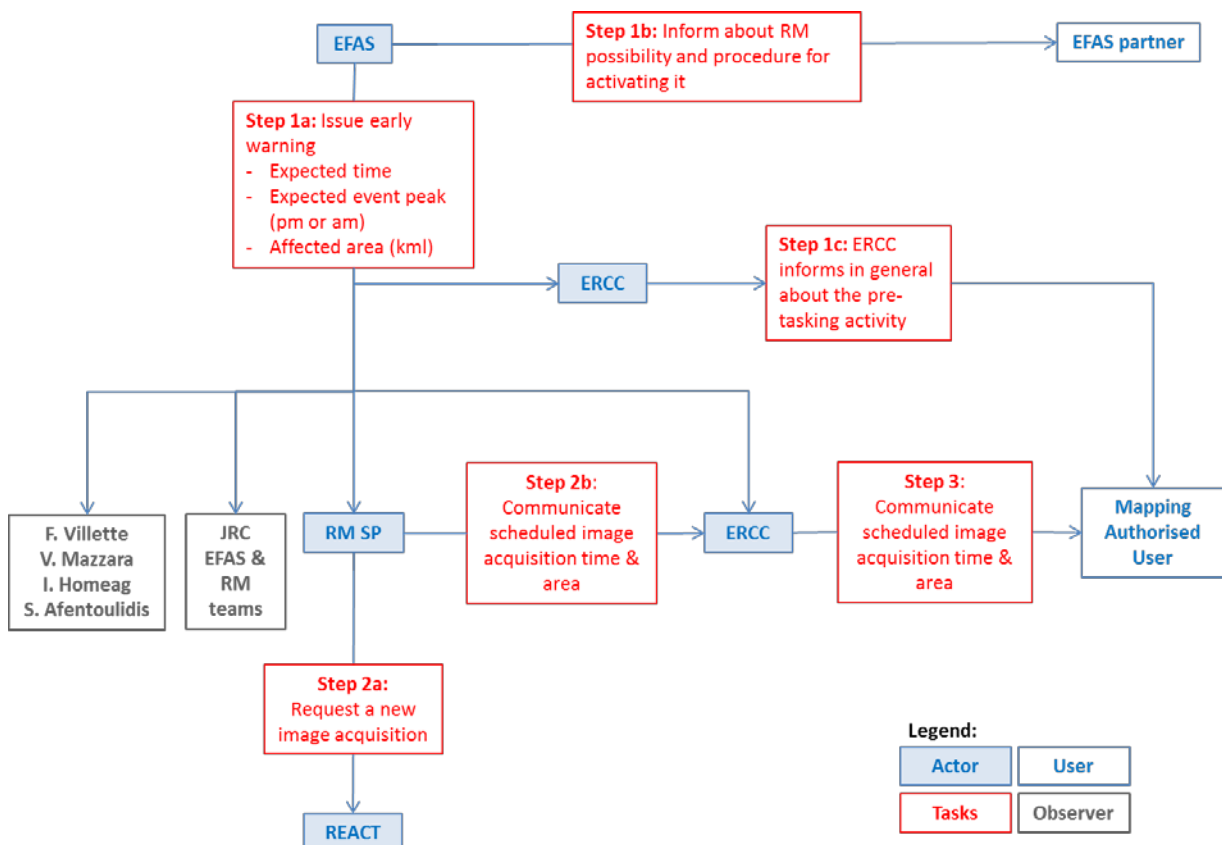


Figure 1. Procedure Early Warning System-Rapid Mapping link for pre-tasking of image acquisitions (EFAS example)

Involved actors, contacts for distribution lists in draft email templates:

- ERCC 24/7 on-duty officers ECHO-ERCC@ec.europa.eu
- RM service provider 24/7 on-duty-officer rapidmapping@ems-copernicus.eu
- JRC ODO 10/7 on-duty-officer jrc-ems-rapidmapping@ec.europa.eu
- Françoise Villette (DG GROW) Francoise.VILLETTE@ec.europa.eu
- Andreas Sorensen (DG ECHO) Andreas.SORENSEN@ec.europa.eu
- Spyros Afentoulidis Spyros.AFENTOULIDIS@ec.europa.eu
- Ionut Homeag Ionut-Lucian.HOMEAG@ec.europa.eu
- EFAS mailing list jrc-ems-efas@ec.europa.eu

1 Pre-tasking request based on early warning (Step 1)

Actor: Early Warning System owner (for EFAS: during test phase JRC team, in the future EFAS dissemination centre)

This step involves three sub-tasks:

- 1a) Issue pre-tasking request based on early warning
- 1b) Inform Early Warning System partner about the availability of Rapid Mapping
- 1c) ERCC informs the Mapping Authorised User in general about the pre-tasking activity

1.1 Issue pre-tasking request based on early warning (Step 1a)

- How:
 - Via email (see template below) **and followed by a phone call** to +39 0640694501 (on-duty phone of the Rapid Mapping Service Provider)
- Criteria for pre-tasking request:
 - A severe impact should be forecasted by the early warning system. The geographical location (inside or outside Europe), predicted extension (affecting large or small parts of a country/region), socio-economic impact (number of people affected, economic damages) and possibility that international help is requested shall be considered.
- When:
 - Not more than approximately 24h before the expected event¹
 - Consider confidence about the early warning, especially area and event peak time

Consider cut-off times for satellite order submission (morning & afternoon slots, see

- Table 2). Some satellite providers accept orders at any time. A hard rule cannot be established.
- Content:
 - Affected area (country, river, region, places), as precise as possible,
 - Provide KML with buffered critical points along the river (for floods)
 - Expected event peak, specify morning or afternoon

¹ EFAS flood forecasts are updated twice a day during early and late morning. Based on these forecasts EFAS flood notifications are released before 9.00 and before 15.00 each day.

Table 1. Step 1a draft email template

<p>Subject: Early warning based satellite image pre-tasking for potential Rapid Mapping activation</p> <p>To: ECHO-ERCC@ec.europa.eu; rapidmapping@ems-copernicus.eu; jrc-ems-rapidmapping@ec.europa.eu</p> <p>Cc: Francoise.VILLETTE@ec.europa.eu; jrc-ems-efas@ec.europa.eu; Andreas.SORENSEN@ec.europa.eu; Spyros.AFENTOULIDIS@ec.europa.eu; Ionut-Lucian.HOMEAG@ec.europa.eu;</p> <p>Attachment: <AOI of the affected areas (KML, KMZ)></p>
<p>NOTE: This is NOT an activation of Copernicus EMS Rapid Mapping (RM) but a request for pre-tasking satellite images in view of a potential RM activation by the Mapping Authorised User.</p> <p>Early warning system: <name of the early warning system on which this early warning is based on></p> <p>Situation description: <brief description of the situation, type of event predicted and the prediction></p> <p>Expected start of the event: <dd/mm></p> <p>Expected event peak: <dd/mm hh:mm UTC></p> <p>Expected duration: <nb of days></p> <p>Recommended image acquisition window: <dd/mm hh:mm UTC> to <dd/mm hh:mm UTC></p> <p>Affected country(s): <country name></p> <p>Affected region(s): <name of NUTS region NUTS level></p> <p>Affected major citie(s): <city name></p> <p>Affected river basin(s): <river basin name></p>

Table 2. Cut-off times for data ordering and resulting image acquisition time window (only for image providers/missions which have cut-off times) (source DAP v2.3)

Provider/ mission	Sensor type	Deadlines to receive emergency tasking requests (all in UTC)	
		Cut-off time to receive tasking request in UTC (day 0)	Resulting acquisition time (start, in UTC)
Sentinel 1	Radar	10:00 CEST	Day 0 from 18:00
		Mo 17:15 CEST	Day 1
		Fr 16:00 CEST	Day 1
e-GEOS	Radar	7:30	Day 0 from 18:21 to day 1 6:21
		17:30	Day 1 from 6:21-18:21
Airbus DE	Radar	08:30	Day 0 from 18:02 to day 1 from 07:17
		21:30	Day 1 from 07:17-18:01

1.2 Inform Early Warning System partner about the availability of Rapid Mapping (Step 1b)

Actor: Early Warning System owner (for EFAS: during test phase JRC team, in the future EFAS dissemination centre)

Task: Inform the Early Warning System point of contact (e.g. EFAS partner):

- about the availability of the RM service
- that following an early warning images will be pre-tasked for a potential mapping of affected areas

Table 3. Step 1b draft email template – example for an EFAS alert

<p>Subject: EFAS alert for <region/place> - Availability of flood rapid mapping (Copernicus EMS)</p> <p>To: EFAS partner</p> <p>Cc: jrc-ems-efas@ec.europa.eu</p> <p>Attachment: <AOI of the affected areas (KML, KMZ)></p>
<p>Dear EFAS partner,</p> <p>With reference to the EFAS alert issued <date>, for <region, place> in <country> we would like to remind you that the Copernicus Emergency Management Service (CEMS) also provides the possibility to obtain rapid satellite based geospatial information showing the extent and impact of an ongoing flood (Rapid Mapping, for more information: http://emergency.copernicus.eu/mapping).</p> <p>Based on the mentioned EFAS alert and the latest EFAS forecasts, the Rapid Mapping service is about to request the acquisition of new satellite imagery over the affected areas as outlined in the attached area of interest (AOI). If you have any comments on this request of imagery and related AOI, please get back to us as soon as possible. Note: This is NOT an activation of the CEMS Rapid Mapping service. It can only be activated by the specific authorised user for your country, which can be found here: https://www.efas.eu/utilities/cems-rapid-mapping.html. If your country does not have a specific authorised user please contact the Emergency Response Coordination Center (ECHO-ERCC@ec.europa.eu)</p> <p>Yours sincerely,</p> <p>The EFAS team</p>

1.3 ERCC informs the Mapping Authorised User in general about the pre-tasking activity (Step 1c)

Actor: ERCC

Task: inform the Mapping Authorised user about the pre-tasking activity (see template below)

Table 4. Step 1c draft email template

<p>Subject: Request of new imagery following EFAS alert for upcoming floods</p> <p>To: <Mapping AU Focal point (incl. 24h contact)></p> <p>Cc: rapidmapping@ems-copernicus.eu; jrc-ems-rapidmapping@ec.europa.eu; Francoise.VILLETTE@ec.europa.eu; Andreas.SORENSEN@ec.europa.eu; Ionut-Lucian.HOMEAG@ec.europa.eu; echo-ercc@ec.europa.eu; Spyros.AFENTOULIDIS@ec.europa.eu; Juan.ESCALANTE@ec.europa.eu</p> <p>Attachment: NA</p>
<p>Dear Authorised User of the Copernicus EMS Mapping services,</p> <p>We hereby inform you that following an EFAS early warning for floods for <region, place> in <country> we are requesting the acquisition of new satellite imagery over the potentially affected areas. This initiative aims at improving timeliness in the Rapid Mapping service and in particular at reducing the time required for obtaining post-event imagery. This pre-tasking is done only in view of a potential Rapid Mapping service activation but does not constitute an actual activation.</p> <p>Please let us have information and concern you may have about this flood and your desire to activate the Copernicus EMS Mapping service.</p> <p>We remain available for questions you might have.</p> <p>Best regards,</p> <p>The ERCCduty officers</p>

2 Image pre-tasking (Step 2)

Actor: Rapid Mapping service provider

This step involves two sub-tasks:

- 2a) Request a new image acquisition to REACT
- 2b) Communicate scheduled acquisition time and area to ERCC

2.1 Request a new image acquisition to REACT (Step 2a)

- Check the AOI provided in the pre-tasking request of the early warning and optimise with respect to satellite footprint if necessary (focus on covering areas along the river)
- For the SPERF submission assign a pre-tasking activation code EMSR9XX (consider that for the first one applied for the French floods in June 2016 was EMSR900)
- ask REACT for feasibility of HR1 or HR2 radar (incl. Sentinel-1, resolution class is related to AOI size) in the recommended acquisition window (see Table 1)
- If Sentinel-1 passes are available, then ask for NRT delivery
- If Sentinel-1 is not available or cannot be delivered in NRT, order the next possible **HR1 acquisition**

2.2 Communicate scheduled acquisition time and area to ERCC (Step 2b)

- Email content: AOI (KML), acquisition time, resolution, sensor type
- Distribution list:
 - TO: ECHO-ERCC@ec.europa.eu; Andreas.SORENSEN@ec.europa.eu; lonut-Lucian.HOMEAG@ec.europa.eu; Spyros.AFENTOULIDIS@ec.europa.eu
 - CC: jrc-ems-rapidmapping@ec.europa.eu

Table 5. Step 2b draft email template

<p>Subject: [EMSR9XX] status update</p> <p>To: ECHO-ERCC@ec.europa.eu</p> <p>Cc: jrc-ems-rapidmapping@ec.europa.eu; Francoise.VILLETTE@ec.europa.eu; Andreas.SORENSEN@ec.europa.eu; lonut-Lucian.HOMEAG@ec.europa.eu; Spyros.AFENTOULIDIS@ec.europa.eu; jrc-ems-efas@ec.europa.eu</p> <p>Attachment: <KML /KMZ of SPERF AOI></p>
<p>Dear ERCC duty officer,</p> <p>We have requested the following image for the area in attachment:</p> <p><acquisition time dd/mm hh:mm> <sensor> <resolution VHR/HR></p> <p>We expect the image to be delivered at <dd/mm hh:mm> UTC.</p> <p>Best regards,</p> <p>RM SP OdO</p>

3 Inform Mapping Authorised User about the image acquisition (Step 3)

Actor: ERCC

Task:

- ERCC duty officer informs the Mapping Authorised User (AU), or the relevant PoC in the case of a non-EU country, as well as other relevant initiatives (e.g. International Charter Space and Major Disasters) about the EFAS alert based pre-tasking of satellite acquisitions (share AOI, resolution, acquisition time) and asks whether the AU wishes to activate the EMS RM service.

Subject: Request of new imagery following <early warning system name> pre-tasking for upcoming <event type> - UPDATE

To: <AU Focal point (incl. 24h contact)>

Cc: rapidmapping@ems-copernicus.eu; jrc-ems-rapidmapping@ec.europa.eu; Francoise.VILLETTE@ec.europa.eu; Andreas.SORENSEN@ec.europa.eu; Ionut-Lucian.HOMEAG@ec.europa.eu; echo-ercc@ec.europa.eu; Spyros.AFENTOULIDIS@ec.europa.eu; Juan.ESCALANTE@ec.europa.eu

Attachment: <KML/KMZ of SPERF AOI>

Dear Authorised User of the Copernicus EMS Mapping services,

Please be informed that at <dd/mm hh:mm> UTC a new radar image (<sensor>) will be acquired over the area defined in the attached file. On that basis, we are now ready to very quickly produce maps showing the extent and impact of the flood in the mentioned areas. Please let us know if you wish to activate the Rapid Mapping service.

We remain available for questions you might have.

Best regards,

The ERCC duty officers

List of abbreviations and definitions

CEMS	Copernicus Emergency Management Service
EFAS	European Flood Awareness System
ERCC	Emergency Response Coordination Center
AOI	Area of Interest
RM	Rapid Mapping
AU	Authorised User
SP	Service Provider
OdO	On duty officer
PoC	Point of Contact
NRT	Near real time
REACT	Rapid Emergency Activation for Copernicus Tasking

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