

# 12 Nov 2017 Mw 7.3 Earthquake at Iran-Iraq Border Region

GDACS Earthquake Red Alert

13 Nov 2017

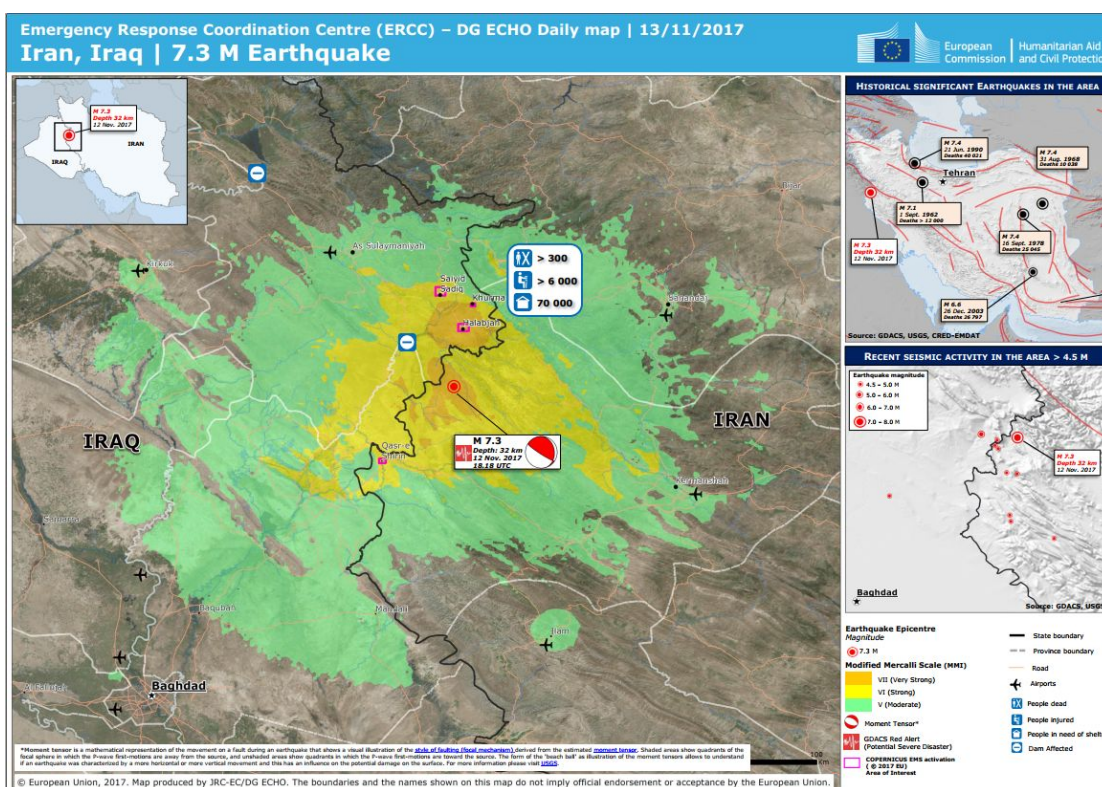


Fig. 1 - Daily map produced for the Earthquake in Iran and Iraq

## 1 Executive Summary

An earthquake of magnitude **7.3 M** at a depth of **22 km** hit the border region between Iran and Iraq on **12 Nov 2017 at 18:18 UTC**. (2.4 million people in the 100 km radius from the epicentre). The epicenter was located 9 km north-east of Asegaleh village (Iran) and 32 km south of Halabjah (Iraq). The earthquake mostly affected the provinces of Kermanshah and Bakhtaran in Iran (1.8 million people) and As Sulaymaniyah (1.2 million) and Diyala (920000 people) in

Iraq. The quake has been also felt in other neighbouring countries such as Turkey, Kuwait, Armenia, Jordan, Lebanon , Saudi Arabia and Qatar.

USGS PAGER estimated a shaking up to "Very Strong" for 464k people and "Strong" for 2.5 million people. GDACS issued a **Red alert** for the potential humanitarian consequences about 20 min after the event. Due to a technical problem only the email was issued and not the SMS.

According to local media, as of 13 Nov at 12.00 UTC, nearly **400 people died** and over **6 000 were injured** in Iran and Iraq, mostly in Kermanshah province (Iran). In addition, they also reported that 70 000 are in need of emergency shelter in Iran.

**Copernicus EMS Rapid Mapping** was activated by ECHO-ERCC on 13 Nov 2017 at 13:00 UTC. The objective of this images analysis is to identification of the damage extent to buildings and to a number of important infrastructures, such as the Darbandikhan dam.

For the **Darbandikhan dam** UN requested the JRC support through ERCC to estimate the potential consequences of a sudden dam failure caused by the seismic activity.

## 2 Situation Overview

### 2.1 Situation

An earthquake of magnitude **7.3 M** at a depth of **22 km** hit the border region between Iran and Iraq **on 12 Nov 2017 at 18:18 UTC**. (2.4 million people in the 100 km radius from the epicentre). The epicenter was located 9 km north-east of Asgaleh village (Iran) and 32 km south of Halabjah (Iraq). The earthquake mostly affected the provinces of Kermanshah and Bakhtaran in Iran (1.8 million people) and in Iraq As Sulaymaniyah (1.2 million) and Diyala (920000 people) in Iraq. The quake has been also felt in other countries such as Turkey, Kuwait, Armenia, Jordan, Lebanon , Saudi Arabia and Qatar.

Assessments are underway and the number of victims is expected to increase (see Section 2.2) No significant weather phenomena are forecast for the next six days, with only partly cloudy to cloudy conditions (see more information in Appendix A).

### 2.2 Humanitarian impact

Situation as of 13 Nov, 12:00 UTC (MEDIA)

According to media, nearly **400 people died** and over **6 000 were injured** in Iran and Iraq, mostly in **Sarpol-e Zahab** city and surrounding areas of **Kermanshah province (Iran)**. In addition media reported that 70 000 people are in need of emergency shelter in Iran.

In Iraq, the Kurdish Regional authorities have reported **7 dead**, while approx. 320 people have received medical assistance, mostly from Sulaimaniyah governorate. The majority of cases relate to broken limbs, breathing difficulties and shock.

According to media, the areas of **Sarpol-e Zahab** in Iran and **Darbandikhan** in the Kurdistan Region have been severely affected. In Sarpol-e Zahab the main hospital has been severely damaged.

<b>Situation (as of 13 Nov, 12:00 UTC, Media)</b>	
Dead	<b>nearly 400</b> <i>mostly in Kermanshah province (Iran), 7 in Iraq</i>
People injured	<b>&gt; 6 000</b> <i>mostly in Kermanshah province (Iran) , 320 in Iraq</i>
People in need of emergency shelter	<b>70 000 in Iran</b>

Humanitarian Response:

- Iran National Red Crescent Society and the National Crisis Management Organization has deployed personnel and supplies (aid and ambulances) to the province where 70 000 people reportedly need emergency shelter. The Government of Iran has so far not requested international assistance (source: DG ECHO).
- Immediately after the earthquake, the Departments of Health in Sulaymaniyah, Garmiyān and Halabja Governorates sent tens of ambulances to the affected areas, and critical injuries were transferred to Sulaymaniyah Emergency hospital, with less critical injuries receiving treatment at local hospitals. The Turkish Red Crescent has a team from Erbil on the ground assessing damage and providing assistance. An OCHA-led inter-agency assessment team is currently in Sulaymaniyah and plans to visit Darbandikhan later this afternoon. (source: UN OCHA Iraq | Flash Update #2, as of 13 Nov)
- With ECHO support, WHO has deployed emergency kits and ambulances to Sulaimaniyah hospital. Response teams, psychological support capacity and additional critical medicines and consumables are deployed and on standby. ECHO's humanitarian partners, IMC and Handicap International, having emergency health response capacity in the area, also stand ready to support. (source: DG ECHO)
- A number of organizations, such as Oxfam, are currently assessing the wider impact of the earthquake in affected regions of Iraq, with a priority given to potential reported damage to the Darbandikhan Dam and to housing, especially considering the large number of pre-existing partially damaged houses and infrastructure as a result of the past three years of conflict. (source: DG ECHO)

- Overall, humanitarian partners in Iraq are standing by to assist the Government of Iraq, should a humanitarian response be required. Supplies of food, health items, medicines, shelter kits and Water, Sanitation and Hygiene (WASH) assistance are already located in country, and can be moved into storage sites and distribution points if necessary. A United Nations Disaster Assessment and Coordination (UNDAC) team is put on alert for immediate deployment to the affected areas if required. The ERCC is also closely monitoring the situation and outcome of ongoing assessments and will keep Participating States of the EU Civil Protection Mechanism as well as partners informed on the evolution of the situation. (source: DG ECHO)

## 2.3 Seismotectonic of the area

No fewer than four major tectonic plates (Arabia, Eurasia, India, and Africa) and one smaller tectonic block (Anatolia) are responsible for seismicity and tectonics in the Middle East and surrounding region. Geologic development of the region is a consequence of a number of first-order plate tectonic processes that include subduction, large-scale transform faulting, compressional mountain building and crustal extension.

Along the eastern margin of the Mediterranean region there is complex interaction between the Africa, Arabia and Eurasia plates. The Red Sea Rift is a spreading center between the Africa and Arabia plates, with a spreading rate of approximately 10mm/yr near its northern end, and 16mm/yr near its southern end (Chu, D. and Gordon, R. G., 1998). Seismicity rate and size of earthquakes has been relatively small along the spreading center, but the rifting process has produced a series of volcanic systems across western Saudi Arabia.

Further north, the Red Sea Rift terminates at the southern boundary of the Dead Sea Transform Fault. The Dead Sea Transform is a strike-slip fault that accommodates differential motion between the Africa and Arabia plates. Though both the Africa plate, to the west, and the Arabia plate, to the east, are moving in a NNE direction, the Arabia plate is moving slightly faster, resulting in the left-lateral, strike-slip motion along this segment of the plate boundary. Historically, earthquake activity along the Dead Sea Transform has been a significant hazard in the densely populated Levant region (eastern Mediterranean). For example, the November 1759 Near East earthquake is thought to have killed somewhere between 2,000-20,000 people. The northern termination of the Dead Sea Transform occurs within a complex tectonic region of southeast Turkey, where interaction of the Africa and Arabia plates and the Anatolia block occurs. This involves translational motion of the Anatolia Block westwards, with a speed of approximately 25mm/yr with respect to Eurasia, in order to accommodate closure of the Mediterranean basin.

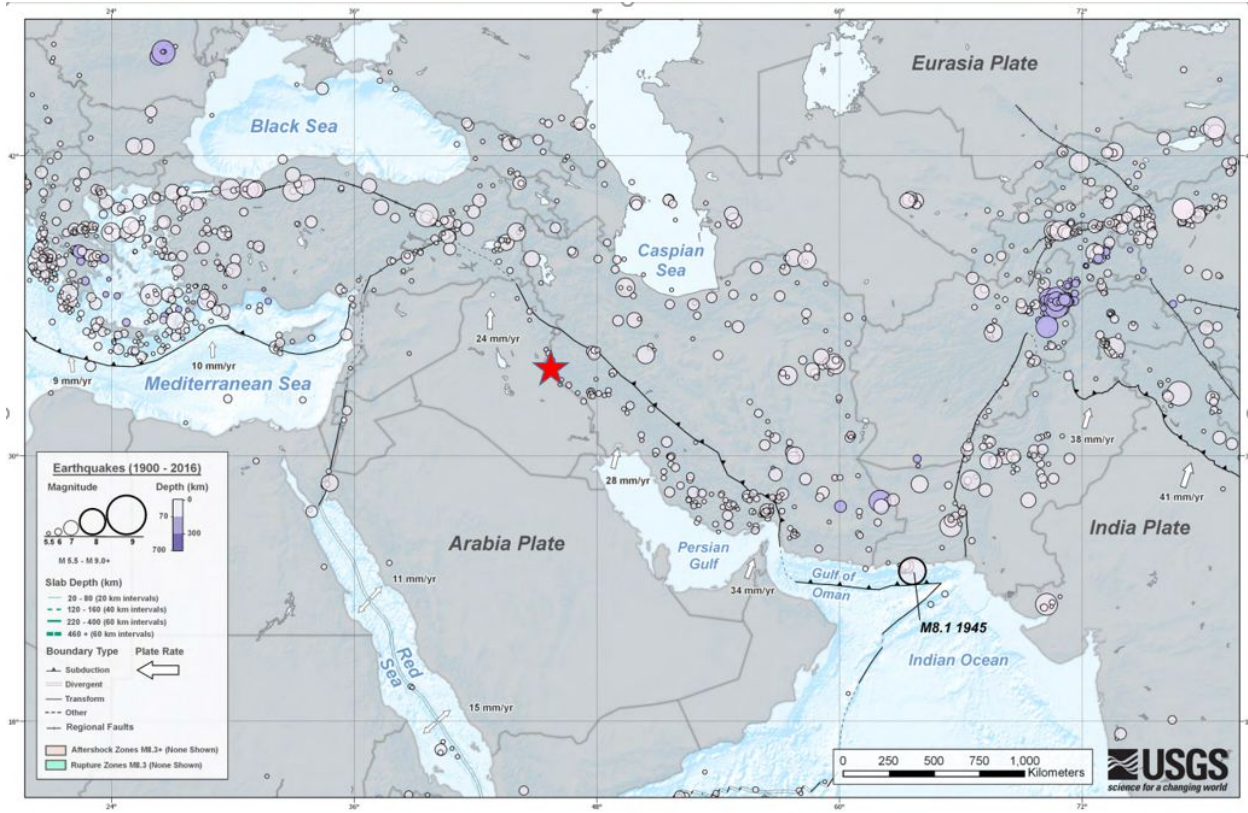


Fig. 2 - Historical Seismicity in the area (USGS, modified)

### 3 JRC involvement

- For earthquakes and tsunamis, JRC does no longer prepare Situation Reports for ERCC. This is done by the pilot ARISTOTLE consortium. ARISTOTLE is a pilot project (until end 2017) that aims at providing accurate and authoritative information on natural disaster to ERCC <http://aristotle.ingv.it/>. A sustainable follow-up project is under discussion.
- GDACS provides extensive automated situation reports. The GDACS earthquake model was revised in 2017 with significant improvements. <http://www.gdacs.org>.
- For some events, like this, Flash reports are issued to inform the JRC hierarchy.
- For some events JRC produces Post Event Report (within a few weeks from the event) with a scientific evaluation of hazard and disaster information. This may contribute to plausibility assessment of Solidarity Fund claims.
- For earthquakes and tsunamis, research in JRC.E.1 covers preparedness and response. It focuses on (1) real-time automated situation reports for global response community, (2) tsunami modelling and monitoring, (3) sea level instrumentation in Mediterranean.
- JRC manages and organizes the Emergency Response Service of Copernicus Programme.

### 3.1 GDACS alert

The Global Disasters Alerts and Coordination System identified the event 6 minutes after the event and classified the event as **Red alert** (high possibility of disaster requiring international aid).

As of 1<sup>st</sup> Sept 2017, GDACS includes a new algorithm to assess the overall impact of earthquakes and the potential need of humanitarian intervention. The new model draws on a combination of earthquake intensity calculation (using the USGS shakemap) and a new empirical model by JRC, when the shakemaps are not available. Furthermore, the Coping Capacity indicator from the set of INFORM indices is now included in the final GDACS Alert Score.

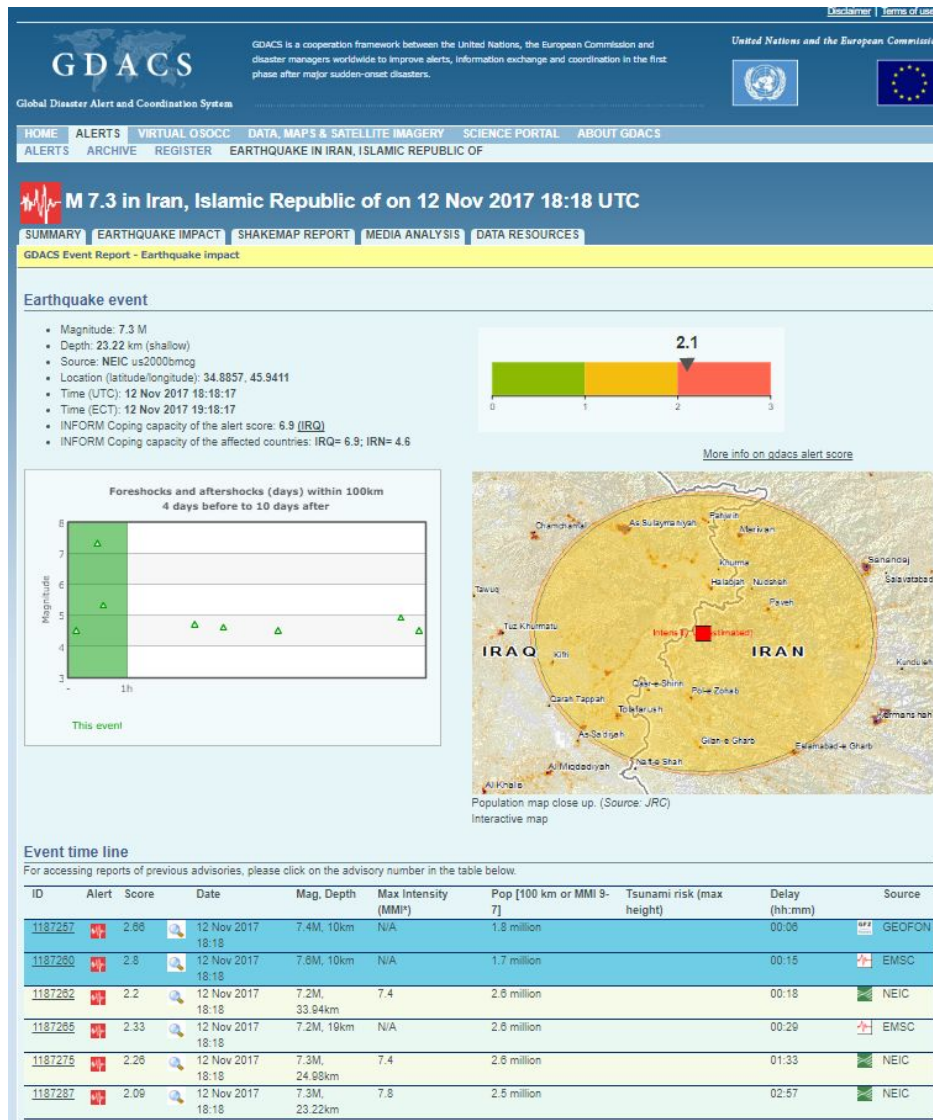


Fig. 3 - GDACS report page

Through the new system we aim at reducing false alerts and at providing a better estimation of the impact. The ultimate goal is to improve the service for the Humanitarian community.

Unfortunately for this event no SMS has been sent out due to a technical problem in one of our scripts. Past 4 h it was considered not useful to send out the SMMS messages. We have decided to implement periodic checks of the SMS procedure to be sure to avoid in the future similar failure.

It should be noted that about 1h 26 min after the earthquake social media started to publish tweets mentioning “killed” in the text. At that time no news was still having information about the real impact of the event. The Social Media analysis in GDACS proved to be very useful.

## 2 Copernicus activation

The Copernicus Emergency Mapping Service has been activated by ERCC on 13 Nov. 2017, at 14:00 and the activation regarded a series of AOIs that have been identified by JRC in collaboration with ERCC; the activation considered also the two dams (Darbindikhan and Dukan) to check for visible impact traces. The activation was done avoiding overlaps with mapping activities conducted by UNOSAT (involving the International Charter) and to fulfill requests from another local end user.

The maps will be published in the EMS web site at this address:

<http://emergency.copernicus.eu/mapping/list-of-components/EMSR256>

As technical coordinator of the service the JRC is involved in the activation (on-duty role providing support to ERCC, the service provider and the user, acting as observer and intervening in discussions with relevant other stakeholders such as the International Charter, ESA). JRC also takes care of the overall quality review and operates the platforms through which products are disseminated.

### 3.3 Dams Failure estimations

JRC has been requested by ERCC, to perform a dam failure analysis of the **Darbindikhan Dam** and of the **Dukan Dam**, both in Iraq. The first one has been subject to a very strong seismic activity (intensity VII of Mercalli scale) and therefore may be subject to potential failures.

Concerns have also been expressed for the **Mosul Dam** but the UN OCHA Flash Update 2 indicates: *“The Mosul Dam is reportedly undamaged. However, the Darbandikhan Dam, a multi-purpose embankment on the Diyala river, is being assessed for damage today by the Ministry of Water Resources (MoWR), as local sources report that the dam was impacted by the landslides that pushed heavy rocks and rubble onto the dam’s spillway. Residents*

downstream of the dam were advised by authorities to be vigilant and ready for evacuation, should an emergency alert be issued.”

After the activities performed in 2016 by JRC on the potential failure of the Mosul dam (due to gypsum erosion), other dam failure analyses have been performed (Castreccioni lake for the Cingoli dam as a consequence of the Italian Earthquake and the Puerto Rico dam, affected by the Cyclone MARIA in 2017). UN therefore requested the help of JRC through the ERCC. It was agreed that the computations will start as soon as the visual inspections from satellite images or by local visits will be completed.

## 4. Other activities in support to ERCC

The JRC produces a daily bulletin containing the major events in the previous 24h; in today’s event list this earthquake was described; a daily map with the situation update is also being prepared (Fig. 1). These are published on the ERCC Portal and distributed to all Member States. The Daily Flash reports are available at <http://erccportal.jrc.ec.europa.eu/ECHO-Flash>.

### 4.1 ARISTOTLE activation

On 12 Nov 2017 18:37 UTC ARISTOTLE was activated and a report was produced at 20:18 UTC, containing the description of the event, the historical events and other information according to the standardized template. Due to the evolution of the event ERCC requested an update of the report on 13/11/2017 06:05 UTC and an update of the situation was provided by the consortium. The ARISTOTLE Team a second report was uploaded at 09:09 UTC. The estimation of ARISTOTLE experts indicated an Orange Alert, i.e. important consequences that can be coped at National Level.

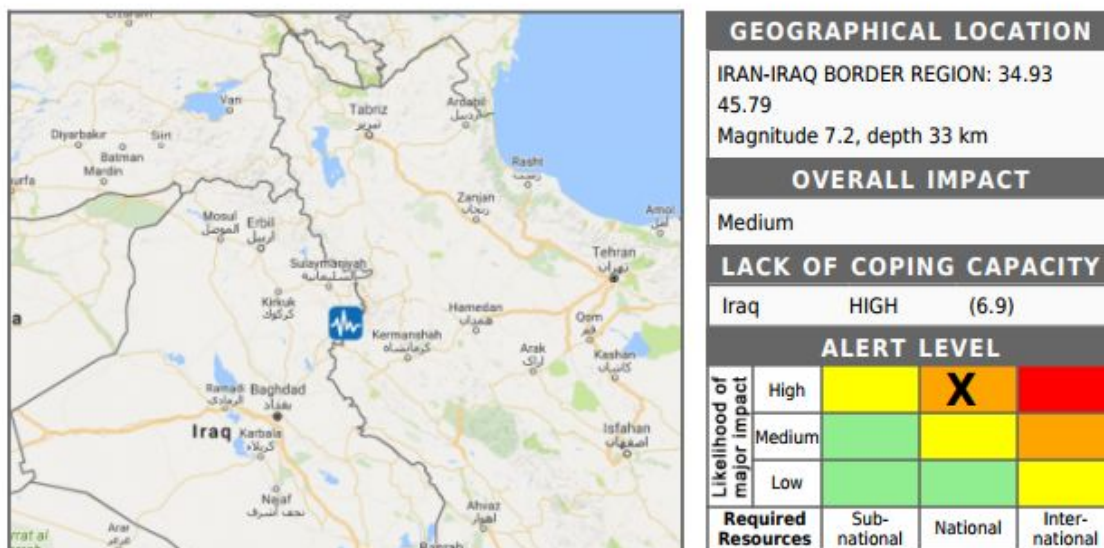


Fig. 4 - ARISTOTLE classification of the event



## 4.2 Virtual OSOCC Activation

VOSOCC was activated in the frame of GDACS. This is an open forum for First Responders. Several messages and information have been exchanged in order to coordinate the USAR teams and support teams that have offered their assistance.

## 4.3 International Charter activation

The international charter has been activated by UNOSAT in order to provide emergency mapping service to the International Community. The activation of the charter occurs in parallel with the Copernicus activation and sharing of the Areas of Interest occurs in order to be avoid duplication of efforts. A public page of the charter is not yet available at the time of writing. The home page of the Charter is: <https://disasterscharter.org/web/guest/home>

## 5 Expected Updates

No update is foreseen unless the situation will change.

## 6 References and contact points within JRC

Contact points within JRC: Disaster Risk Management Unit

- Ian Clark, [ian.clark@ec.europa.eu](mailto:ian.clark@ec.europa.eu)
- Tom De Groeve, [tom.de-groeven@ec.europa.eu](mailto:tom.de-groeven@ec.europa.eu)
- Alessandro Annunziato, [alessandro.annunziato@jrc.ec.europa.eu](mailto:alessandro.annunziato@jrc.ec.europa.eu)
- Annett Wania, [Annett.WANIA@ec.europa.eu](mailto:Annett.WANIA@ec.europa.eu)

For updated information on the disaster, please consult the following web sites:

- GDACS: <http://www.gdacs.org/report.aspx?eventid=1126166&eventtype=EQ>
- ERCC portal: <http://erccportal.jrc.ec.europa.eu/>
- Copernicus: <http://emergency.copernicus.eu/mapping>

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[1] Art. 35.6 – UCPM Commission Implementing Decision 2014/762/EU

# Appendix A - Assessment of Weather Conditions

## Weather Forecast for Ozgoleh / Asgaleh (IRAN) and Halabjah (IRAQ) Greater Area

No significant weather phenomena are forecast for the next six days (Monday 13 Nov to Saturday 18 Nov 2017) with only partly cloudy to cloudy conditions. Maximum temperatures reaching 21-23°C (warm hours) dropping locally to 4-6°C (during early morning hours). Winds mainly from northeast (Ozgoleh) and southeast (Halabjah) directions 10-15 km/h. Rainy weather conditions are expected to prevail from Sunday (19 Nov) onwards.

Meteograms for Ozgoleh & Halabjah (blue line: 9km res / red line: 18km res / cyan: ensembles)

