CASE STUDIES OF TWO SIGNIGICANT DUST STORMS THAT AFFECTED OMAN: SYNOPTIC AND MESOSCALE BASED DUST STORMS

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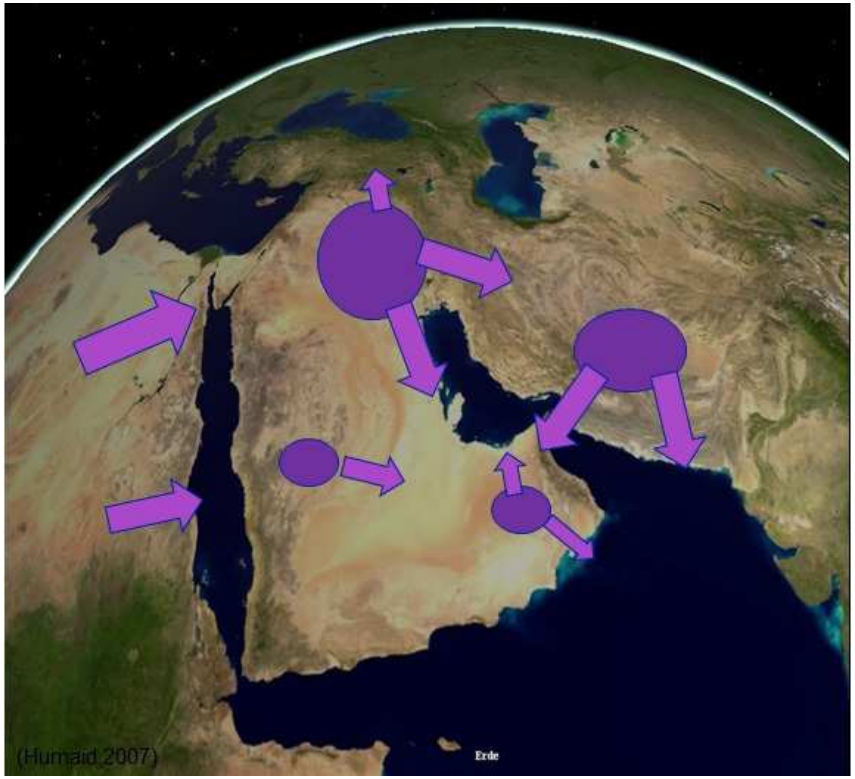
Outline

- Introduction
- Main Dust storm Sources in our Region
- Synoptic and Mesoscale based duststorms.
- Comparison of the forecasts and impacts of two significant dust storms that have affected Oman recently: the first one from a synoptic source and the second one from a local Meso-scale source.
- Conclusion

Introduction

- Dust storms have become very common over the Arabian Peninsula recently.
- This increase in frequency could be attributed to dry winter seasons in the region in the last few years.
- In addition to their immediate dangerous impacts, dust storms can also cause long term harm to the environment by affecting vegetation, altering type of soil and accelerating desertification

Main Dust storm Sources in our Region



- Tigris and Euphrates Rivers Basin.
- Sistan Basin
- East of Alhejaz Mountains.
- South-West of Alhajar Mountains

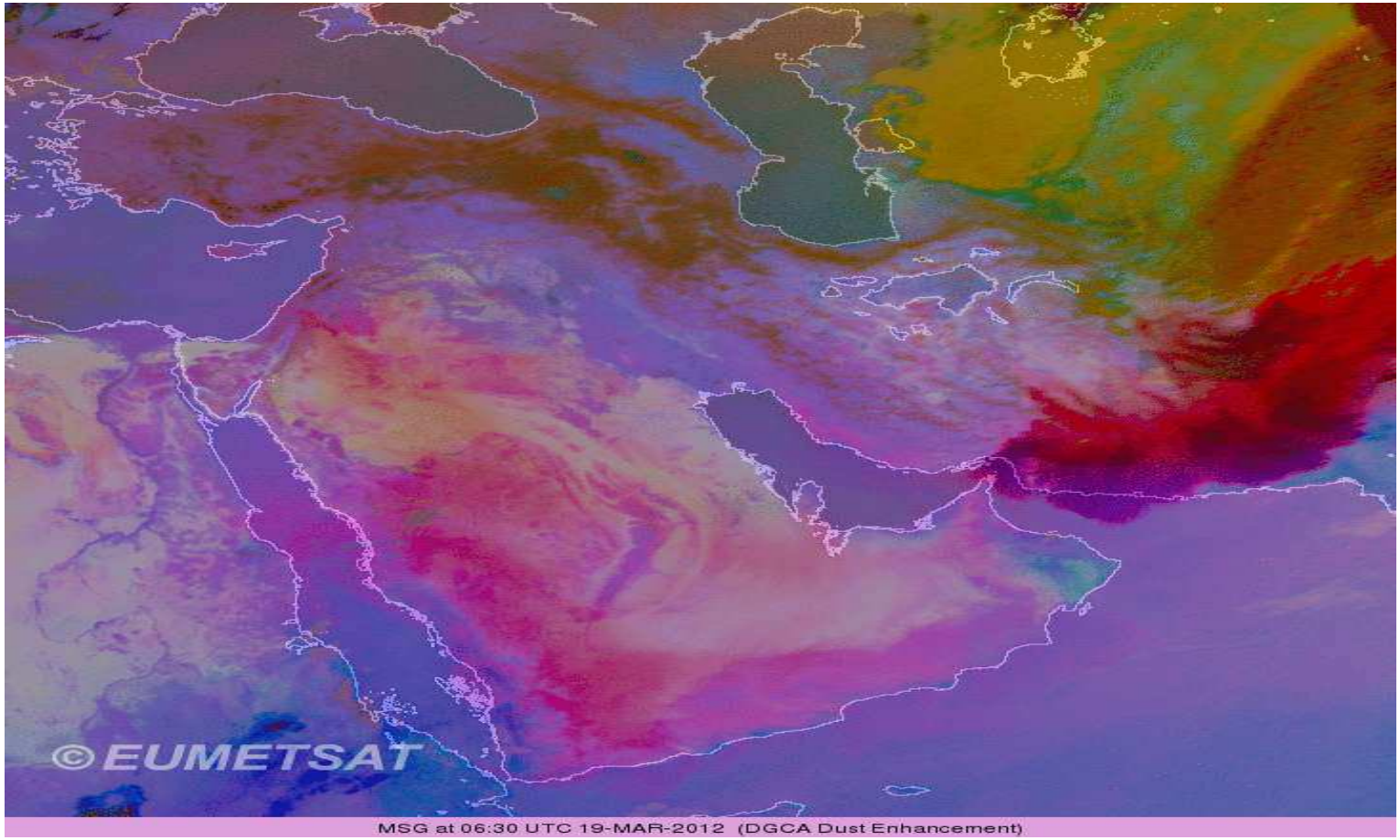
Synoptically Driven Dust storms

- Following the passage of westerly disturbances during the winter season, the resulting large pressure gradients lead usually to the formation of large scale dust storms.
- Carried away by northerly winds.
- Can be forecasted and tracked using NWP guidance and Remote Sensing tools.

Meso-Scale Dust storms

- Strong downdrafts from local thunderstorms may also lead to the formation of local Meso-scale dust storms of a significant impact.
- This type is usually called Haboob dust storms and they are very hard to forecast and track using conventional NWP Methods and Remot Sensing tools.

Case study #1: The synoptically driven dust storm affecting Oman on the 19th of March 2012



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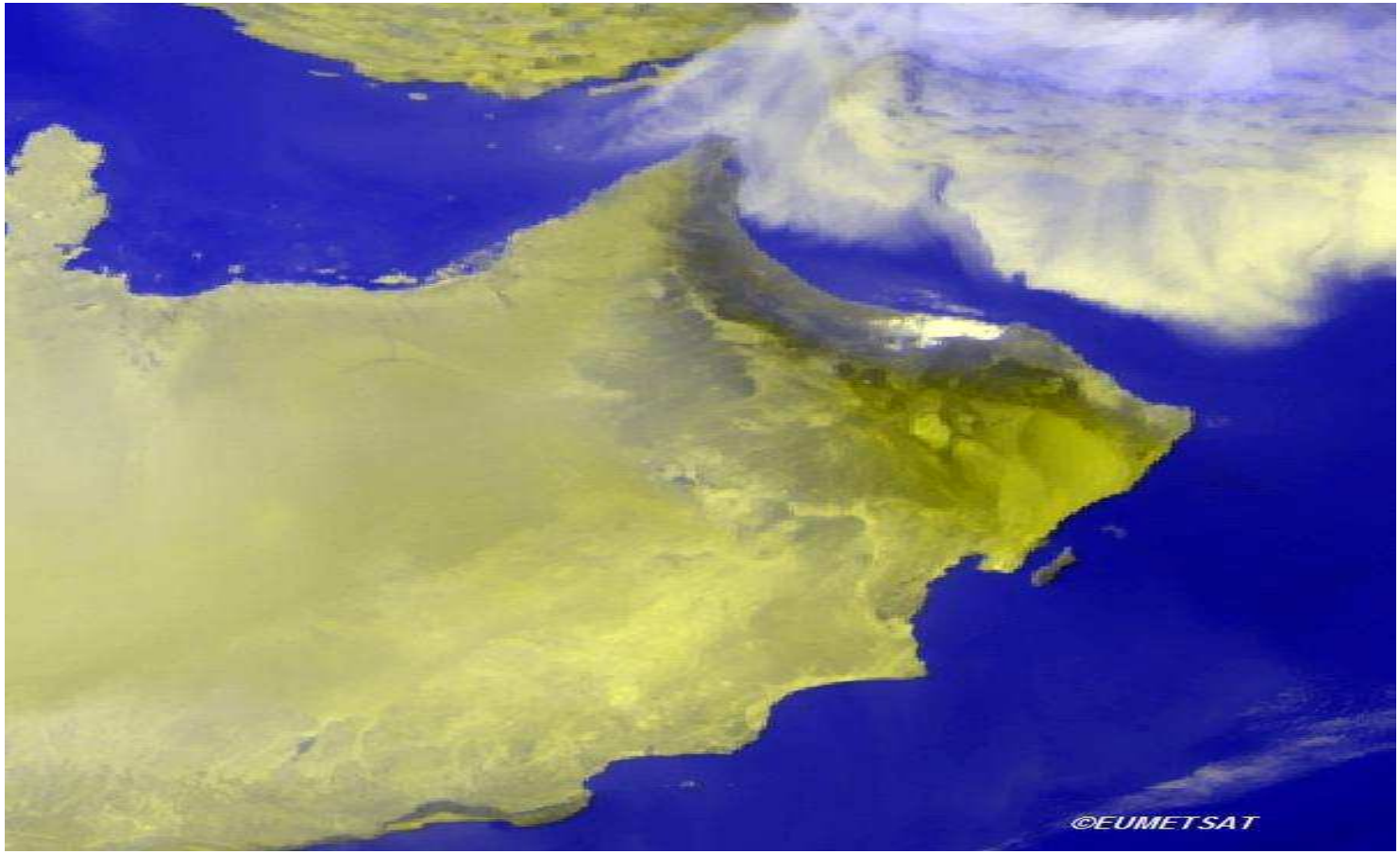

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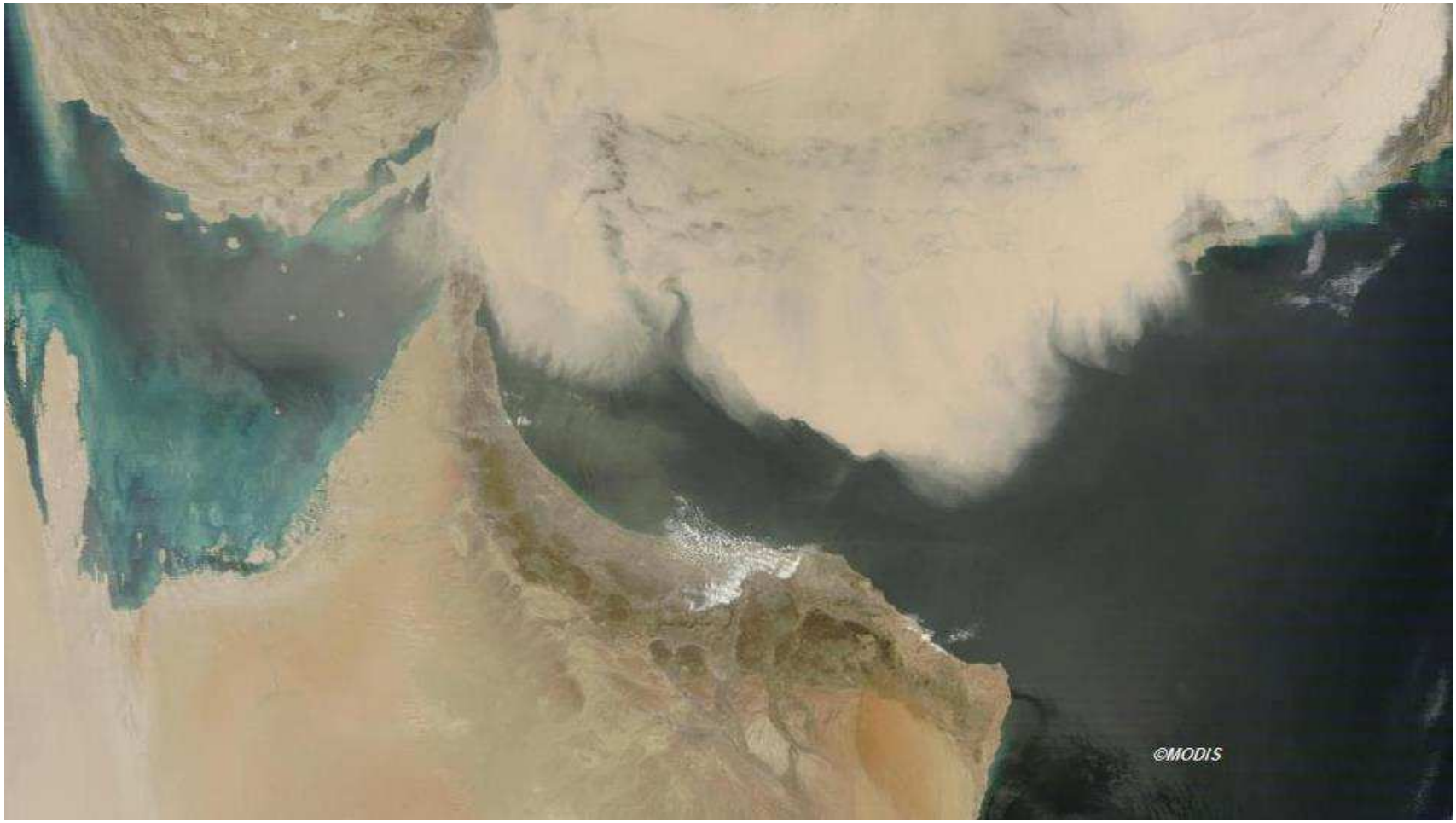

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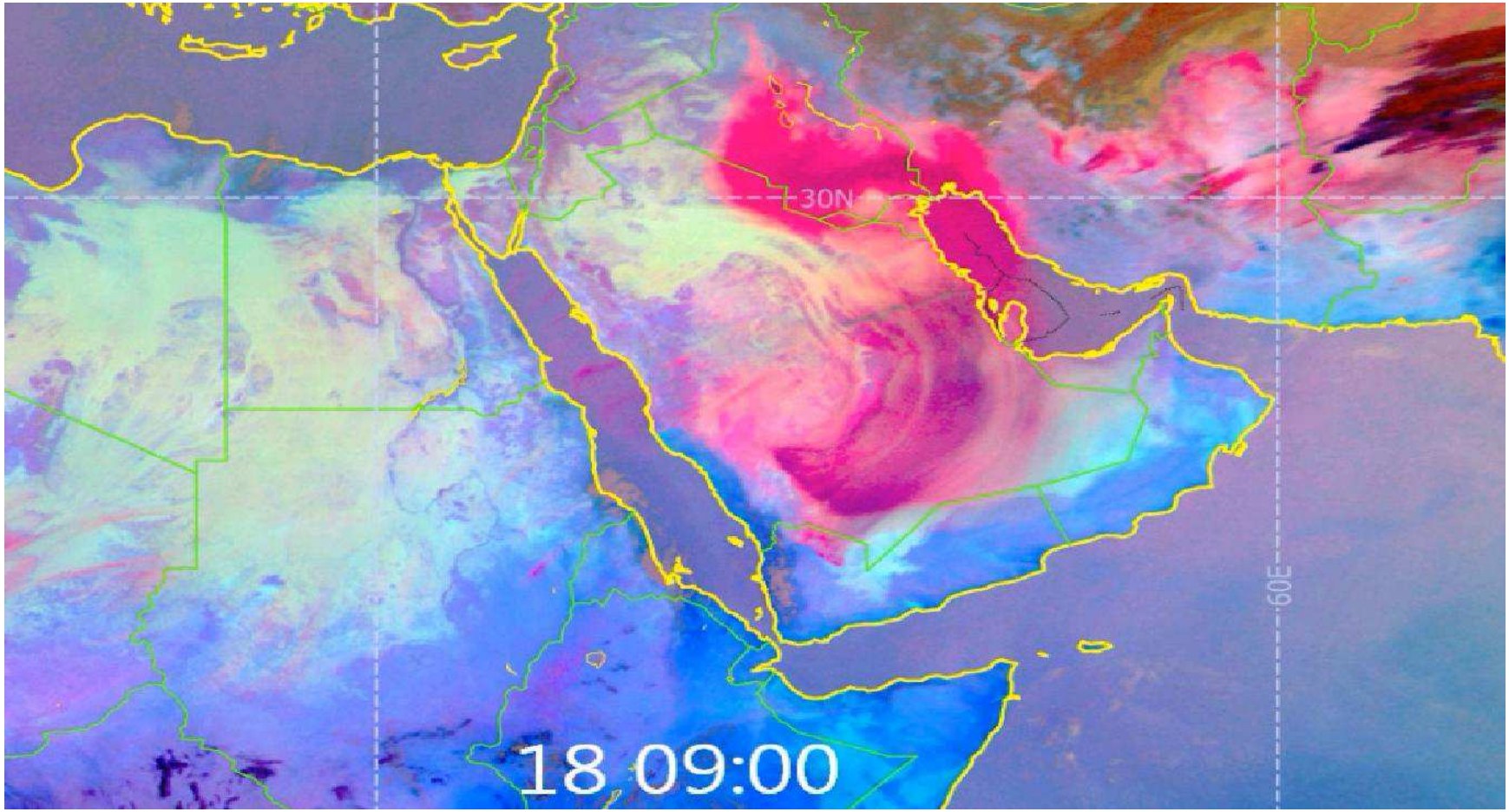
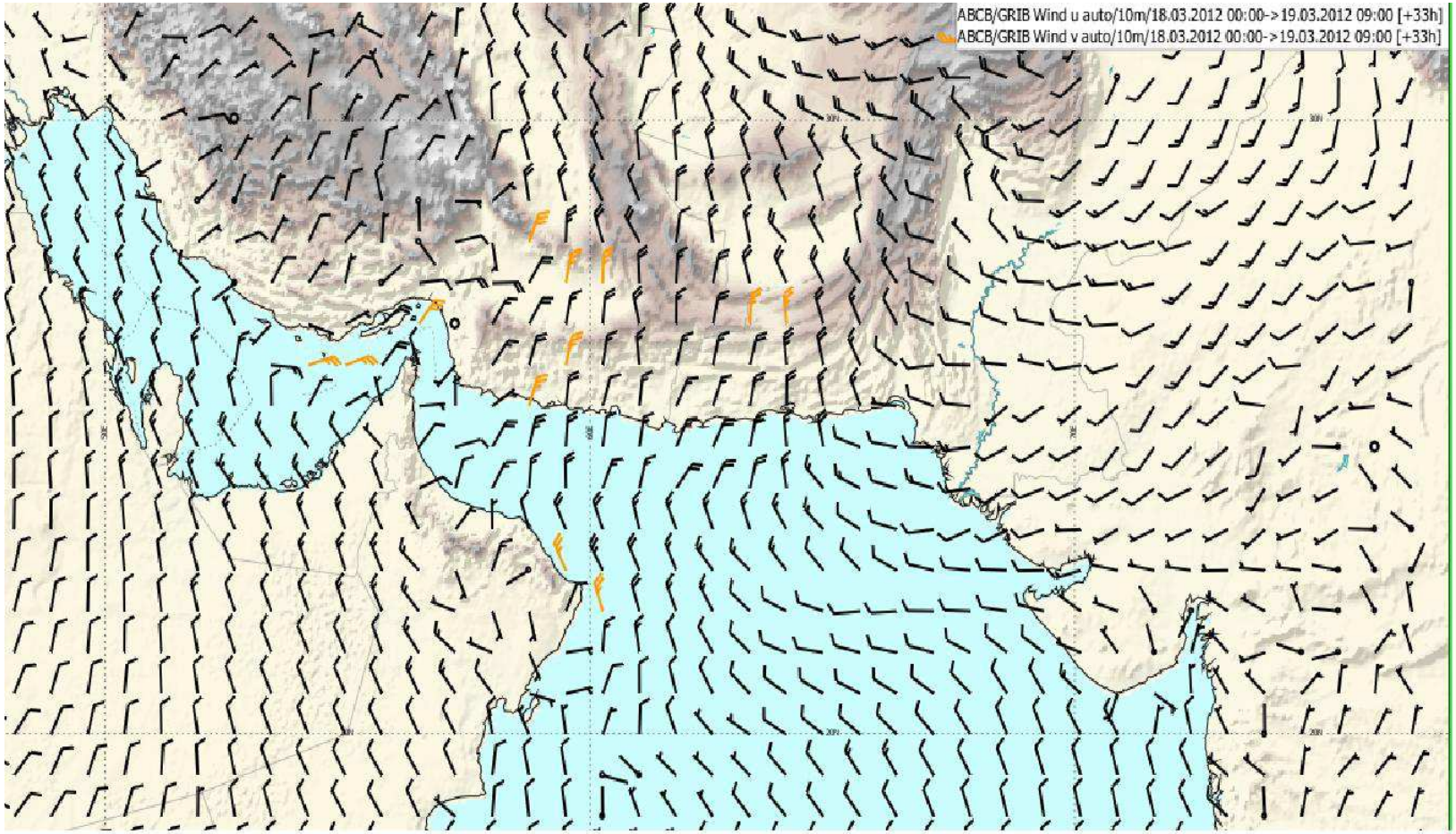
Another Huge Dust storm on the Previous day!



33 hour surface winds forecast from Oman regional model valid at 09 UTC on 19th of March 2012.



Warning Issued before the dust storm Arrival

Sultanate of Oman
Ministry of Transport & Communications
D. G. of Meteorology & Air Navigation
Muscat

سلطنة عمان
وزارة النقل والإتصالات
المديرية العامة للأرصاد والملاحة الجوية
مسقط

عاجل جدا

التاريخ: ٢٦ ربيع الثاني ١٤٣٣هـ الموافق: ١٩ مارس ٢٠١٢م
اليوم : الإثنين
الوقت: ١١:٣٠ صباحاً

تحذير من عاصفة غبارية تتسبب في تدني الرؤية الأفقية إلى ما دون ٥٠٠ م في بعض أجواء السلطنة

تهيب المديرية العامة للأرصاد والملاحة الجوية بضرورة توخي الحيطة والحذر وعدم التعرض المباشر إلى العاصفة الترابية القادمة إلى أجواء السلطنة والتي من المتوقع تأثيرها خلال الساعتين القادمتين بشكل مباشر على محافظات مسقط، جنوب الباطنة، شمال الباطنة، مسندم وجنوب الشرقية.

حيث من المتوقع أن يتسبب إنتشار الغبار في إنخفاض الرؤية الأفقية إلى مادون الـ(٥٠٠متر) أو إنعدامها في بعض الأحيان.

كما تهيب المديرية بجميع الصيادين ومرتادي البحر في سواحل محافظة مسندم وبحر عمان بضرورة أخذ الحيطة والحذر والتأكد من حالة البحر قبل إرتياده نظرا لهيجانه وتدني الرؤية الأفقية فيه بسبب الرياح المحملة بالأتربة.

وتشير التوقعات إلى بقاء الأحـــوال الجوية هذه حتى يوم الغد (الثلاثاء) مع تواصل إنتشار العوالق الترابية في جميع أجواء السلطنة حتى الأربعاء القادم.

والله أعلم
مركـــز التنبؤات الرئيسي

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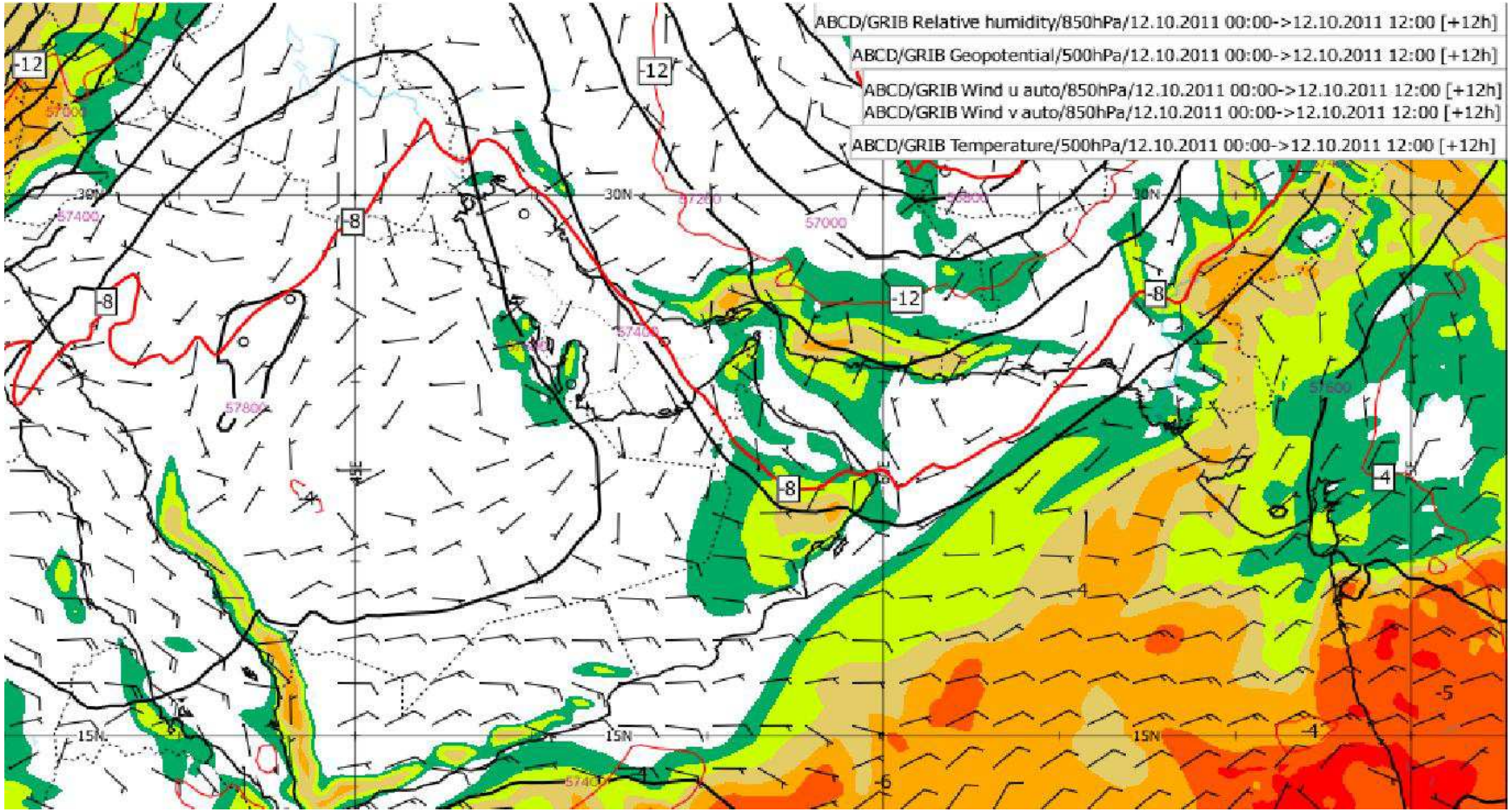
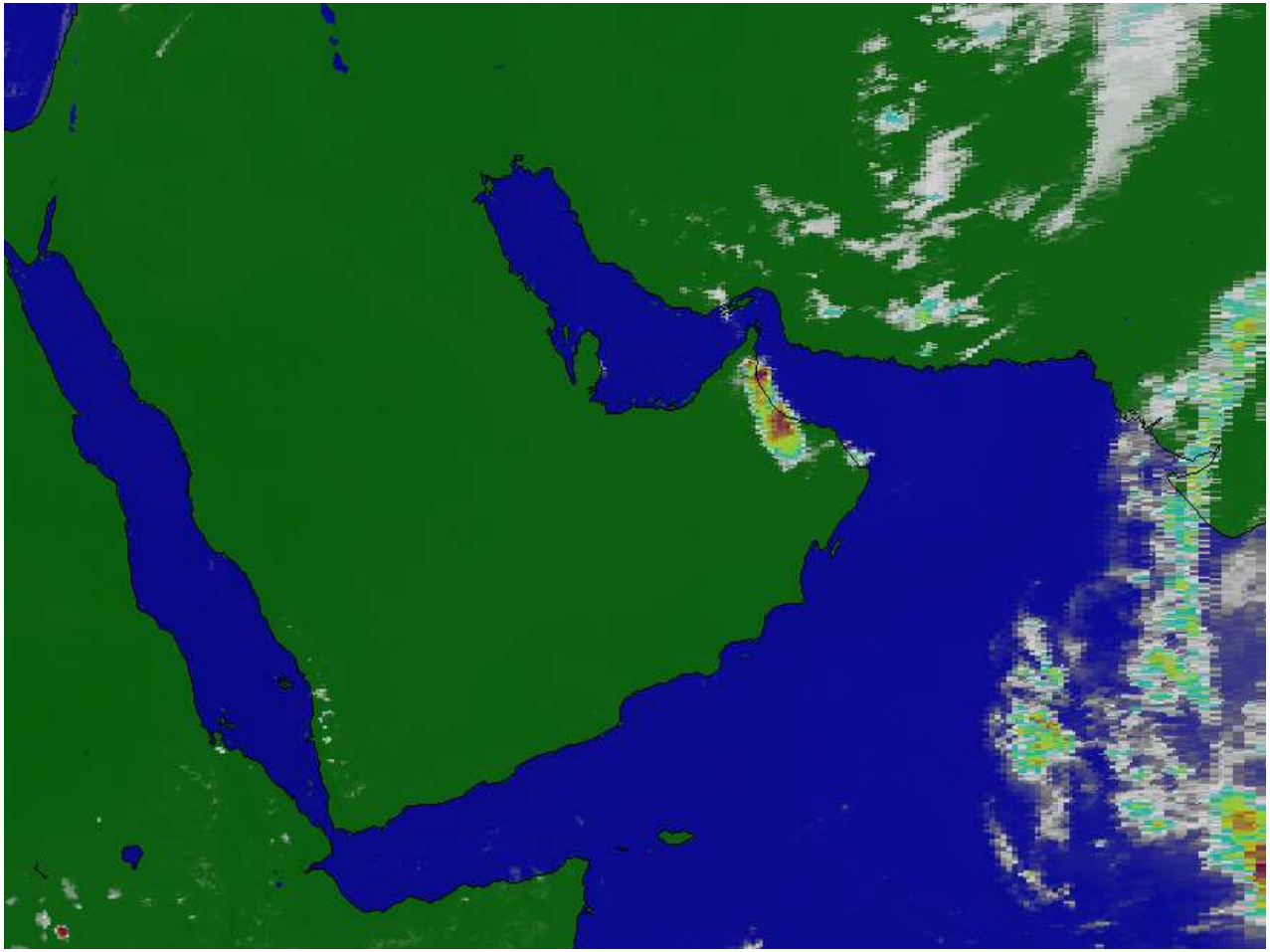
هاتف: ٢٤٥١٩٣٦١ - فاكس: ٢٤٥١٩٨٨٠

Case Study #2: The Haboob dust storm affecting Northern Oman on 12th of October 2011



Locally enahanced thunderstorms developed over the chain of Al-Hajir mountains during the afternoon of 12th of October 2011



A wall of dust formed and moved along very fast to affect the coastal areas of Oman Sea

Difficulty to issue warnings for this Haboob dust storm

- It is difficult to forecast Mesoscale downdrafts using conventional numerical weather prediction products.
- The wall of dust was under the cloud cover and hence it was hard to detect using Meteosat’s dust RGB channel.

Conclusion

- The Haboob dust storm which affected Oman on 12-10-2011 was caused by strong down drafts.
- This kind of Mesoscale storms is difficult to forecast by conventional NWP products.
- In addition, they are also difficult to detect and monitor by the dust RGB satellite images.
- On the other hand, it is easier to forecast and monitor synoptically driven dust storms using conventional remote sensing and numerical weather prediction products.

Thank you for your attention