

Heavy rains versus Thunderstorms in Maputo 31 Oct and 01 Nov 2013

SWFDP training Desk

By Flavio Monjane

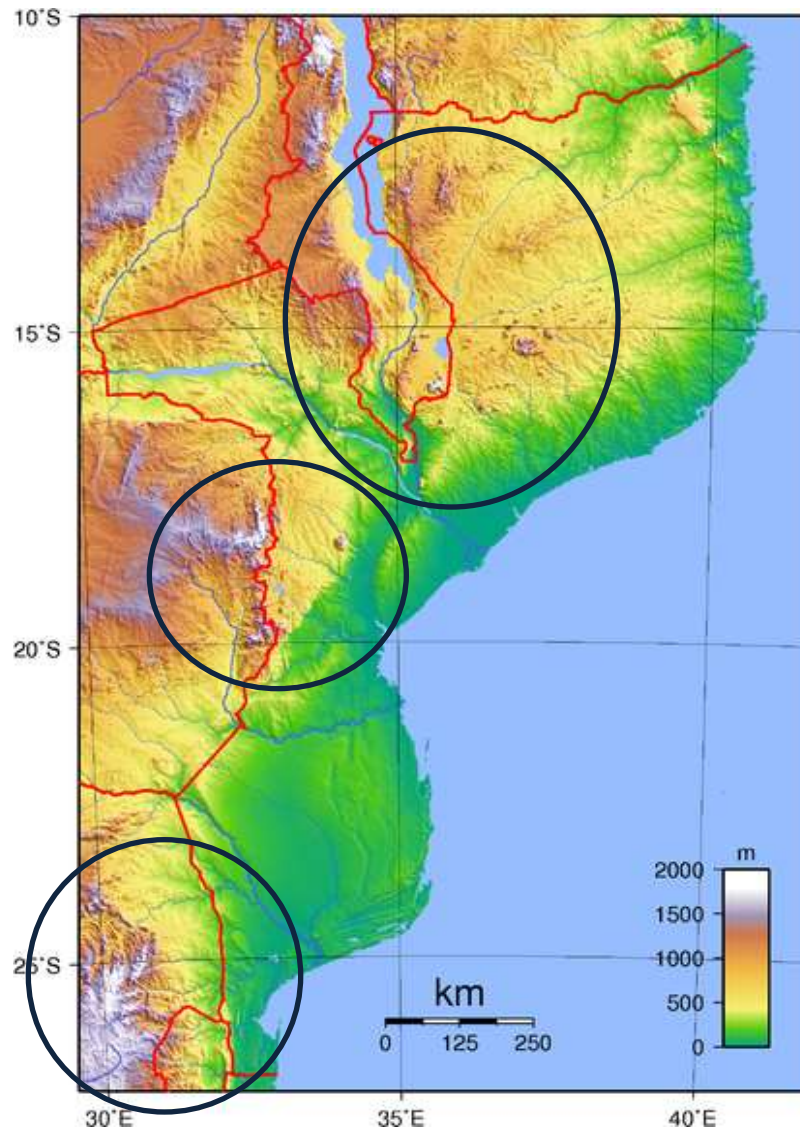
Summer season_Highlights

Plenty of sunshine, warm and humid along de coast.

Thunderstorms, strong winds(micro-scale) and heavy rains are frequent throughout the country. Although Highlands of central Mozambique and southern provinces are more likely to experience thunderstorms.

In the northern portions of the country, weather is influenced by easterly flow and ITCZ activity; scattered/moderate convection cause heavy rains, and thundery in places.

In the southern region thunderstorms and heavy rains are related to development of coastal low over SE RSA ,tropical trough and southeasterly flow which are dominant during summer months.



Motivation

- Challenge in forecasting Thunderstorms
- Casualties due to thunderstorms: 39 deaths (2012/2013, source :INGC)
- Relationship between heavy rains (above 30 mm/24h) and Thunderstorms.

Forecasting tools

- RSMC web portal

The screenshot displays the RSMC web portal interface, organized into several sections:

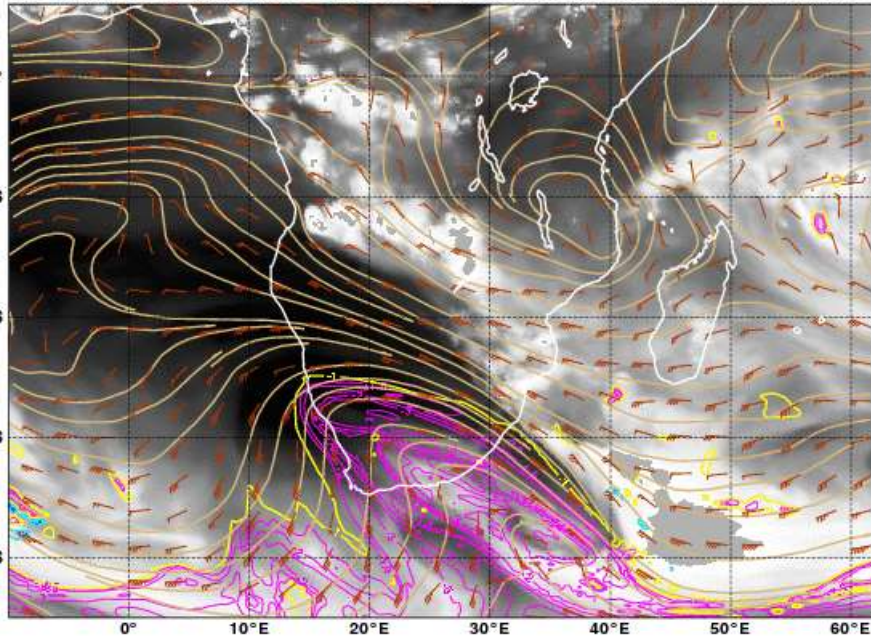
- Guidance Products**
 - NWP & EPS Products**
 - Regional Models**
 - [UM SA12](#)
 - [UM Africa LAM](#)
 - [Asterix La Reunion](#)
 - Global Products**
 - [NOAA: EPS](#)
 - [ECMWF: EPS](#)
 - [Met Office: EPS](#)
 - [NOAA: EPS](#)
 - [SAWS: EPS \(SAWS\)](#)
 - Training Website**
 - [Met-eLearning](#)
 - SWFDP Training Nov 2012**
 - [GDPFS](#)
 - [PWS](#)
 - RSMC Guidance Archive**
 - Contact RSMC**
 - Logout**
- Guidance Products**
 - Short-range (1-2 Days)**
 - [Map Day 1](#)
 - [Map Day 2](#)
 - [Risk Tables](#)
 - [Discussion](#)
 - Medium-range (3-5 Days)**
 - [Map Day 3](#)
 - [Map Day 4](#)
 - [Map Day 5](#)
 - [Prob Tables](#)
 - [Discussion](#)
 - SWFDP Evaluation Form**
 - [Click Here](#)
- Nowcasting Products**
 - Satellite-Based Rainfall**
 - Hydro-Estimator Rainfall Totals**
 - [1hr](#) • [3hr](#) • [6hr](#) • [24hr](#)
 - Hydro-Estimator Rainfall Totals In Days**
 - [10 Days](#) • [30 Days](#)
 - [Description of Product](#)
 - Hail Forecasts from UM SA12**
 - [1hr](#) • [12 UTC](#) • [24hr](#)
 - Convective Thunderstorm Forecasts**
 - [Probability of Convective Thunderstorms](#)
 - [Description of Product](#)
 - Hydro-estimator Storm Tracks**
 - [SADC](#)
 - [SADC NW](#)
 - [SADC NE](#)
 - [SADC SW](#)
 - [SADC SE](#)
 - [Madagascar](#)
 - [South Africa](#)
- Regional and International Centers**
 - [ECMWF](#)
 - [NCEP](#)
 - [UK Met Office](#)
 - [WMO](#)
 - [RSMC - Reunion](#)
 - [ACMAD](#)
- SADC Countries**
 - [SADC Countries National Meteorological Services](#)
- Other Services and Products**
 - [Short-range](#)
 - [Long-range \(Seasonal\)](#)

NWP-Products

- NOAA-ncep
- Met office
- ECMWF
- UM12

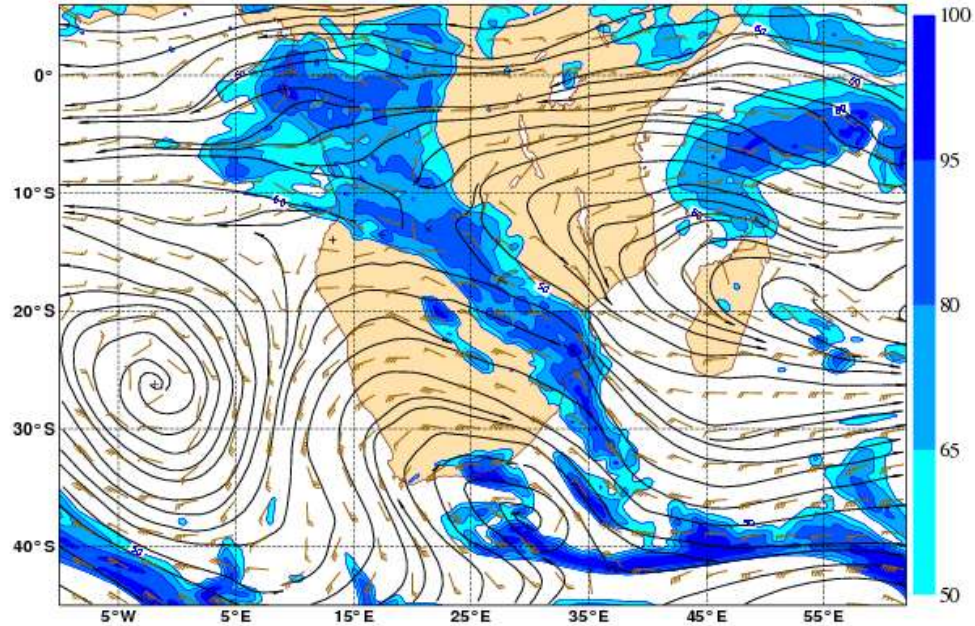
Wx maps

RTTOV gen. Meteosat 9 WV6.2 ECMWF Fc 20131031 00 UTC +36h: 250 hPa Wind (stream+barbs), 330K PV (purple)

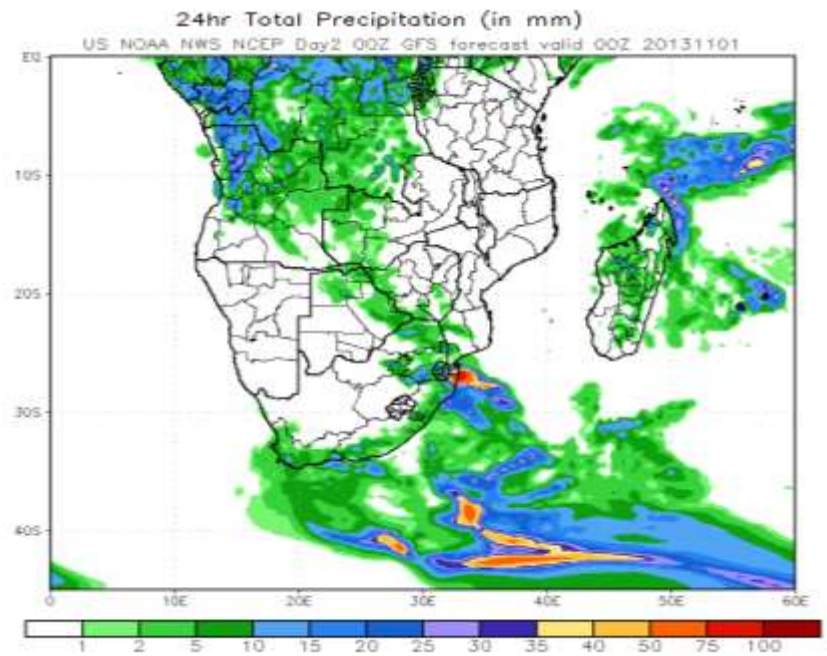
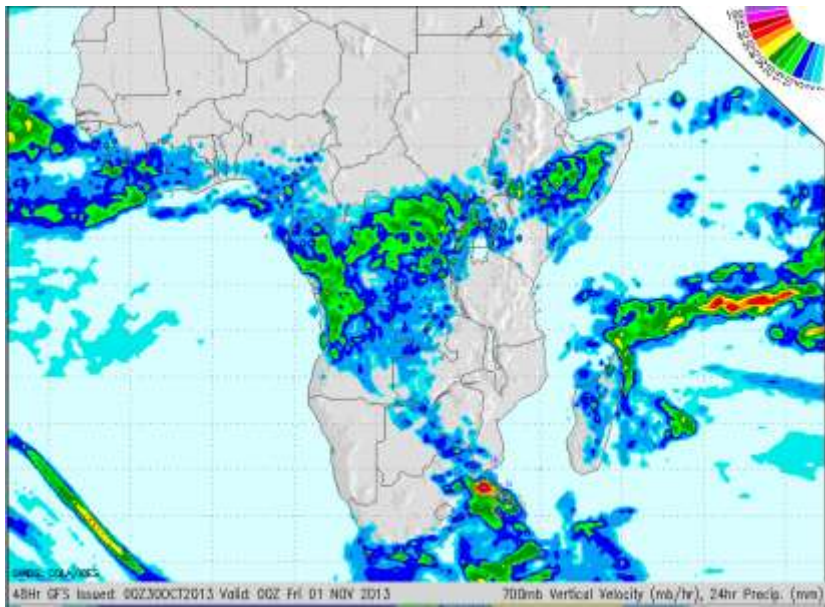


250 hpa wind

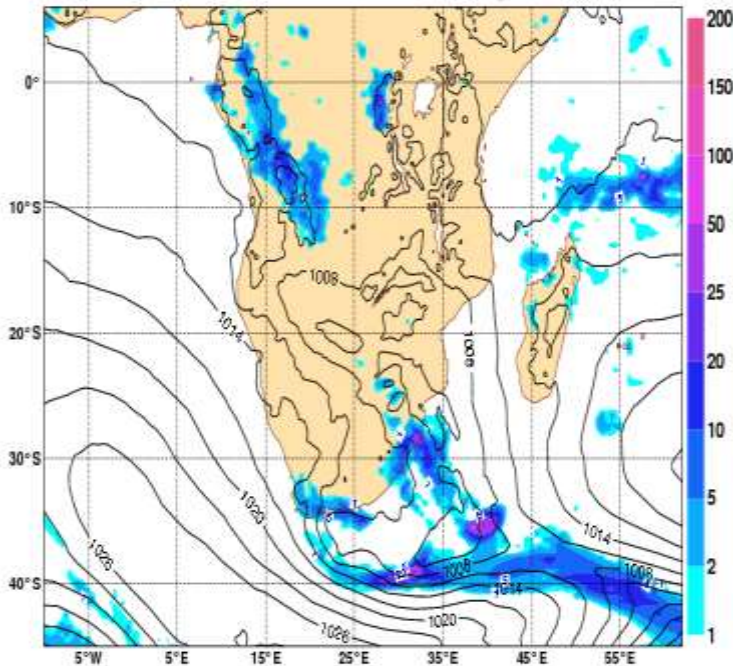
Thursday 31 October 2013 00 UTC ECMWF Forecast 1-24 VT: Friday 1 November 2013 00 UTC 500 hPa Relative humidity/ V velocity/ V velocity



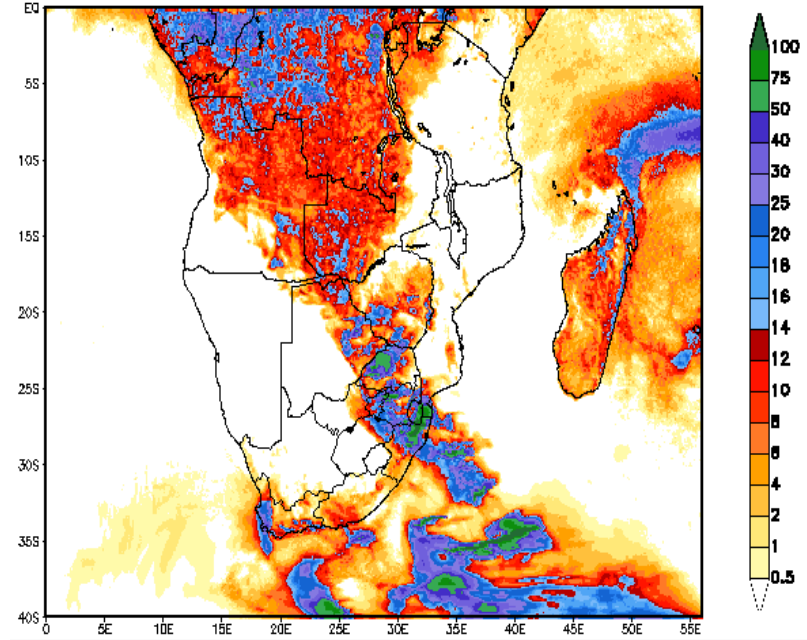
500hpa



ECMWF Fc 2013102912 +60 h MSLP (hPa) and Precip (mm) since last 6 h



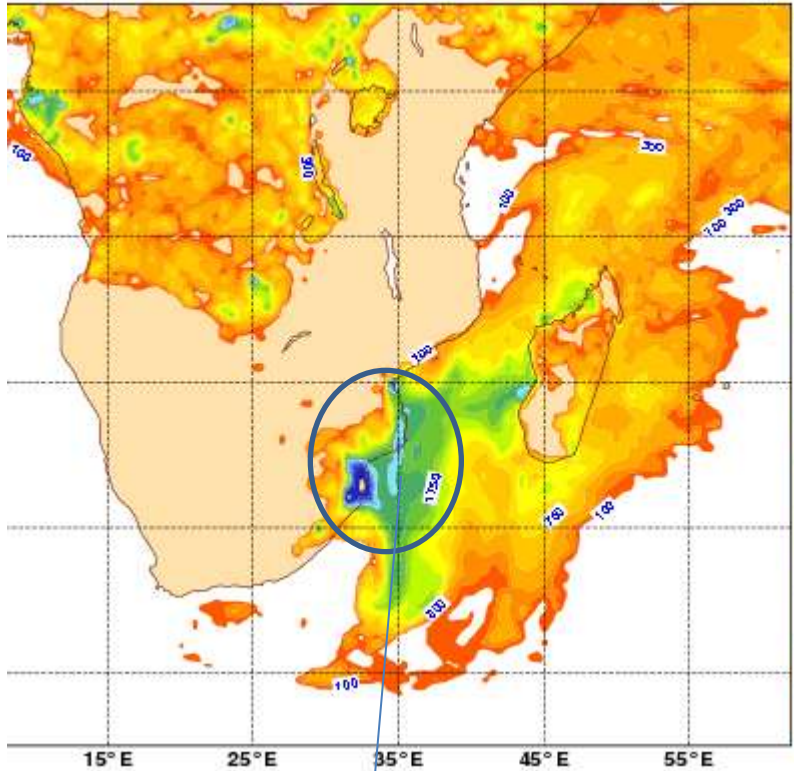
UM 12km horizontal resolution Accumulating Precipitation for past 24 hours (mm)



precipitation of 01Z to 24Z, 31 OCT – Initiated 00Z 30 OCT 2013

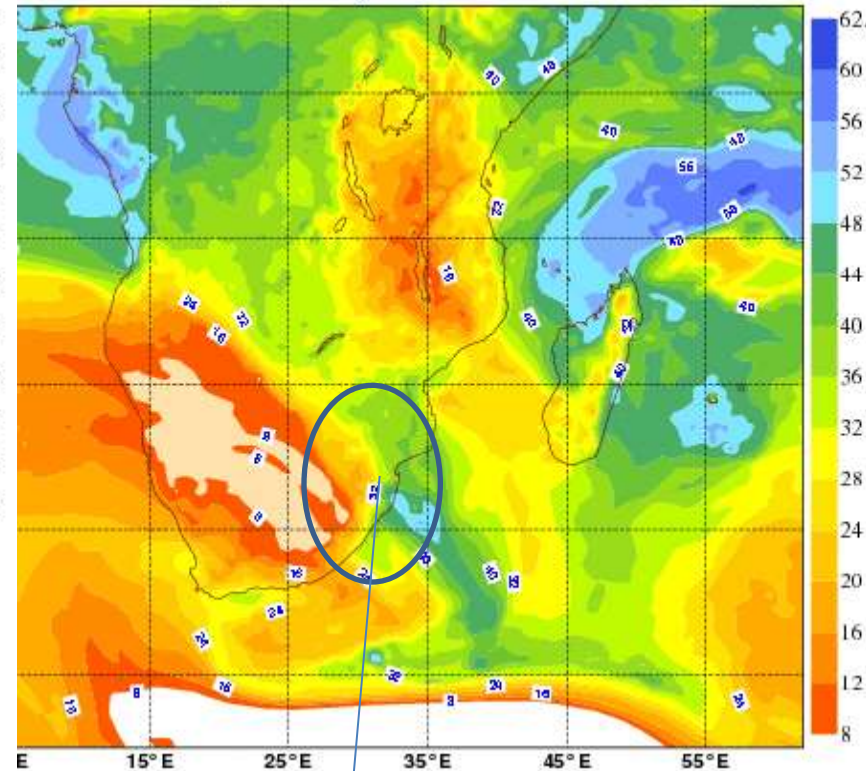
CAPE/TCW

ECMWF Forecast t+24 VT: Thursday 31 October 2013 12UTC Surface: Convective available potential energy



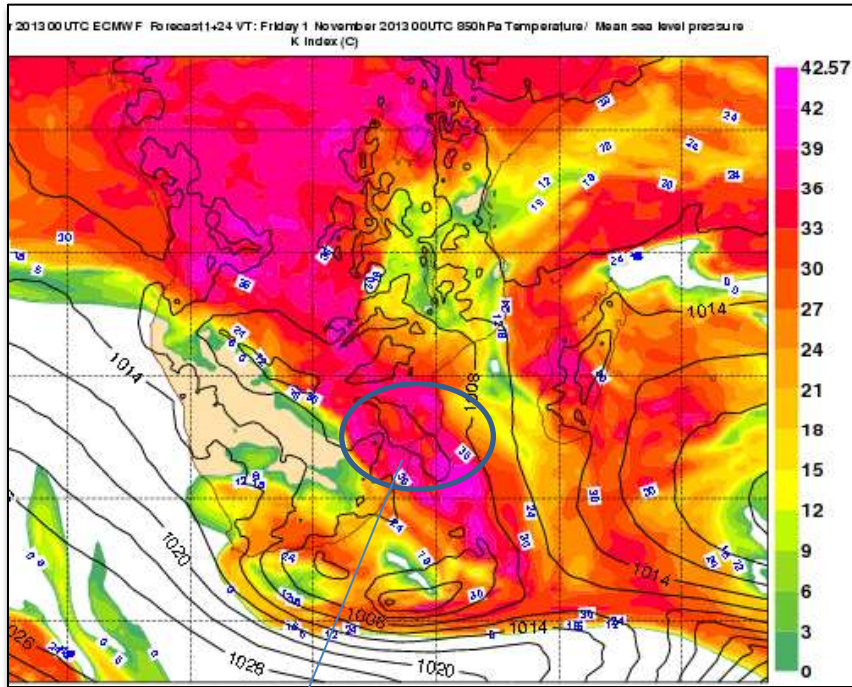
CAPE > 2500

ECMWF Forecast t+30 VT: Thursday 31 October 2013 18UTC Surface: Total column water

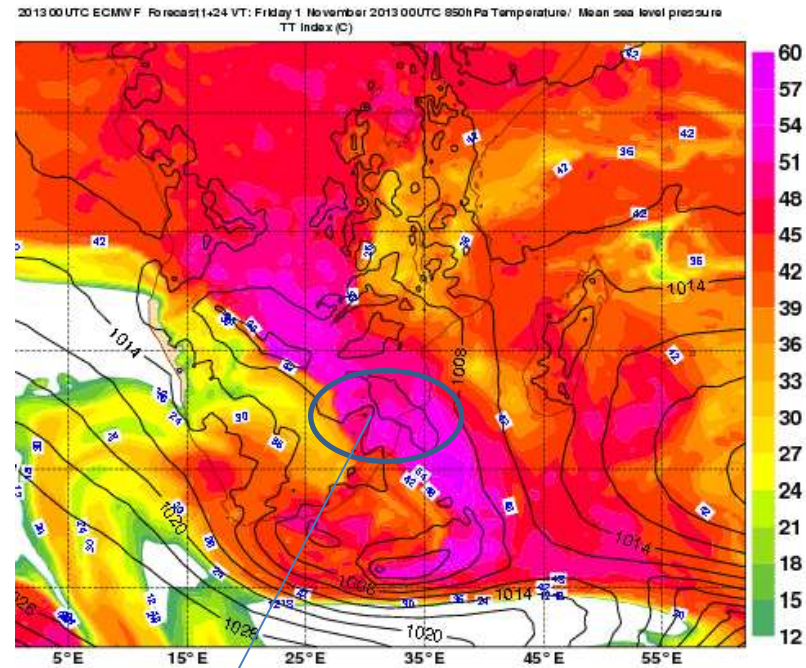


TCW > 40

K-index/TT



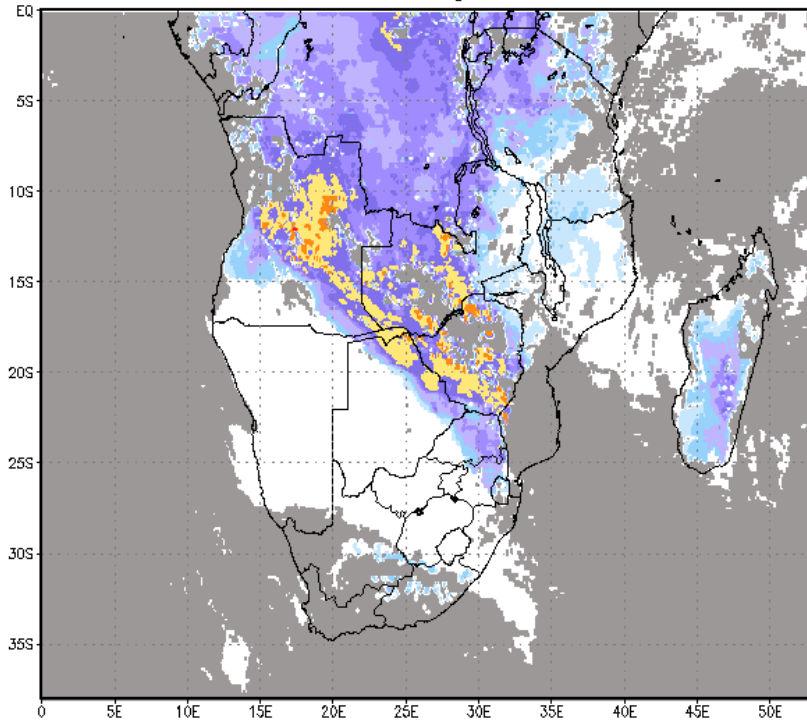
Ki > 39



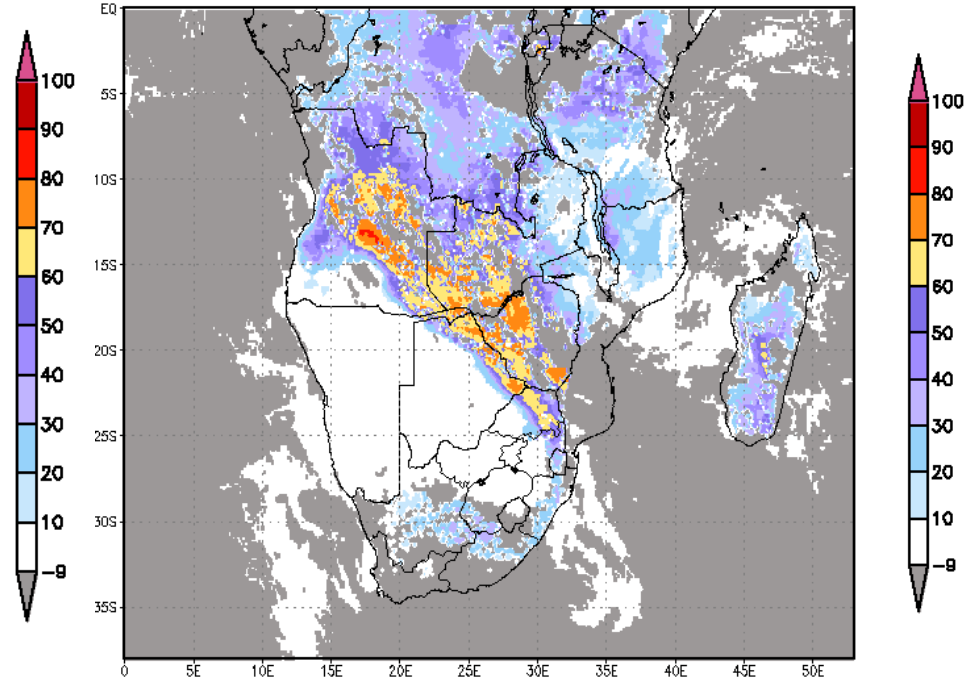
TT > 51

CII

Probability for convective thunderstorms in percentages on 01NOV2013 Time average 0600-0900 UTC



Probability for convective thunderstorms in percentages on 01NOV2013 Time average 1100-1400 UTC



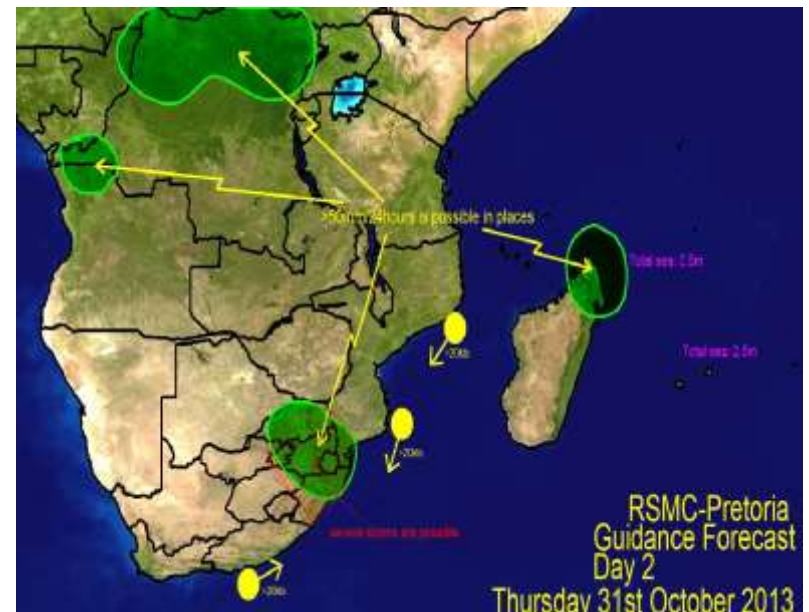
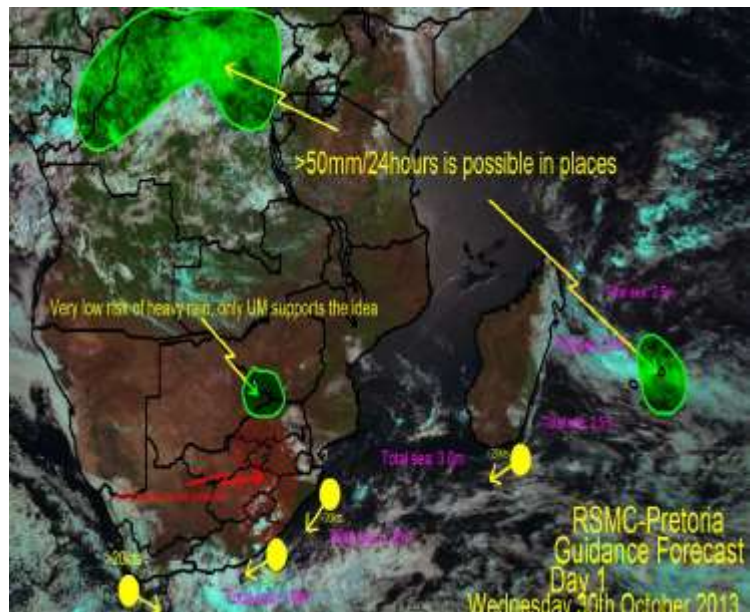
Discussion

Thursday 31st October 2013

- A steep westerly upper trough over the southern parts of the sub-continent will result in a chance of heavy rains over NE RSA, Swaziland and extreme southern Mozambique. Severe storms are also possible as there is an indication of high K-index, TT and strong vertical wind shear.

RSMC Pretoria guidance

Issued on 30th October 2013:



lead time: 24-36 hrs ahead.

NMS-Mozambique

Maputo, 30 de Outubro de 2013

Boletim Nº	038/INAM-DAPT/999/2013
Emitido:	12:00 Horas (Tempo Local)
Valido até:	12:00 Horas de 01 de Novembro de 2013
Tipo de Comunicado: Informação Alerta <u>Aviso</u>	Alerta
Fenómeno meteorológico:	Chuvas moderadas a fortes acompanhadas de trovoadas
Áreas de risco	Zona sul do país
Descrição	<p>O INAM prevê a ocorrência de aguaceiros e chuvas em regime moderado a forte (30 a 50 milímetros em 24 horas) acompanhadas de trovoadas e ventos fortes (até 60 km/h), a partir do final do dia 31 até dia 02 de Outubro de 2013.</p> <p>As chuvas poderão ocorrer em regime forte (mais de 50 milímetros em 24 horas) nas províncias de Maputo (distritos Matutuíne, Boane, Namaacha, Marracuene, Moamba, cidade de Maputo e Matola), Gaza (distritos de Chókwe, Bilene, Guijá, Chibuto, Mandlakaze e Cidade de Xai-xai) e Inhambane (distritos de Zavala, Inharrime, Jangamo, Panda, Homóine, Morrumbene, Maxixe e cidade de Inhambane).</p>
Recomendações:	Acompanhamento dos boletins meteorológicos e tomada de medidas de precaução e segurança.
Actualização:	Este boletim será actualizado as 12:00 de 01 de Novembro

Elaborado por:

Meteorologista: *Acácio Tembe, Telmo Susnila, Arsenio Minda e André Nhantumbão*

.....
Chefe do DAPT

.....
Sérgio Buque

Observed TS on 31/10/2013

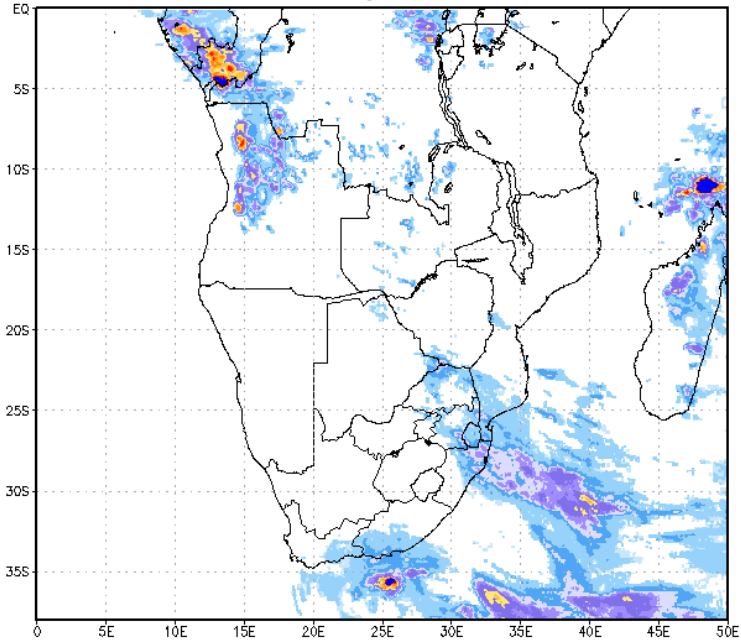
- **METAR FQMA 312100Z 19009KT 9999 **TS** FEW015
BKN020 FEW030CB 27/19 Q1004 TEMPO 3000
TSRA RMK CB TO W=**
- **METAR FQMA 312000Z 27006KT 9999 **TS**
FEW015 BKN020 FEW030CB 31/17 Q1003 TEMPO
3000 TSRA RMK CB TO W=**
- **METAR FQMA 311900Z 34015KT 9999 **TS** FEW015
BKN020 FEW030CB 31/17 Q1003 TEMPO 3000
TSRA RMK CB TO W=**
- **METAR FQMA 311800Z 34008KT 9999 **TS** BKN015
OVC020 FEW030CB 32/17 Q1001 BECMG 3000
TSRA RMK CB TO W/NW=**

Observed TS on 01/11/2013

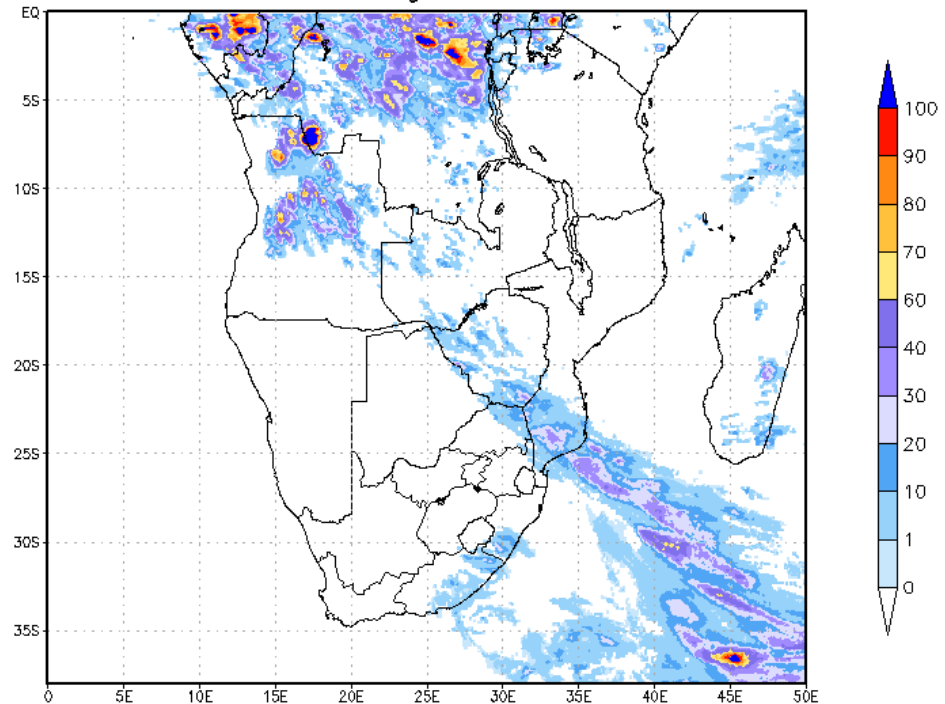
- **METAR FQMA 012200Z 21005KT 5000 **TSRA** SCT009
OVC020 FEW025CB 21/22 Q1011 NOSIG RMK CB TO
NE/NW=**
- **METAR FQMA 012100Z 25006KT 4000 **TSRA** SCT009
OVC020 FEW025CB 21/21 Q1011 NOSIG RMK TO NE/NW=**
- **METAR FQMA 012000Z 13006KT 4000 **TSRA** SCT010
BKN020 FEW025CB 22/21 Q1009 NOSIG RMK SE/E=**
- **METAR FQMA 011900Z 04007KT 120V180 9999 **TS** BKN020
FEW025CB 23/20 Q1008 NOSIG RMK SE/E=**
- **METAR FQMA 011800Z 14008KT 5000 **-TSRA** BKN020
FEW025CB 23/20 Q1008 NOSIG RMK CB ALL DIRECTION=**

Observations

Sum Local HE mm
for 24h ending on 01NOV2013



Sum Local HE mm
for 24h ending on 02NOV2013



Synops 01Nov 0600Z

- Maputo:0.2 mm
- Changalane:0.0 mm

Synops 02Nov 0600Z

- Maputo:86.8 mm
- Obsev:19.3 mm
- Changalane:0.0 mm

Conclusion/challenges

- Forecasting thunderstorms is challenging and its track is well detected by RADAR; but if necessary ingredients for development of thunderstorms are known
- understanding (enhanced skills) of instabilities index (TT, KI, Li, CAPE, TCW), CII and coupled with good interpretation of vertical wind profile, and local knowledge, would bridge lack of facilities (Radar and soundings) in forecasting thunderstorms.

Obrigado!