Statistics and brief explanation of maltaclouds' "Cloud-type forecast" accuracy rate for the rainy season 2013-4:

Accuracy Rate by Month and Season for the Year 2013/4				
Month	Season	Accuracy Rate		Change in Accuracy Rate from last year
Sept		80.00%		20.00%
Oct		58.06%		-16.13%
Nov		76.67%		6.67%
	Autumn		71.43%	3.30%
Dec		64.52%		-3.22%
Jan		67.74%		3.22%
Feb		50.00%		-12.96%
	Winter		61.11%	-4.06%
Mar		67.74%		9.68%
Apr		68.00%		-5.33%
May		58.06%		0.00%
	Spring		64.37%	1.33%
Jun		66.67%		-6.66%
Jul		77.42%		0.00%
Aug		77.42%		3.23%
	Summer		73.91%	-1.09%
	Annually		**67.69%**	-0.13%

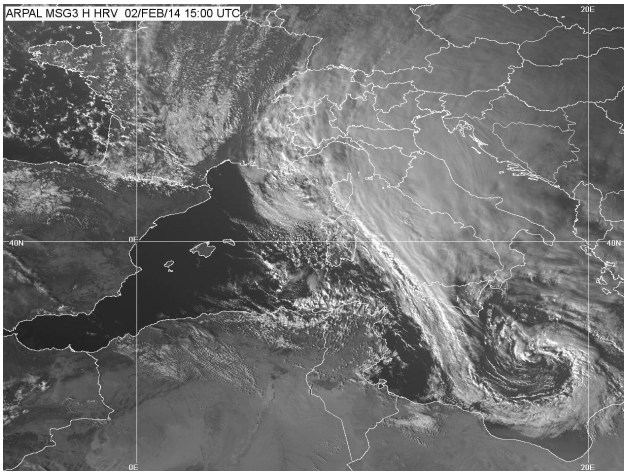
The above picture shows that maltaclouds.net cloud forecast had maintained its accuracy rate when compared to the previous year. However, the following emerge from this data:

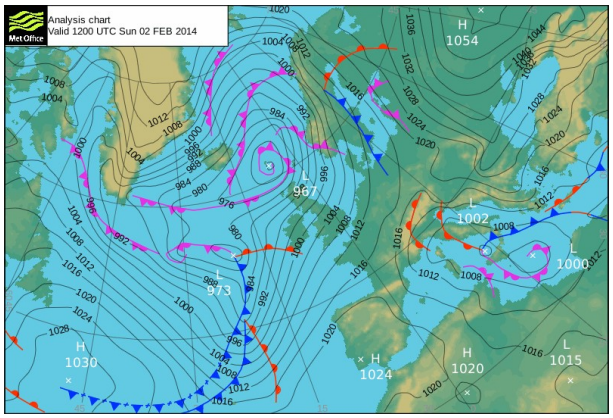
1) Cloud forecasting is the least accurate during Meteorological Winter and months of seasonal transition (Sept, Dec, March and June). This is mainly due to the continously changing weather conditions experienced in Winter because of the many mid-latititude low pressure systems that normally pass over the Mediterranean during that season. In this case, the weather models handled the September and November storms very well making for an unusually high accuracy rate. However, the accuracy rate dropped sharply for October as an unseasonable high pressure system during the last 2 weeks of October made cloud forecasting difficult. This was mainly due to low-level cloud formation (such as Stratus clouds) which are very difficult to forecast and depend mainly on the amount of moisture in the air which in itself is quite difficult to

determine. At times, more clouds were expected but then dissipated upon reaching the Maltese Islands due to hostile conditions.

2) The accuracy rate for the 2013-4 cloud forecast seem to follow the trend observed during the last rainy season especially during Winter but with some notable exceptions:

a) The low accuracy rate for the month of May was observed again this year with the 58.06% accuracy rate being exactly the same as last year's and 19.36% lower than that of the rainy season 2011-12. Perhaps this indicates the variability of May's weather. However, more cloud data needs to be collected before a sound conclusion can be made. February 2014 also surprised in the sense that the accuracy rate was weak. In fact, it registered the lowest accuracy rate ever recorded since cloud forecasting started being made around 3 years ago. As happened during October 2013, a long period of high pressure was observed over the Central Mediterranean during February despite the said month starting very stormy due to an intense depression over the Islands. It seems that available weather models are better able to handle mid-latitude cyclones or low pressure systems than convective and localized storm systems. Weather models are sometimes unreliable when modelling unusual or extreme weather events. The fact that last year's rainy season contained less convective storms and more mid-latitude cyclones helped to increase the accuracy rate in certain months. The 2 pictures below show a classical example of a mature low pressure system or mid-latitude cyclone that passed over the Mediterranean Sea during the last rainy season. These depict the cloud structure as photographed by a visible satellite and the surface weather chart respectively.





b) Summer 2014 cloud accuracy rate decreased again this year to 73.91% from the 75% registered last year and the 83% registered the year before. This was mainly due to local cloud formation (mostly Cumulus and Stratocumulus during the day and Stratus during early morning) or lack of which is very difficult to predict. However, Summer 2014 began very late. In fact, June was much more unsettled than usual and it registered a record number of rain days (4 days with rain) when on average only a day of rain is expected. This decreased the month's accuracy rate by more than 6 percentage points. However, July still managed to maintain its accuracy rate despite being less settled than usual. Only the month of August, which was very settled

weather-wise (more or less August 2014 had the same weather everyday - mostly sunny with MAX temperatures around 32 degrees Celcius) managed to increase the accuracy rate but was not enough to counter-balance June's drop in the clouds' forecast accuracy rate. It must be remembered that Summer 2012 was very bright and the second hottest in recent years. On the other hand, Summer 2013 was less settled than normal while Summer 2014 began unusually late.

3) The summer months of July and August still displayed the highest accuracy rate. The normally settled weather substantially increases maltaclouds' cloud forecast accuracy rate.

Statistics and brief explanation of maltaclouds' "Cloud-type forecast" accuracy rate for the rainy season 2014-5:

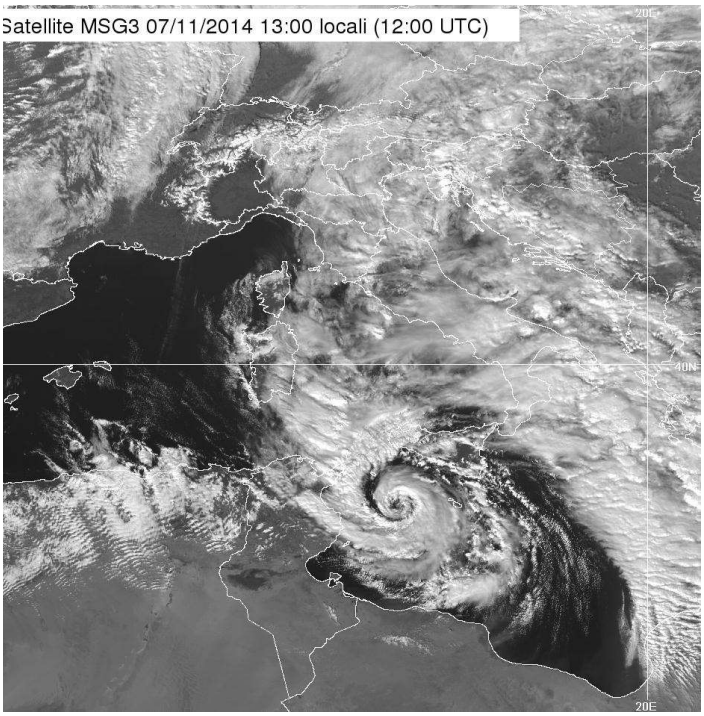
Accuracy Rate by Month and Season for the Year 2014/5				
Month	**Season**	**Accuracy Rate**		**Change in Accuracy Rate from last year**
Sept		73.33%		-6.67%
Oct		*70.97%*		12.91%
Nov		*70.00%*		-6.67%
	Autumn		*71.43%*	0.00%
Dec		*80.65%*		16.13%
Jan		*67.74%*		0.00%
Feb		*57.14%*		7.14%
	Winter		*68.89%*	7.78%
Mar		*70.97%*		3.23%
Apr		*66.67%*		-1.33%
May		*51.61%*		-6.45%
	Spring		*63.04%*	-1.33%
Jun		*70.00%*		3.33%
Jul		*77.42%*		0.00%
Aug		*67.74%*		-9.68%
	Summer		*71.74%*	-2.17%
	Annually		**68.69%**	1.00%

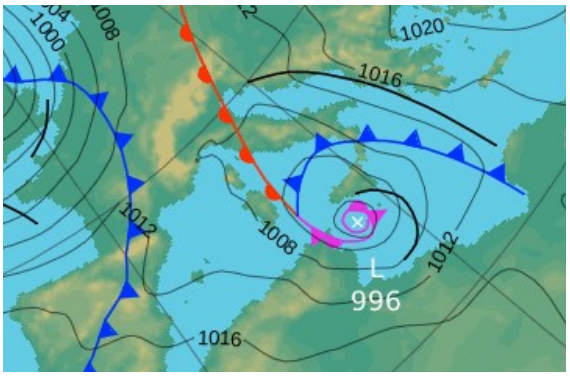
The following is a list of significant weather events that took place during the 2014-5 rainy season:

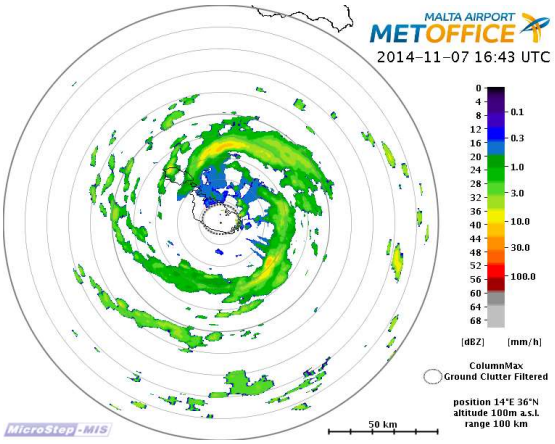
1) Very dry September and dry October due to lack of thermal contrasts between the seasonally cool air masses and warmth present. Summer 2014 was on the cool side especially July. This cool summer, had resulted in incursions of cooler air during the first part of autumn, not being able to produce significant thunderstorms until October.

2) On 7th November 2014, the eye of a Mediterranean cyclone passed directly over the Maltese Islands. The previous 15 days before the cyclone hit, daily rounds of heavy rain and thunderstorms occurred over most of the Central Mediterranean hence creating very moist conditions in which a cyclone could develop. This cyclone produced 118 kmh gusts (damaging Force 12 wind) and 43mm of rain in 48 hours. Figure 1 shows the eye of the Mediterranean cyclone very near the Maltese Islands including the circular pattern of the rainfall image and the sea-level pressure chart of the day.

Figure 1: Mediterranean cyclone visible satellite image and related weather charts





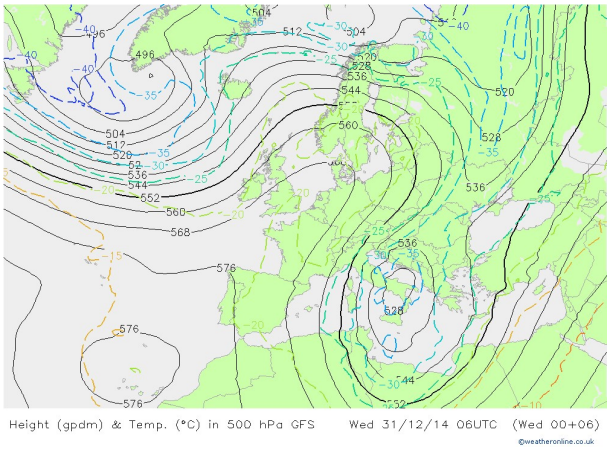


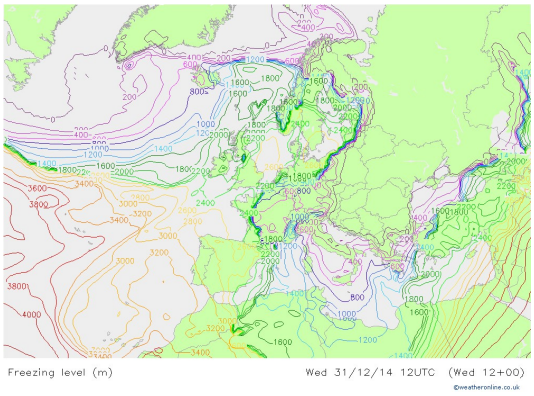
3) Worthy of note is a MAX of 27°C registered in Selmun on the very last day of November due to unseasonably hot southerly wind. Overall, Autumn 2014 was warmer than average.

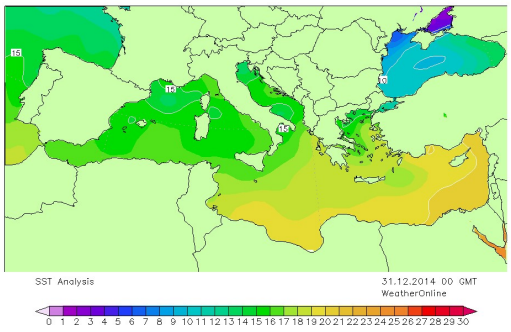
4) Relatively settled December but with an unusually cold ending. The maximum temperature registered on the 31st December was 8°C while the minimum fell to 3.7°C. This made it the coldest December day on record for at least 20 years. As a result, non-

accumulating graupel showers were reported all over the Islands with light snow allegedly falling over Dingli. The unusually cold weather for the Maltese Islands was caused by a modified continental airmass sliding southwestwards from the Balkans and taking a short sea track towards the Islands bringing very cold air with it. The soft hail and some weather charts are shown in Figure 2.

Figure 2: Soft hail video and the weather charts depicting this unusually early cold wave







5) Winter 2014 was one of the coldest on record as multiple cold airmasses were dragged down from the Balkans. In fact, unreported light sleet fell again on the 9th February 2015 during a NNE gale while driving from Xgħajra in Malta following photography of the very rough seas.

6) Spring 2015 started later than normal with March registering a record number of thunderstorm days. Cold days and nights were registered until 13th April. However, temperatures quickly shot up within a matter of days due to the arrival of a North African anticyclone. 3rd May 2015 initiated a 6-day heat spell with maximum temperature ranging between 27°C and 30°C. During this period, nearby Sicily has registered Europe's earliest 40°C temperature on record followed by Catalonia in Spain.

7) Freak Summer thunderstorm on 8th August 2015 producing a large waterspout and possible dust devil over the Grand Harbour area. The tail end of a storm moving westwards from the Ionian Sea (due to an extended trough) became much worse upon moving over a very warm patch of sea on the coastal side of eastern Malta. Some places registered over 20mm of rain in just 30 minutes (that is almost 3 times the monthly average of August). Sea temperature was around 28°C, approximately 4°C higher than average for the period, and possibly around 30°C at the coast due to lack of wind and sea breezes pushing warmer waters around the Maltese Islands. The sea became so hot due to many days with light winds and a stubborn North African anticyclone extending from the Iberian peninsula towards Northern Italy as early as May heating Atlantic waters as it entered the Mediterranean. Heatwave conditions ensued over the mentioned areas and extended further eastwards as summer progressed. However, June in Malta was cooler than average.

Figure 3: The unusual mammatus cloud display following the freak thunderstorm

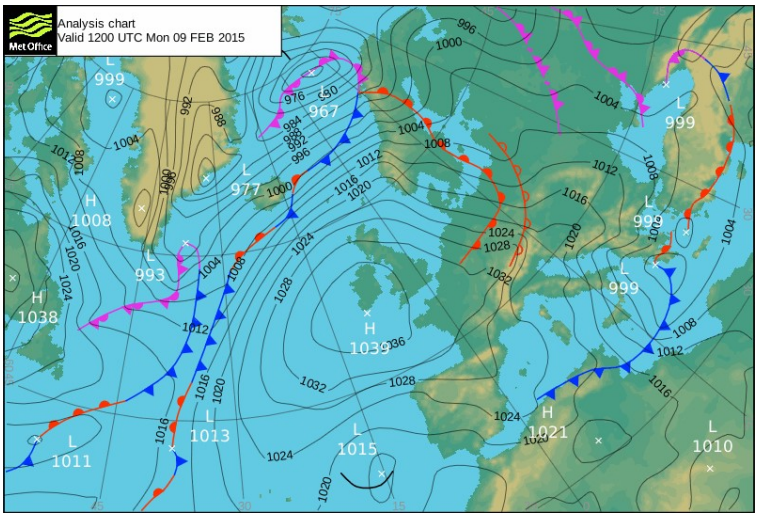
These aforementioned weather events had an effect on the types of clouds developed during the year and hence maltaclouds' accuracy rate. The above excel data segregating maltaclouds accuracy rate by month and by season show that maltaclouds.net cloud forecast has improved by a full percentage point when compared against the previous rainy season. To some extent, this may be due to better and sophisticated cloud forecasting models used and better knowledge from previous years. However, the following differences and similarities also emerge from this data:

1) This time round, cloud forecasting was the least accurate during Meteorological Spring and the months of November, February, May and August. The significant weather events mentioned earlier on had a major effect on these statistics because these contribute to weather variability making forecasting a bit harder than normal. For example August is usually a very settled month. However, freak thunderstorms (August had 4 rain days) contributed to weather variability which normally happens in transition towards Autumn.

In previous years, Winter was the least accurate in cloud forecasting due to the continuously changing weather conditions caused the frequent passage of mid-latitude low pressure systems

over the Mediterranean Sea. However, winter 2015 was dominated by a stubborn weather pattern with cold air raids coming directly from the Balkan Peninsula. Figure 4 depicts the dominant weather pattern throughout winter 2015. Furthermore, the month of December at an unusually high accuracy rate of 80% gave a major boost to Winter 2015 average accuracy rate.

Figure 4: A typical weather setup of Winter 2015 with high pressure to the north sending cold air masses towards the Central Mediterranean



2) 2015 saw Spring transition very quickly from Winter to practically Summer within practically 30 days. This led to much weather variability dragging down the accuracy rate. Of major note is the low accuracy rate for the month of May. This was observed for the third consecutive year with the 51.61% accuracy rate being 6.45% lower than that of the rainy season 2013-14. The reason might be that unlike local perception of May being a relatively settled month, in reality this cloud forecasting exercise may be indicating or rather confirming the variability of May's weather. The weather in May began hot but then turned relatively unsettled again. 18th May registered around 1.5 times the average monthly rainfall due to a cold plunge passing over Malta after an unusually warm period. Furthermore, May sees the transition from clouds that form due to large-scale features that weather models can predict to clouds that form due to small-scale feautures which are very hard to detect such as convective clouds that form over land areas due to the sun's strong daytime heating as the month progresses. For example on the 10th May, convective clouds from southern Sicily managed to make their way southwestwards towards eastern Malta due to strong NNE'ly jet stream. Maltaclouds has gained more experience about this. Hence an improvement in cloud forecasting during the transition to Summer should be expected in the coming years.

3) Summer 2015 cloud accuracy rate decreased again this year to 71.74% from the 73.91% in 2014 and the 75% registered in 2013. Maltaclouds believes that this year, August was to blame for this decrease due to variable weather conditions mentioned sporadically in this analysis.

Statistics and brief explanation of maltaclouds' "Cloud-type forecast" accuracy rate for the rainy season 2015-6:

Accuracy Rate by Month and Season for the Year 2015/6				
Month	Season	Accuracy Rate		Change in Accuracy Rate from the previous year
Sept		80.00%		6.67%
Oct		*77.42%*		6.45%
Nov		*70.00%*		0.00%
	Autumn		*75.82%*	4.39%
Dec		*77.42%*		-3.23%
Jan		*61.29%*		-6.45%
Feb		*65.52%*		8.38%
	Winter		*68.13%*	-0.76%
Mar		*70.97%*		0.00%
Apr		*80.00%*		13.33%
May		*58.06%*		6.45%
	Spring		*69.57%*	6.53%
Jun		*56.67%*		-13.33%
Jul		*77.42%*		0.00%
Aug		*70.00%*		2.26%
	Summer		*68.13%*	-3.61%
	Annually		**70.40%**	1.71%

During the period under review, there was an unusually strong El Niño event. NOAA's Oceanic Niño Index peaked at 2.3°C (4.3°F), which was equal to that of December 1997 making it the tied strongest event on record. Normally the Mediterranean Region, being far from the Pacific, is not effected by an El Nino. However, due to the phenomena's unusual strength, there were tele-connections to the world's climate. It seemed that stronger rainfall over the tropics (including never heard before back to back 2 hurricanes in the Gulf of Gabes in November), had activated the Hadley cell even more which in turn pushed the sub-tropical anticyclones into the Mediterranean and the Maltese Islands during the normally unsettled Winter months. In fact, this Winter with just 76.8mm of precipitation recorded between December and February was among the driest ever recorded. Only 3 days in January were relatively cold whilst most of the Winter days were unusually warm with a peak temperature of 23.6°C in February being more typical of the Spring months. Below was the typical pressure configuration of Winter.

Figure 1: Typical 500mb chart observed last Winter

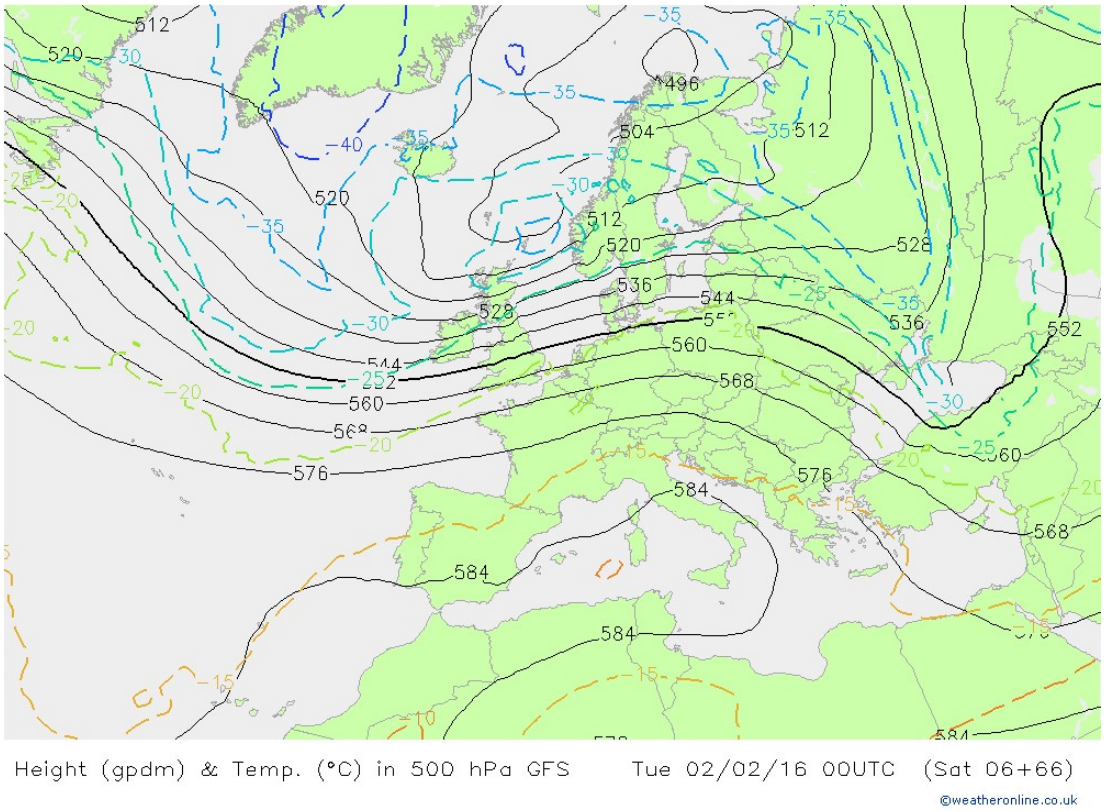
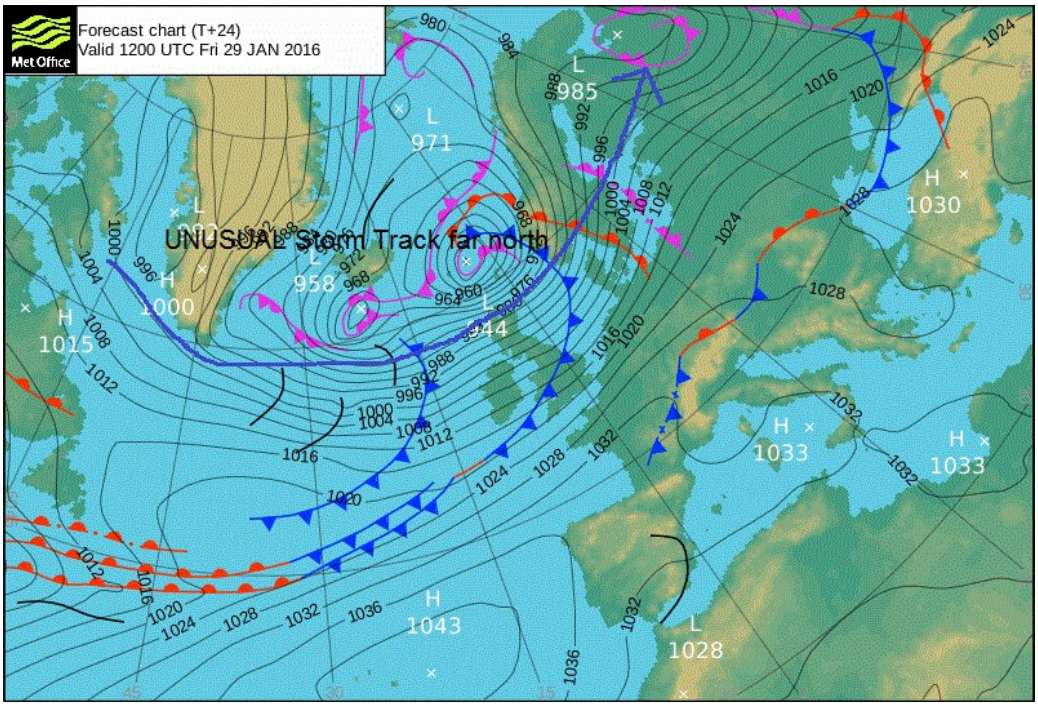


Figure 2: Sea-level pressure observed last Winter (typical of a positive NAO)



All this influenced our cloud forecast as follow:

1) Increase in the accuracy rate for Autumn more noticeably in September and October. Despite, October containing several rain events (in fact October was the wettest month for that year with more than 80mm of precipitation being recorded), there was lack of synoptic features. The still warm sea and lack of prevailing wind (except from thunderstorm gusts) encouraged the formation of localized thunderstorms delivering heavy rainfall.

2) Marginal decrease in Winter accuracy forecast. This was mostly due to the unusual weather conditions taking place during that Winter – when maltaclouds forecasted an almost clear sky, local clouds had developed due to the prolongation of stable conditions. It might also have been the case that the previous Winter of 2014 had seen more of a persistent weather pattern. However, the difference in accuracy was insignificant from the previous rate at an overall reduction of just 0.75%.

3) Increase in Spring forecast accuracy was observed especially in April which saw an unusually high 80% accuracy rate despite normally being considered a transition month. However, April 2016 was very similar to a summer month in both lack of rainfall and persistence of high pressure system. On the other hand, at 58% accuracy rate for May was still rather low. This similar to the previous May reflected variable weather conditions as the season was transitioning to Summer.

4) Summer cloud forecast accuracy rate saw a decline from previous years down to 68.13% which strangely enough equaled that of Winter. This drop was due to the inability to forecast local cloud formations on land and low clouds. However, the biggest reason was a huge drop in June's cloud forecast accuracy rate by more than 13% from the previous year. June was an abnormally unsettled month with much more variability than usual. This variability culminated on a heavy thunderstorm that hit parts of Malta on the 24th producing a 27mm of rain in just an hour and making the month one of the wettest after 2007 and 2003.

Overall, the cloud forecast accuracy rate increased by 1.7% to 70.4%. As emphasized, weather conditions during the year contribute heavily to the accuracy rate as the more variable and extreme the weather conditions are, the more challenging it is to capture all the variables to forecast a particular cloud and not the other. In the meanwhile, maltaclouds invested more in better forecasting tools. It is also gaining increased experience in expecting the correct cloud species to form given certain weather conditions and atmospheric features.

Statistics and brief explanation of maltaclouds' "Cloud-type forecast" accuracy rate for the rainy season 2016-7:

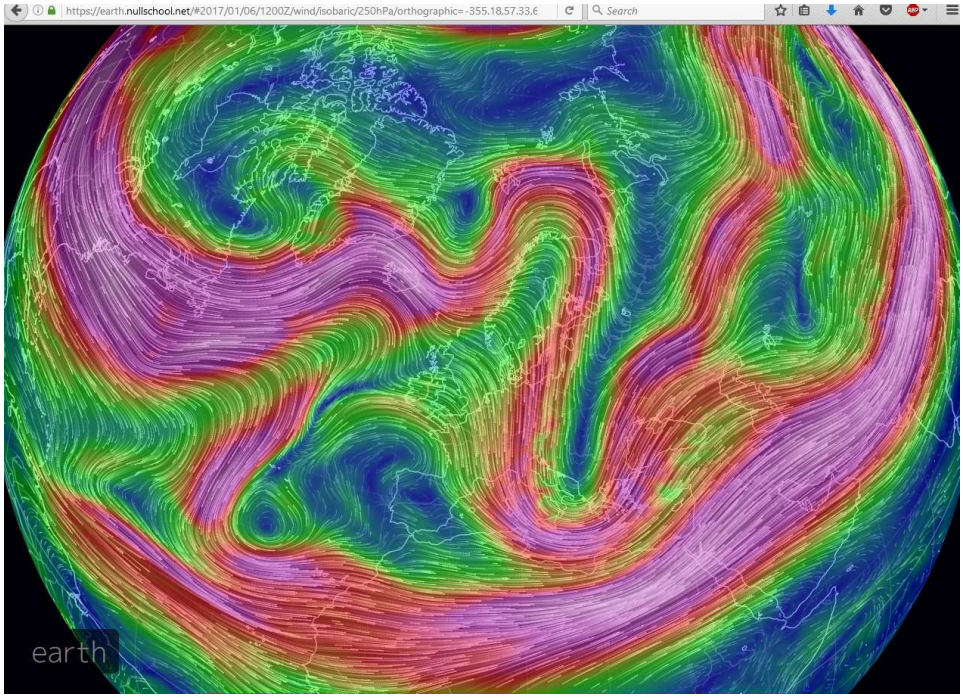
Accuracy Rate by Month and Season for the Year 2016/7				
Month	Season	Accuracy Rate		Change in Accuracy Rate from the previous year
Sept		82.76%		2.76%
Oct		70.00%		-7.42%
Nov		76.67%		6.67%
	Autumn		76.40%	0.58%
Dec		61.29%		-16.13%
Jan		80.65%		19.36%
Feb		67.86%		2.34%
	Winter		70.00%	1.87%
Mar		74.19%		3.22%
Apr		80.00%		0.00%
May		54.84%		-3.22%
	Spring		69.57%	0.00%
Jun		73.33%		16.66%
Jul		83.87%		6.45%
Aug		67.74%		-2.26%
	Summer		75.00%	6.87%
	Annually		**72.77%**	2.37%

The above picture shows that the cloud forecast of maltaclouds.net increased its accuracy rate for the second year running with an even bigger margin of 2.37% when compared to the previous year. This is a very encouraging improvement in cloud forecasting more so when compared against the 67.69% cloud forecast accuracy rate recorded in 2014 when cloud observations started being professionally recorded and compared against the day's cloud forecast.

This year experienced a lack of heavy autumnal thunderstorms early in Autumn mostly due to last year's Summer being cooler and more unsettled than usual leaving less thermal energy in the surrounding waters than normal to fuel incoming atmospheric disturbances. This resulted in a very high accuracy rate for September and an overall improvement in Autumnal cloud forecast given the relative lack of hit or miss thunderstorms which usually decrease this forecast's accuracy markedly. However, October still displayed some variability in the weather.

A very long cold spell dominated the weather in January. This led to a very high accuracy rate for the month meaning that the cloud forecast accuracy rate is much more related with the persistence of a particular weather pattern including prolonged periods of static high or low pressure systems rather than just the normally settled Summer months. Of course, December was the transition between Autumn and the upcoming cold spell.

Figure 1: An unusually far south undulating jet stream dragging very cold air from the north of Scandinavia towards the Maltese Islands



Figures 2 and 3: The visible satellite image and the corresponding weather sounding respectively

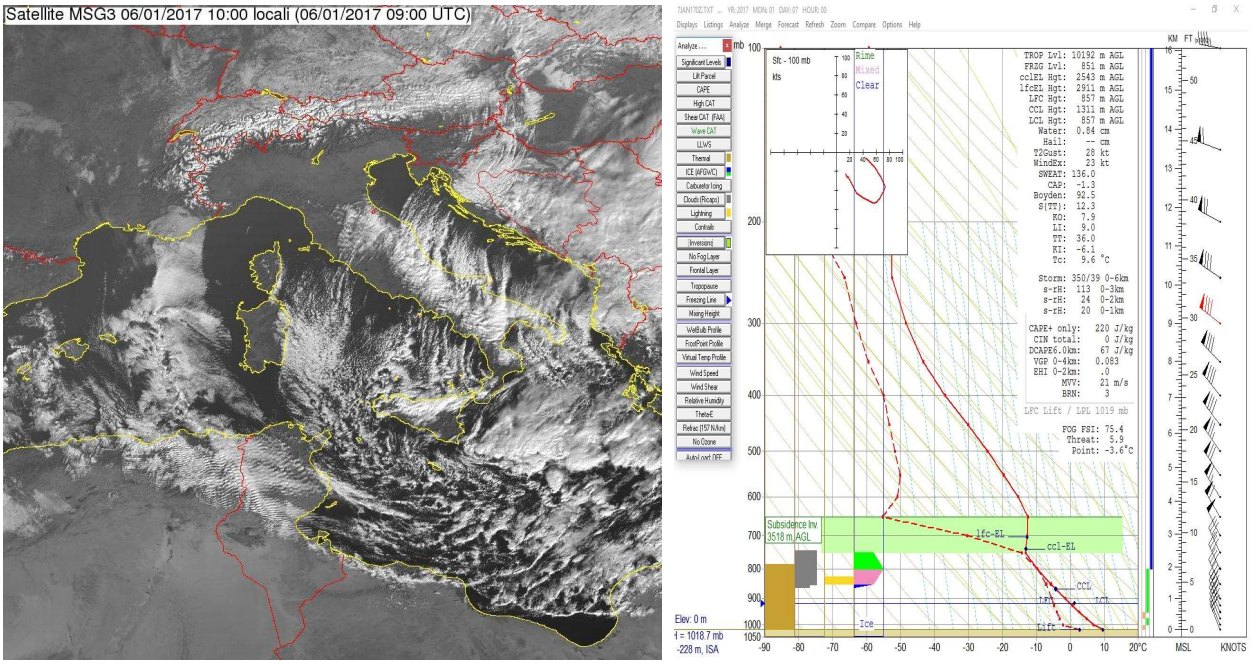
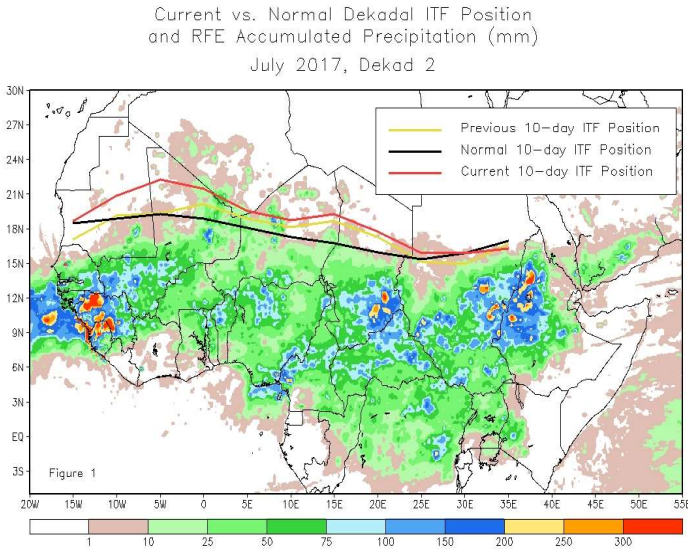
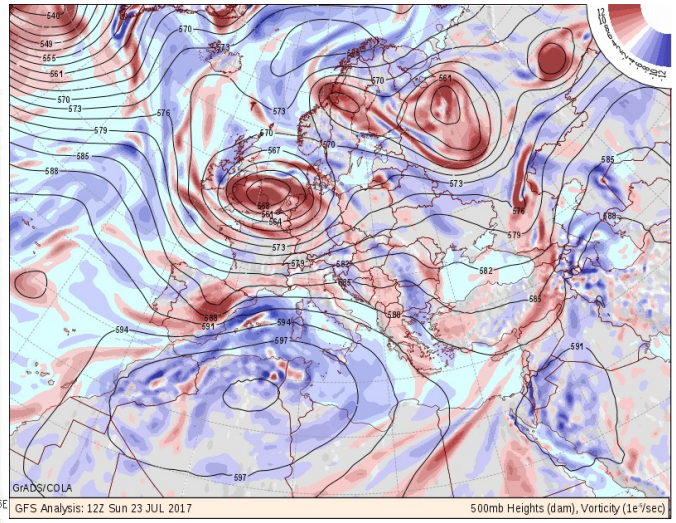


Figure 2 shows a particular weather phenomena known as the lake-effect cumulus clouds. This happens when a very cold and dry airmass moves over a warm body of water which heats and humidifies the air just above it thus becoming unstable at the surface whilst retaining its original features at upper-levels. A low pressure system was unable to form over the warm Mediterranean waters as usually happens in this instance as the upper trough was to the east over the Balkans. In this case, the static feauture led to a high cloud forecast accuracy as the only clouds that formed were cumulus and stratocumulus producing some ice pellet showers at times. Cumulonimbus clouds were inhibited by an inversion at an altitude of about 3.5km disallowing the rising warm air bubbles to reach much altitude.

Summer 2017 was the third hottest Summer on record after that of 2003 and 2012. This was due to an unusually elevated ITCZ pushing the North African anticyclone unusually far north towards the Maltese Islands. In early August, this produced the longest heatwave ever recorded in the Maltese Islands lasting for a total of 10 days with MAX temperature above 35C daily and high humidity.

Figures 4 and 5: A much higher position of the ITCZ than usual and the resultant upper-level ridge

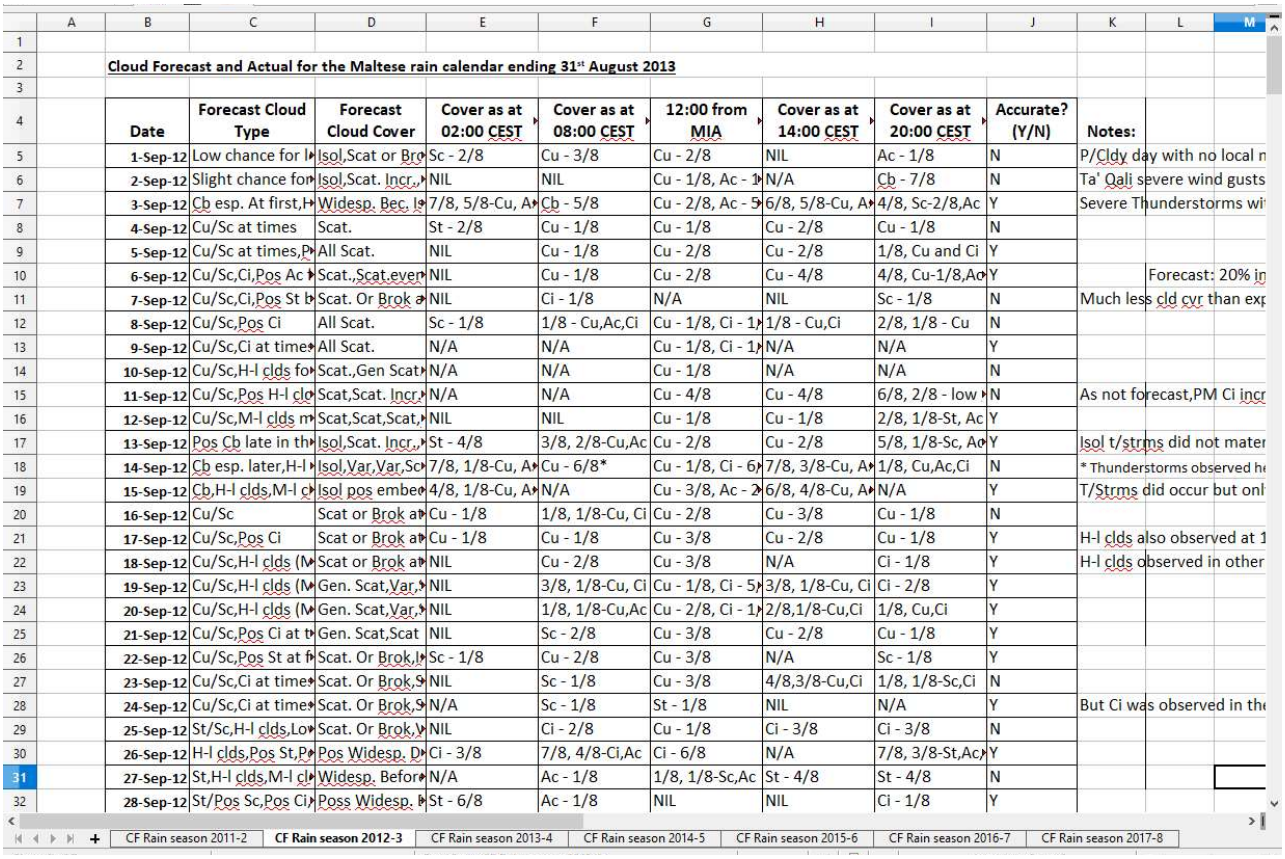




This led to a 75% cloud forecast accuracy for the Summer which is almost a 7% improvement from last year. However, it must be pointed out that the accuracy rate for Summer 2016 was relatively low due to more unsettled weather conditions in otherwise endless sunny days despite the Azores High being stronger than usual for that Summer.

Overall, cloud forecasting remains the least accurate during months of seasonal or weather transition (Sept, Dec, March and June but not only). It is important to note that the continually increasing cloud forecast accuracy rate is occurring in the background of increased technology to forecast the weather such as new weather charts. Maltaclouds is also gaining more experience and knowhow in this niche area of meteorology as years go by leading to improved cloud forecasting hence also contributing to the accuracy rate.

Below is a sample on how cloud forecasts and actual cloud data is collated into an excel sheet document.



Cloud Forecast and Actual for the Maltese rain calendar ending 31st August 2013

Date	Forecast Cloud Type	Forecast Cloud Cover	Cover at 02:00 CEST	Cover at 08:00 CEST	12:00 from MIA	Cover at 14:00 CEST	Cover at 20:00 CEST	Accurate? (Y/N)	Notes:
1-Sep-12	Low chance for I	Isol,Scat or Bro	Sc - 2/8	Cu - 3/8	Cu - 2/8	NIL	Ac - 1/8	N	P/Cldy day with no local r
2-Sep-12	Slight chance for	Isol,Scat. Incr.,	NIL	NIL	Cu - 1/8, Ac - 1	N/A	Cb - 7/8	N	Ta' Qali severe wind gusts
3-Sep-12	Cb esp. At first,H	Widesp. Bec. Is	7/8, 5/8-Cu, A	Cb - 5/8	Cu - 2/8, Ac - 5	6/8, 5/8-Cu, A	4/8, Sc-2/8,Ac	Y	Severe Thunderstorms wi
4-Sep-12	Cu/Sc at times	Scat.	St - 2/8	Cu - 1/8	Cu - 1/8	Cu - 2/8	Cu - 1/8	N	
5-Sep-12	Cu/Sc at times,P	All Scat.	NIL	Cu - 1/8	Cu - 2/8	Cu - 2/8	1/8, Cu and Ci	Y	
6-Sep-12	Cu/Sc,Ci,Pos Ac	Scat.,Scat.ever	NIL	Cu - 1/8	Cu - 2/8	Cu - 4/8	4/8, Cu-1/8,Ac	Y	Forecast: 20% in
7-Sep-12	Cu/Sc,Ci,Pos St b	Scat. Or Brok a	NIL	Ci - 1/8	N/A	NIL	Sc - 1/8	N	Much less cld cvr than exp
8-Sep-12	Cu/Sc,Pos Ci	All Scat.	Sc - 1/8	1/8 - Cu,Ac,Ci	Cu - 1/8, Ci - 1	1/8 - Cu,Ci	2/8, 1/8 - Cu	N	
9-Sep-12	Cu/Sc,Ci at time	All Scat.	N/A	N/A	Cu - 1/8, Ci - 1	N/A	N/A	Y	
10-Sep-12	Cu/Sc,H-l clds fo	Scat.,Gen Scat	N/A	N/A	Cu - 1/8	N/A	N/A	N	
11-Sep-12	Cu/Sc,Pos H-l clo	Scat,Scat. Incr,	N/A	N/A	Cu - 4/8	Cu - 4/8	6/8, 2/8 - low	N	As not forecast,PM Ci incr
12-Sep-12	Cu/Sc,M-l clds m	Scat,Scat,Scat,	NIL	NIL	Cu - 1/8	Cu - 1/8	2/8, 1/8-St, Ac	Y	
13-Sep-12	Pos Cb late in th	Isol,Scat. Incr.,	St - 4/8	3/8, 2/8-Cu,Ac	Cu - 2/8	Cu - 2/8	5/8, 1/8-Sc, Ac	Y	Isol t/strms did not mater
14-Sep-12	Cb esp. later,H-l	Isol,Var,Var,Sc	7/8, 1/8-Cu, A	Cu - 6/8*	Cu - 1/8, Ci - 6	7/8, 3/8-Cu, A	1/8, Cu,Ac,Ci	N	* Thunderstorms observed he
15-Sep-12	Cb,H-l clds,M-l c	Isol pos embe	4/8, 1/8-Cu, A	N/A	Cu - 3/8, Ac - 2	6/8, 4/8-Cu, A	N/A	Y	T/Strms did occur but onl
16-Sep-12	Cu/Sc	Scat or Brok a	Cu - 1/8	1/8, 1/8-Cu, Ci	Cu - 2/8	Cu - 3/8	Cu - 1/8	N	
17-Sep-12	Cu/Sc,Pos Ci	Scat or Brok a	Cu - 1/8	Cu - 1/8	Cu - 3/8	Cu - 2/8	Cu - 1/8	Y	H-l clds also observed at 1
18-Sep-12	Cu/Sc,H-l clds (M	Scat or Brok a	NIL	Cu - 2/8	Cu - 3/8	N/A	Ci - 1/8	Y	H-l clds observed in other
19-Sep-12	Cu/Sc,H-l clds (M	Gen. Scat,Var,	NIL	3/8, 1/8-Cu, Ci	Cu - 1/8, Ci - 5	3/8, 1/8-Cu, Ci	Ci - 2/8	Y	
20-Sep-12	Cu/Sc,H-l clds (M	Gen. Scat,Var,	NIL	1/8, 1/8-Cu,Ac	Cu - 2/8, Ci - 1	2/8,1/8-Cu,Ci	1/8, Cu,Ci	Y	
21-Sep-12	Cu/Sc,Pos Ci at t	Gen. Scat,Scat	NIL	Sc - 2/8	Cu - 3/8	Cu - 2/8	Cu - 1/8	Y	
22-Sep-12	Cu/Sc,Pos St at f	Scat. Or Brok,	Sc - 1/8	Cu - 2/8	Cu - 3/8	N/A	Sc - 1/8	Y	
23-Sep-12	Cu/Sc,Ci at time	Scat. Or Brok,	NIL	Sc - 1/8	Cu - 3/8	4/8,3/8-Cu,Ci	1/8, 1/8-Sc,Ci	N	
24-Sep-12	Cu/Sc,Ci at time	Scat. Or Brok,	N/A	Sc - 1/8	St - 1/8	NIL	N/A	Y	But Ci was observed in the
25-Sep-12	St/Sc,H-l clds,Lo	Scat. Or Brok,	NIL	Ci - 2/8	Cu - 1/8	Ci - 3/8	Ci - 3/8	N	
26-Sep-12	H-l clds,Pos St,P	Pos Widesp. D	Ci - 3/8	7/8, 4/8-Ci,Ac	Ci - 6/8	N/A	7/8, 3/8-St,Ac	Y	
27-Sep-12	St,H-l clds,M-l cl	Widesp. Befor	N/A	Ac - 1/8	1/8, 1/8-Sc,Ac	St - 4/8	St - 4/8	N	
28-Sep-12	St/Pos Sc,Pos Ci	Poss Widesp.	St - 6/8	Ac - 1/8	NIL	NIL	Ci - 1/8	Y	

CF Rain season 2011-2 | **CF Rain season 2012-3** | CF Rain season 2013-4 | CF Rain season 2014-5 | CF Rain season 2015-6 | CF Rain season 2016-7 | CF Rain season 2017-8

Actual cloud data would be sold at € 0.50c per actual cloud cell. For example a day's cloud data would be sold at € 2.50c. Kindly note that some cloud data (less than 10%) is missing due to technical issues. Actual cloud observations around the Maltese Islands are recorded 5 times a day at 00:00, 06:00, 10:00, 12:00 and 18:00 GMT.

Statistics and brief explanation of maltaclouds' "Cloud-type forecast" accuracy rate for the rainy season 2017-8:

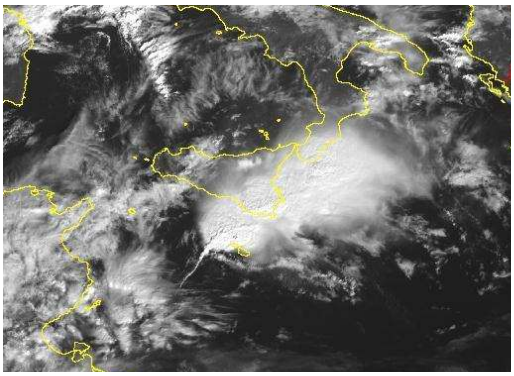
Accuracy Rate by Month and Season for the Year 2017/8				
Month	Season	Accuracy Rate		Change in Accuracy Rate from the previous year
Sept		76.67%		-6.09%
Oct		70.97%		-0.97%
Nov		63.33%		-13.34%
	Autumn		70.33%	-6.07%
Dec		83.87%		22.58%
Jan		67.74%		-12.91%
Feb		70.37%		2.51%
	Winter		74.16%	4.16%
Mar		58.06%		-16.13%
Apr		66.67%		-13.33%
May		64.52%		9.68%
	Spring		63.04%	-6.53%
Jun		63.33%		-10.00%
Jul		70.00%		-13.87%
Aug		87.10%		19.36%
	Summer		73.63%	-1.37%
	Annually		**70.22%**	-2.55%

The above screen shot shows that maltaclouds' cloud forecast accuracy rate had decreased slightly from the previous year but still maintained the accuracy rate of previous years. This must also be compared against the 67.69% cloud forecast accuracy rate that was recorded in 2014 when cloud observations started being professionally recorded and compared against the day's cloud forecast.

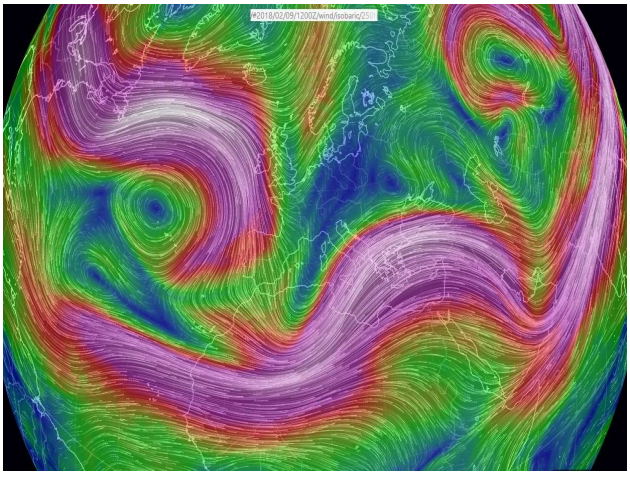
The following is a list of significant weather events that took place during the 2017-8 rainy season:

1) There was a general lack of severe thunderstorms during Autumn 2017 despite the previous Summer recording the longest heatwave ever to hit the Maltese Islands during August 2017 nick-named 'Lucifer' but which was relatively mild. There were only 2 rain and thunderstorm days in September followed by a very wet start to October from the 2nd till the 5th as a series of thunderstorms rising from Africa passed over our Islands but which none produced any severe

phenomena except for heavy rain. The rest of October was then dominated by the Azores High being pushed eastwards by the passage of hurricane 'Ophelia' over the Atlantic. November 2017 managed to produce one of the most colourful storms ever photographed as a Mesoscale Convective System brushed the Maltese Islands.



2) Winter 2018 was a mixed bag of affairs with one of the brightest Januaries on record followed by a drenching rain storm in February lasting for 16 hours between the 9th and the 10th Feb producing a total of 126.3mm. This was a very unusual rainfall being brought about by a cold airmass arriving from the south specifically from the western Sahara Desert and then contrasting with the warm Libyan Sea leading to the formation of active nimbostratus clouds as its moisture condensed into rain.



3) Nothing to write home about regarding Spring 2018. However, I managed to photograph very rare cloud formation in Malta below being the horse-shoe shaped cloud and altocumulus lacunosus respectively. These are explained in detail in their respective cloud gallery.

4) As was expected in the seasonal forecast, Summer 2018, that is the period between 1st June and 31st August, was mild and unusually stormy with a total of 9 thunderstorm days and 65.4mm of precipitation, all values being way above average. Furthermore, the highest temperature during that period was just 35.7°C recorded on the 13th July which was unusually mild for a Maltese Summer. This humid Summer resulted in some grape rot in an otherwise good season vide this article https://www.timesofmalta.com/articles/view/20180830/local/wine-harvest-up-after-lifesaving-february-rains.687950 . This Summer was the result of a very persistent high pressure in Northern Europe leaving the Maltese Islands quite unstable at times with the Azores and North African anticyclones unable to take dominance for most of the Summer.

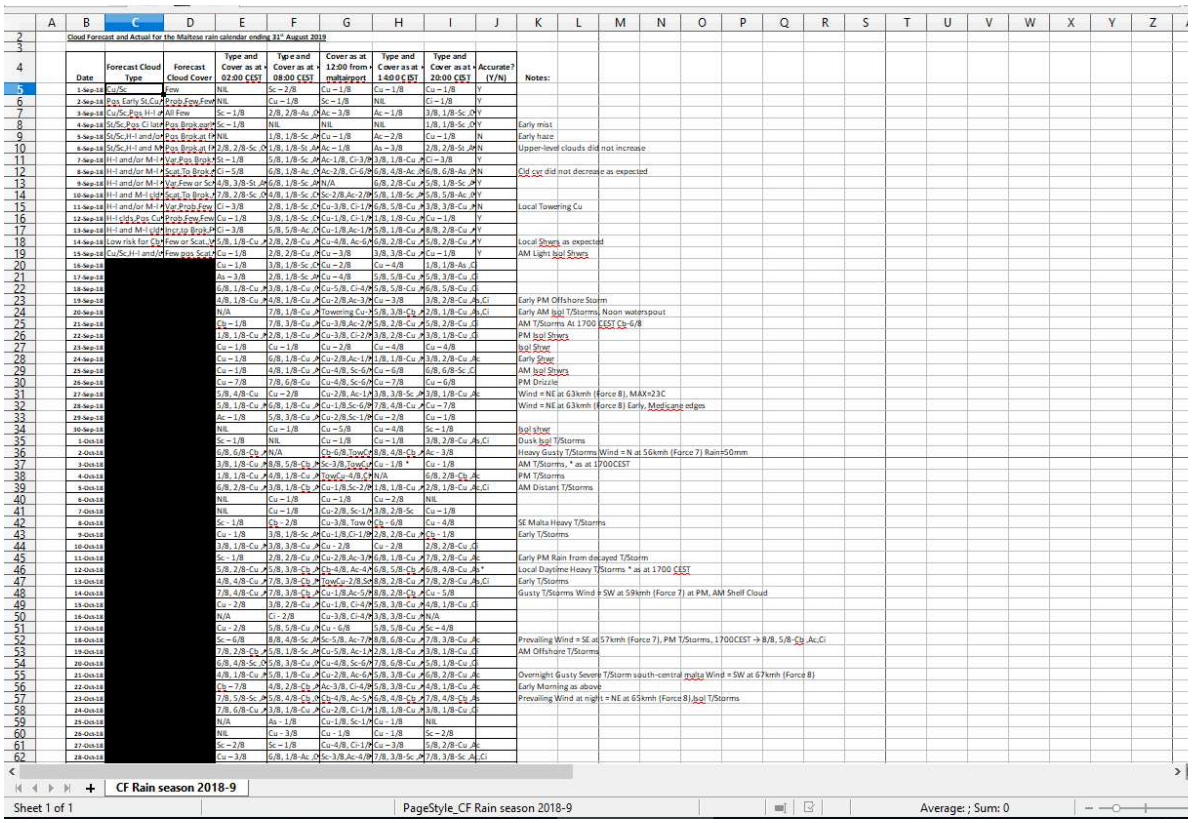
These weather events in highlight effected the cloud forecast markedly. Due to a generally settled December, this led to an unusually high accuracy of 83.87% as the month had an Azores anticyclone dominance. Cloud forecast accuracy for Winter was slightly better than Summer. This may come as a surprise considering Malta's normally monotonous fine weather. However, the rainy season under analysis produced Winter days which were quite stable whilst the opposite was true for Summer as the latter was dominated by changing weather conditions

producing clouds of bad weather as well as stratus at times as the ground remained damp. However, August 2018 still had a very accuracy rate and this perhaps to better handling of the weather conditions as the same thunderstorm clouds had formed under persistent weather conditions. As usual cloud forecasting is the least accurate in Spring and Autumn due to the many changes in weather parameters that take place during these transition seasons.

As said for last year, actual cloud data would be sold at € 0.50c per actual cloud cell. For example a day's cloud data would be sold at € 2.50c. Kindly note that some cloud data (less than 10%) is missing due to technical issues. Actual cloud observations around the Maltese Islands are recorded 5 times a day at 00:00, 06:00, 10:00, 12:00 and 18:00 GMT. Kindly contact me at c.caruana@maltaclouds.net for cloud date purchase.

A Maltaclouds perspective look-back at the main weather events of the rainy season 2018-9:

Cloud forecast accuracy analysis for this season is unavailable since maltaclouds was undergoing a major revamp process. However, cloud data was still kept as usual throughout the rainy season. Cloud forecast analysis will resume as from November 2019 following the re-launch of maltaclouds.



Cloud Forecast and Actual for the Maltese rain calendar ending 31st August 2019

Date	Forecast Cloud Type	Forecast Cloud Cover	Type and Cover as at 02:00 CEST	Type and Cover as at 08:00 CEST	Cover as at 12:00 from maltairport	Type and Cover as at 14:00 CEST	Type and Cover as at 20:00 CEST	Accurate? (Y/N)	Notes:
1-Sep-18	Cu/Sc	Few	NIL	Sc – 2/8	Cu – 1/8	Cu – 1/8	Cu – 1/8	Y	
2-Sep-18	Pos. Early St,Cu	Prob.Few,Few	NIL	Cu – 1/8	Sc – 1/8	NIL	Ci – 1/8	Y	
3-Sep-18	Cu/Sc,Pos Hi-l	All Few	Sc – 1/8	2/8, 2/8-As ,Ci	Ac – 3/8	Ac – 1/8	3/8, 1/8-Sc ,Ci	Y	
4-Sep-18	St/Sc,Pos Ci late	Pos.Brok.early	Sc – 1/8	NIL	NIL	NIL	1/8, 1/8-Sc ,Ci	Y	Early mist
5-Sep-18	St/Sc,Hi and/or	Pos.Brok.at fi	NIL	1/8, 1/8-Sc ,Ac	Cu – 1/8	Ac –2/8	Cu – 1/8	N	Early haze
6-Sep-18	St/Sc,Hi and M	Pos.Brok.at fi	2/8, 2/8-Sc ,Ci	1/8, 1/8-Sc ,Ac	Ac – 1/8	Ac – 3/8	2/8, 2/8-Sc ,Ac	N	Upper-level clouds did not increase
7-Sep-18	Hi and/or M-l	Var.Pos.Brok.a	St – 1/8	5/8, 1/8-Sc ,Ac	Ac-1/8, Ci-3/8	3/8, 1/8-Cu ,Ac	Ci – 3/8	Y	
8-Sep-18	Hi and/or M-l	Scat.To Brok.a	Ci – 5/8	6/8, 1/8-Ac ,Ci	Ac-2/8, Ci-6/8	6/8, 4/8-Ac ,Ci	6/8, 6/8-As ,Ac	N	Cid cvr did not decrease as expected
9-Sep-18	Hi and/or M-l	Var.Few or Sc	4/8, 3/8-St ,Ac	6/8, 1/8-Sc ,Ac	N/A	6/8, 2/8-Cu ,Ac	5/8, 1/8-Sc ,Ac	Y	
10-Sep-18	Hi and M-l cld	Scat.To Brok.a	7/8, 2/8-Sc ,Ci	4/8, 1/8-Sc ,Ci	Sc-2/8,Ac-2/8	5/8, 1/8-Sc ,Ac	5/8, 5/8-Ac ,Ci	Y	
11-Sep-18	Hi and/or M-l	Var.Prob.Few	Ci – 3/8	2/8, 1/8-Sc ,Ci	Cu-3/8, Ci-1/8	6/8, 5/8-Cu ,Ac	3/8, 3/8-Cu ,Ac	N	Local Towering Cu
12-Sep-18	Hi cld's,Pos.Cu	Prob.Few,Few	Cu – 1/8	3/8, 1/8-Sc ,Ci	Cu-1/8, Ci-1/8	3/8, 1/8-Cu ,Ac	Cu – 1/8	Y	
13-Sep-18	Hi and M-l cld	Var.to Brok.a	Ci – 3/8	5/8, 5/8-Ac ,Ci	Cu-1/8,Ac-1/8	5/8, 1/8-Cu ,Ac	8/8, 2/8-Cu ,Ac	Y	
14-Sep-18	Low risk for Cb	Few or Scat.,V	5/8, 1/8-Cu ,Ac	2/8, 2/8-Cu ,Ac	Cu-4/8, Ac-6/8	6/8, 2/8-Cu ,Ac	5/8, 2/8-Cu ,Ac	Y	Local Showrs as expected
15-Sep-18	Cu/Sc,Hi and/or	Few.pos.Scat.V	Cu – 1/8	2/8, 2/8-Cu ,Ac	Cu – 3/8	3/8, 3/8-Cu ,Ac	Cu – 1/8	Y	AM Light isol Showrs
16-Sep-18			Cu – 1/8	3/8, 1/8-Sc ,Ci	Cu – 2/8	Cu – 4/8	1/8, 1/8-As ,Ci		
17-Sep-18			As – 3/8	2/8, 1/8-Sc ,Ac	Cu – 4/8	5/8, 5/8-Cu ,Ac	5/8, 3/8-Cu ,Ci		
18-Sep-18			6/8, 1/8-Cu ,Ac	3/8, 1/8-Cu ,Ac	Cu-5/8, Ci-4/8	5/8, 5/8-Cu ,Ac	6/8, 5/8-Cu ,Ci		
19-Sep-18			4/8, 1/8-Cu ,Ac	4/8, 1/8-Cu ,Ac	Cu-2/8,Ac-3/8	Cu – 3/8	3/8, 2/8-Cu ,As,Ci		Early PM Offshore Storm
20-Sep-18			N/A	7/8, 1/8-Cu ,Ac	Towering Cu-	5/8, 3/8-Cb ,Ac	2/8, 1/8-Cu ,As,Ci		Early AM isol T/Storms, Noon waterspout
21-Sep-18			Cb – 1/8	7/8, 3/8-Cu ,Ac	Cu-3/8,Ac-2/8	5/8, 2/8-Cu ,Ci	5/8, 2/8-Cu ,Ci		AM T/Storms At 1700 CEST Cb-6/8
22-Sep-18			1/8, 1/8-Cu ,Ac	2/8, 1/8-Cu ,Ac	Cu-3/8, Ci-2/8	3/8, 2/8-Cu ,Ci	3/8, 1/8-Cu ,Ci		PM isol Showrs
23-Sep-18			Cu – 1/8	Cu – 1/8	Cu – 2/8	Cu – 4/8	Cu – 4/8		isol Showr
24-Sep-18			Cu – 1/8	6/8, 1/8-Cu ,Ac	Cu-2/8,Ac-1/8	1/8, 1/8-Cu ,Ac	3/8, 2/8-Cu ,Ac		Early Showr
25-Sep-18			Cu – 1/8	4/8, 1/8-Cu ,Ac	Cu-4/8, Sc-6/8	Cu – 6/8	6/8, 6/8-Sc ,Ci		AM isol Showrs
26-Sep-18			Cu – 7/8	7/8, 6/8-Cu	Cu-4/8, Sc-6/8	Cu – 7/8	Cu – 6/8		PM Drizzle
27-Sep-18			5/8, 4/8-Cu	Cu – 2/8	Cu-2/8, Ac-1/8	3/8, 3/8-Sc ,Ac	3/8, 1/8-Cu ,Ac		Wind = NE at 63kmh (Force 8), MAX=23C
28-Sep-18			5/8, 1/8-Cu ,Ac	6/8, 1/8-Cu ,Ac	Cu-1/8,Sc-6/8	7/8, 4/8-Cu ,Ac	Cu – 7/8		Wind = NE at 63kmh (Force 8) Early, Medscape edges
29-Sep-18			Ac – 1/8	5/8, 3/8-Cu ,Ac	Cu-2/8,Sc-1/8	Cu – 2/8	Cu – 1/8		
30-Sep-18			NIL	Cu – 1/8	Cu – 5/8	Cu – 4/8	Sc – 1/8		Isol shwr
1-Oct-18			Sc – 1/8	NIL	Cu – 1/8	Cu – 1/8	3/8, 2/8-Cu ,As,Ci		Dusk Isol T/Storms
2-Oct-18			6/8, 6/8-Cb ,Ac	N/A	Cb-6/8,TowCu	8/8, 4/8-Cb ,Ac	Ac - 3/8		Heavy Gusty T/Storms Wind = N at 56kmh (Force 7) Rain=50mm
3-Oct-18			3/8, 1/8-Cu ,Ac	8/8, 5/8-Cb ,Ac	Sc-3/8,TowCu	Cu - 1/8 *	Cu - 1/8		AM T/Storms, * as at 1700CEST
4-Oct-18			1/8, 1/8-Cu ,Ac	4/8, 1/8-Cu ,Ac	TowCu-4/8,Cb	N/A	6/8, 2/8-Cb ,Ac		PM T/Storms
5-Oct-18			6/8, 2/8-Cu ,Ac	3/8, 1/8-Cb ,Ac	Cu-1/8,Sc-2/8	1/8, 1/8-Cu ,Ac	2/8, 1/8-Cu ,Ac,Ci		AM Distant T/Storms
6-Oct-18			NIL	Cu – 1/8	Cu – 1/8	Cu – 2/8	NIL		
7-Oct-18			NIL	Cu – 1/8	Cu-2/8, Sc-1/8	3/8, 2/8-Sc	Cu – 1/8		
8-Oct-18			Sc - 1/8	Cb - 2/8	Cu-3/8, Tow.Cb	Cb - 6/8	Cu - 4/8		SE Malta Heavy T/Storms
9-Oct-18			Cu - 1/8	3/8, 1/8-Sc ,Ac	Cu-1/8,Ci-1/8	2/8, 2/8-Cu ,Ac	Cb - 1/8		Early T/Storms
10-Oct-18			3/8, 1/8-Cu ,Ac	3/8, 3/8-Cu ,Ac	Cu - 2/8	Cu - 2/8	2/8, 2/8-Cu ,Ci		
11-Oct-18			Sc - 1/8	2/8, 2/8-Cu ,Ac	Cu-2/8,Ac-3/8	6/8, 1/8-Cu ,Ac	7/8, 2/8-Cu ,Ac		Early PM Rain from delayed T/Storm
12-Oct-18			5/8, 2/8-Cu ,Ac	5/8, 3/8-Cb ,Ac	Cb-4/8, Ac-4/8	6/8, 5/8-Cb ,Ac	6/8, 4/8-Cu ,Ac	*	Local Daytime Heavy T/Storms * as at 1700 CEST
13-Oct-18			6/8, 4/8-Cu ,Ac	3/8, 3/8-Cb ,Ac	TowCu-2/8,Sc	8/8, 3/8-Cb ,Ac	2/8, 2/8-Cu ,Ac,Ci		Early T/Storms
14-Oct-18			7/8, 4/8-Cu ,Ac	7/8, 3/8-Cb ,Ac	Cu-1/8,Ac-5/8	8/8, 2/8-Cb ,Ac	Cu - 5/8		Gusty T/Storms Wind = SW at 59kmh (Force 7) at PM, AM Shelf Cloud
15-Oct-18			Cu - 2/8	3/8, 2/8-Cu ,Ac	Cu-1/8, Ci-4/8	5/8, 3/8-Cu ,Ac	4/8, 1/8-Cu ,Ci		
16-Oct-18			N/A	Ci - 2/8	Cu-3/8, Ci-4/8	3/8, 3/8-Cu ,Ac	N/A		
17-Oct-18			Cu - 2/8	5/8, 5/8-Cu ,Ac	Cu - 6/8	5/8, 5/8-Cu ,Ac	Sc – 4/8		
18-Oct-18			Sc – 6/8	8/8, 4/8-Sc ,Ac	Sc-5/8, Ac-7/8	8/8, 6/8-Cu ,Ac	7/8, 3/8-Cu ,Ac		Prevailing Wind = SE at 57kmh (Force 7), PM T/Storms, 1700CEST → 8/8, 5/8-Cb ,Ac,Ci
19-Oct-18			7/8, 2/8-Cb ,Ac	5/8, 1/8-Sc ,Ac	Cu-5/8, Ac-1/8	2/8, 1/8-Cu ,Ci	3/8, 1/8-Cu ,Ci		AM Offshore T/Storms
20-Oct-18			6/8, 4/8-Sc ,Ci	5/8, 3/8-Cu ,Ac	Cu-4/8, Sc-6/8	7/8, 6/8-Cu ,Ac	5/8, 1/8-Cu ,Ci		
21-Oct-18			4/8, 1/8-Cu ,Ac	5/8, 1/8-Cu ,Ac	Cu-2/8, Ac-6/8	5/8, 3/8-Cu ,Ac	6/8, 2/8-Cu ,Ac		Overnight Gusty Severe T/Storm south-central malta Wind = SW at 67kmh (Force 8)
22-Oct-18			Cb – 7/8	4/8, 2/8-Cb ,Ac	Ac-3/8, Ci-4/8	5/8, 3/8-Cu ,Ac	4/8, 1/8-Cu ,Ac		Early Morning as above
23-Oct-18			7/8, 5/8-Sc ,Ac	5/8, 4/8-Cb ,Ac	Cb-4/8, Ac-5/8	6/8, 4/8-Cb ,Ac	7/8, 4/8-Cb ,As		Prevailing Wind at night = NE at 65kmh (Force 8) Isol T/Storms
24-Oct-18			7/8, 6/8-Cu ,Ac	3/8, 1/8-Cu ,Ac	Cu-2/8, Ci-1/8	1/8, 1/8-Cu ,Ac	3/8, 1/8-Cu ,Ci		
25-Oct-18			N/A	As - 1/8	Cu-1/8, Sc-1/8	Cu - 1/8	NIL		
26-Oct-18			NIL	Cu - 3/8	Cu - 1/8	Cu - 1/8	Sc – 2/8		
27-Oct-18			Sc – 2/8	Sc – 1/8	Cu-4/8, Ci-1/8	Cu – 3/8	5/8, 2/8-Cu ,Ac		
28-Oct-18			Cu – 3/8	6/8, 1/8-Ac ,Ci	Sc-3/8,Ac-4/8	7/8, 3/8-Sc ,Ac	7/8, 3/8-Sc ,Ac,Ci		

CF Rain season 2018-9

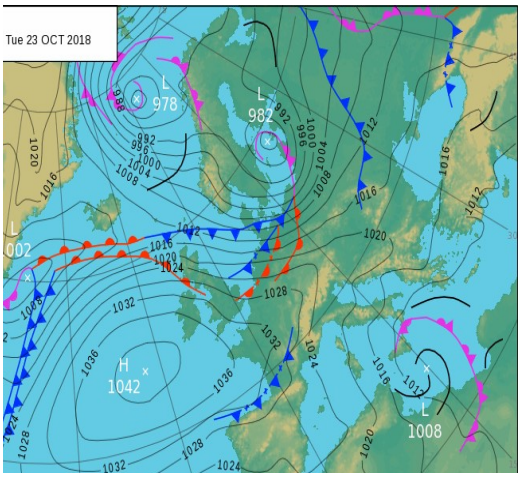
Sheet 1 of 1 | PageStyle_CF Rain season 2018-9 | Average: ; Sum: 0

The following is a list of significant weather events that took place during the 2018-9 rainy season:

1) October 2018 broke records for being the stormiest month ever recorded over the Maltese Islands with 16 thunderstorm days. This followed 2018's trend of being one of the stormiest years on record with thunderstorms even observed during the Summer months of June and August! The previous record was held by both October 1962 and November 1986 with 12 thundery days. The month was also much wetter than normal with 188mm of precipitation. However, this came no close to beating the old rainfall record of 476.5mm measured in October 1951. October's record storminess was the result of plentiful low pressure systems working their way towards the Mediterranean being diverted southwards due to a blocking anticyclone to the north. However, none of the many observed thunderstorms were severe.

File photo

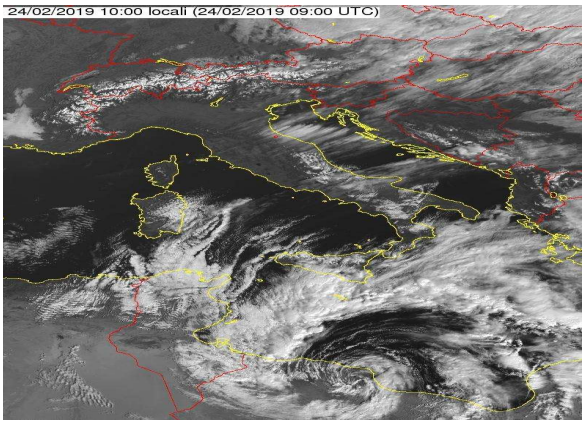
2) It was no surprise that many parts of Malta were flooded by early November following a very wet October and coupled by an unusually stormy 2018 summer. This photo shows a heavily flooded field in Ta' Qali following a stalled localized heavy thunderstorm which deposited over 100mm in nearby Mosta whilst leaving parts of Malta high and dry. Despite a dry start to Autumn (September), the season went on to be wetter than normal.



3) In late December 2018, a major Etna eruption along with NE winds aloft resulted in ash reaching the Maltese Islands. Though mount Etna is a very active volcano, it is rare for ash to reach the Malta as this requires the perfect conditions being of course an ash-type eruption, not the Hawaii type, and upper-level winds from the NE which are rare given that mid-latitude airmasses flow from west to east.

4) A dramatic formation of altocumulus stratiformis mammatus clouds at sunset was observed in early February 2019 linked with a warm recall just before the start of a cold period. No thunderstorms were observed. For further details, kindly click here.

5) Overall, Winter 2019 was colder than normal particularly January which recorded an average temperature of more than 1^{o}C below average. The highlight of Winter was reached on the 23rd and 24th February 2019 when a very cold airmass from the Balkans descended over the Central Mediterranean producing that Winter's lowest temperature of 3.7^{o}C recorded on the evening of the 23rd. This resulted in a very rare form of precipitation when snow pellets fell over the Maltese Islands. This was then immediately followed by the rapid formation of a cold-core Mediterranean cyclone which resulted in the longest gale duration ever recorded over the Maltese Islands. This extreme NE gale peaked at on the 23rd Feb at 4AM with a maximum wind gust of 133kmh (Force 12) and which lasted for a duration of 36 hours.



6) Colder weather conditions lingered on until the very end of May. In fact, May 2019 was one of the coldest ever recorded with an average monthly temperature of just 18.2°C being more than 1.5°C colder than the 2010 baseline. In fact, a rare waterspout or cold air funnel was observed on May 14th as an upper-level wintry cold airmass interacted with strong may sunshine. A cold May 2019 was then followed by the hottest June on record reaching an average temperature of 26.3°C, a whooping jump from the previous month and despite starting with the coolest weekend on record. Summer 2019 was then hotter than average. The weather situation in the latter half of this season was an undulating jet stream running from north to south instead of west to east bringing rapid swings in temperature more common for a continetal climate than a marine Mediterranean one. Also, July 2019 recorded rare rain shower and the observance of stratocumulus volotus cloud. The four pictures represent the months of May, May, July and July respectively.

These weather events in highlight would have certainly effected the cloud forecast. Overall, it was quite an active rainy season as depressions entered the Mediterranean frequently and continued to do so until very late in the season. In the future, such weather extremes are more likely as the jet stream becomes more and more undulating as the difference in temperature between the North Pole and the equator lessens partly due to melting sea ice.

Actual cloud data is being sold at € 0.50c per actual cloud cell. For example a day's cloud data would be sold at € 2.50c. Kindly note that some cloud data (less than 10%) is missing due to technical issues. Actual cloud observations around the Maltese Islands are recorded 5 times a day at 00:00, 06:00, 10:00, 12:00 and 18:00 GMT. Kindly contact me at c.caruana@maltaclouds.net for cloud date purchase.