

PWS International Products Consultation

Executive Summary

Although this was a fairly light touch consultation due to limited Secretariat resources, the evidence in this report is enough to be able to give some broad conclusions to the questions posed:

1. Are the current international services and products useful and relevant?
2. Do the services and products provide the required reach?
3. What priority is placed on the PWS international services?
4. What balance should be given between UK products and services and international products and services?
5. Should the international services evolve? If so, how?

Overall, it appears that the current set of international services and products are valued by the public and government, in that they are used and the feedback is positive. That international forecasts make up 2.2% of the total forecast use seems appropriate given the service is aimed at UK citizens when overseas, and given the correlation between popular sites and UK residents travel, it suggests that, in the main, it is the right set of products. But given this proportion of use, it does not present a strong argument for further PWS investment in international products, especially increasing the number of international forecast sites. However, the consultation did identify a few specific areas where the PWS international services could evolve, in particular that:

- Better use is made of Meteoalarm;
- The Global Incident Forecast service is made more operationally robust; and
- A coherent set of tropical cyclone forecast pages are included as PWS outputs rather than just the Hurricane Seasonal Forecast.

Summary of Recommendations

No.	Recommendation
1	The PWSCG maintain the current scope of the Global Site Forecast Service.
2	The PWSCG request the Met Office to provide more visible and accessible links to Meteoalarm on its international forecast web-pages.
3	The PWSCG to invite the Met Office to present proposals to a future meeting on how it will strengthen the existing Global Incident Forecast service.
4	The PWSCG consider the Met Office involvement in the Voluntary Cooperation Programme (VCP) as an international commitment, and request Secretariat to undertake an annual review of the activity.
5	The PWSCG request that the definition of the Global Long-range Outlook is updated to make it clear that it is part of the International Commitments of the PWS and that the requirements are set by the WMO.
6	The PWSCG invite the Met Office to present a proposal for a more coherent package of global tropical cyclone information, based on the existing pages, to become part of the PWS international outputs.

Introduction

The PWSCG requested the Secretariat to conduct a consultation into the range of PWS international outputs and services and to consider:

1. Are the current international services and products useful and relevant?
2. Do the services and products provide the required reach?
3. What priority is placed on the PWS international services?
4. What balance should be given between UK products and services and international products and services?
5. Should the international services evolve? If so, how?

Due to limitations in Secretariat resources part way through the year, this consultation has been conducted as primarily desk-based research and interviews with Met Office managers responsible for the services. Nevertheless, the recommendations contained within this consultation are based on a robust evidence base. Areas where more consultation may be required are highlighted in the report.

Summary of Current PWS International Services and Outputs

The aim of the PWS international products is to protect UK citizens abroad from the risk of severe weather impacts. Severe weather impacts overseas can be different from those experienced in the UK, and countries visited may lack the resilience infrastructure for warnings and response enjoyed in the UK, increasing the risk to UK citizens. The strategic choice for the PWS is whether to invest in providing a broad range of Met Office services to meet the needs of a proportionally small number of UK citizens or to encourage use of existing products provided by the international meteorological community. In practice, the optimum solution is likely to be a balance of both approaches.

The list of PWS International Services and Outputs considered in this consultation are outlined below. These are a combination of services directed towards the public and specifically for responsible government departments (FCO and DFID):

- Global Site Forecast Service
- Meteoalarm
- Global Incident Forecasts
- Global Pollution Response Service
- Support for local warning delivery
- Global Long-range Outlook
- Hurricane Season Forecasts

Global Site Forecast Service

What is the usage of the Global Site Forecast Service?

The Global Site Forecast Service consists of single site forecasts for 7500 international sites. The usual set of weather parameters are made available for these forecasts, at 3 hourly intervals for 5 days ahead. The single site forecasts are downscaled from Met Office best data, which for Europe is a regional model and for the rest of the world is the global Unified

Model. Thus the international forecasts compared to UK single site forecasts would likely be less accurate because:

- The resolution of the models used for downscaling are coarser;
- The model forecast is updated less frequently; and
- The Met Office may not have access to the detailed observations necessary to improve forecasts through statistical methods.

However, the automated production is efficient, requiring no manual intervention.

None of this seems to concern the public, who have shown an interest in using these sites. Table 1 shows the total visits to the location forecast pages for 2014 through the main (non-mobile) website for UK and International sites.

	Desktop (visits)	Mobile (visits)
UK Forecast Locations	65,467,225	12,416,650
International Forecast Locations	1,657,911	52,373

Table 1: Total desktop and mobile website visits to forecast location pages for 2014 for UK and International forecast locations.

Taking both channels together, International forecasts represent 2.2% of the total usage of site forecasts. Figure 1 shows the top viewed international locations through the website for 2014. It can be seen that popular European holiday destinations dominate and these are consistent with the Office for National Statistics survey of countries visited by UK residents shown in Figure 2.

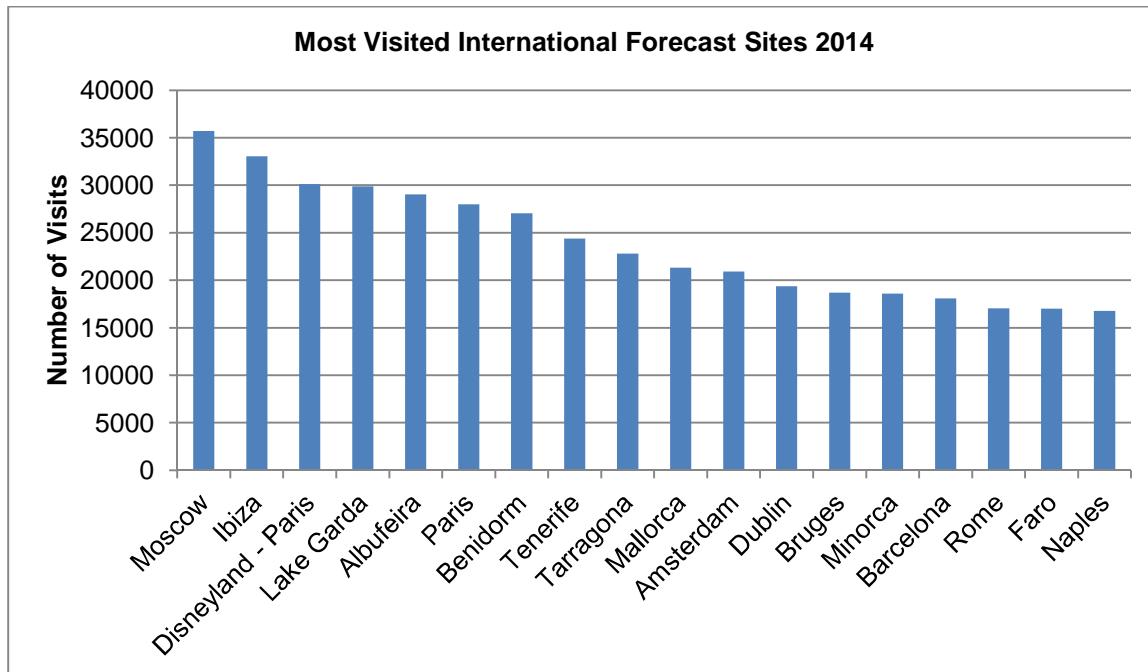


Figure 1: Top viewed locations for the Global Site Forecast Service for 2014. (Source: Met Office)

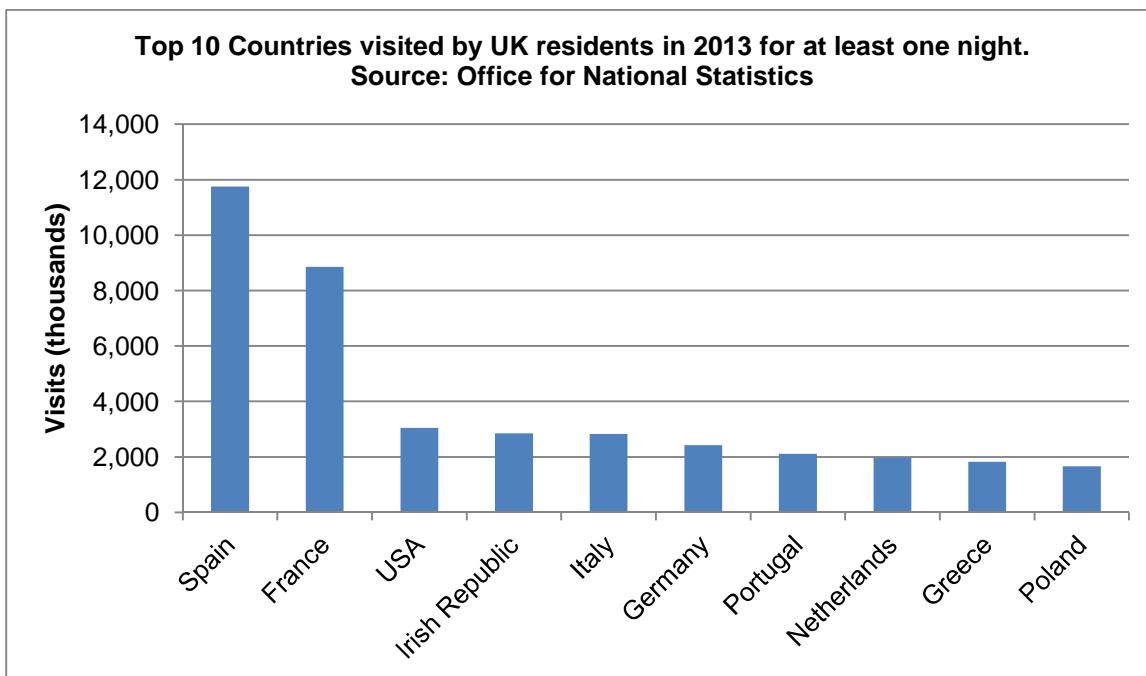


Figure 2: Top 10 countries visited by UK residents in 2013. (Source: Office for National Statistics International Passenger Survey)

Overall, it can be seen that there is some usage of the international forecast sites, particularly for UK residents on or about to go on holiday. That the most popular site is Moscow is of interest as this does not correlate with travel patterns of UK residents. Although we could speculate why this is, it is not a large enough outlier to warrant further investigation or departing from the broad conclusion.

How does the Met Office public international service compare to that provided by other National Met Services?

Table 2 compares the Met Office PWS international service for the public against offerings from the websites of other National Met Services (NMSs) from Europe and around the world.

Country	NMS Website	Availability of International Forecasts
Ireland	Met Eireann http://www.met.ie/default.asp	Front page links to Meteoalarm and WWIS Map forecast for Northern Ireland as part of all Ireland display
France	Météo-France http://www.meteofrance.com/accueil	Comprehensive global site forecast service (in French) including ~ 170 UK sites
Germany	Deutcher Wetterdienst http://www.dwd.de/	Links to continental weather maps, Meteoalarm and WWIS from front page "Weather and Warnings" tab.
Spain	Agencia Estatal de Meteorología http://www.aemet.es/es/portada	Link to WWIS from "Mundo" tab, link to Meteoalarm from warnings

		page
Norway	Norwegian Meteorological Institute http://www.met.no/	Weather forecasts via link to yr.no, online weather service provided by NMI and Norwegian state broadcaster, which has 8.3 million worldwide sites.
Sweden	Swedish Meteorological and Hydrological Institute http://www.smhi.se/	Site forecasts available for Norway and Finland.
Finland	Finnish Meteorological Institute http://ilmatieteenlaitos.fi/	Forecast maps for Europe and the World. Link to Meteoalarm from warnings page.
Switzerland	MeteoSwiss http://www.meteoswiss.admin.ch/	Link to Meteoalarm from warnings page.
USA	National Weather Service http://www.weather.gov/	No international weather forecasts or links.
Australia	Bureau of Meteorology http://www.bom.gov.au/	No international weather forecasts or links. Regional analysis maps.
Canada	Meteorological Service of Canada http://www.ec.gc.ca/meteo-weather/	No international weather forecasts or links.
New Zealand	Meteorological Service of New Zealand http://www.metservice.com/national/home	No international weather forecasts or links.
UK	Met Office http://www.metoffice.gov.uk/	7500 international forecast sites available. Meteoalarm link exists, but not easily found.

Table 2: Comparison of public international forecast offerings from a selection of National Met Service websites.

The Met Office PWS international offering is at the top end of international services offered by NMSs, with only Météo-France offering a similar level of service. The Norwegian Met Institute delivers all its forecasts through an online weather service, yr.no, provided jointly with the Norwegian state broadcaster, which offers 8.3 million global sites. Several NMSs provide their international forecasts through a link to the WMO¹ sponsored World Weather Information Service (WWIS) which includes forecasts for over 1700 cities provided by 133 NMSs from WMO Members, including the Met Office. Many European NMSs provide links to Meteoalarm, a web portal run through a EUMETNET² programme which collates national warnings from participating NMSs (see below).

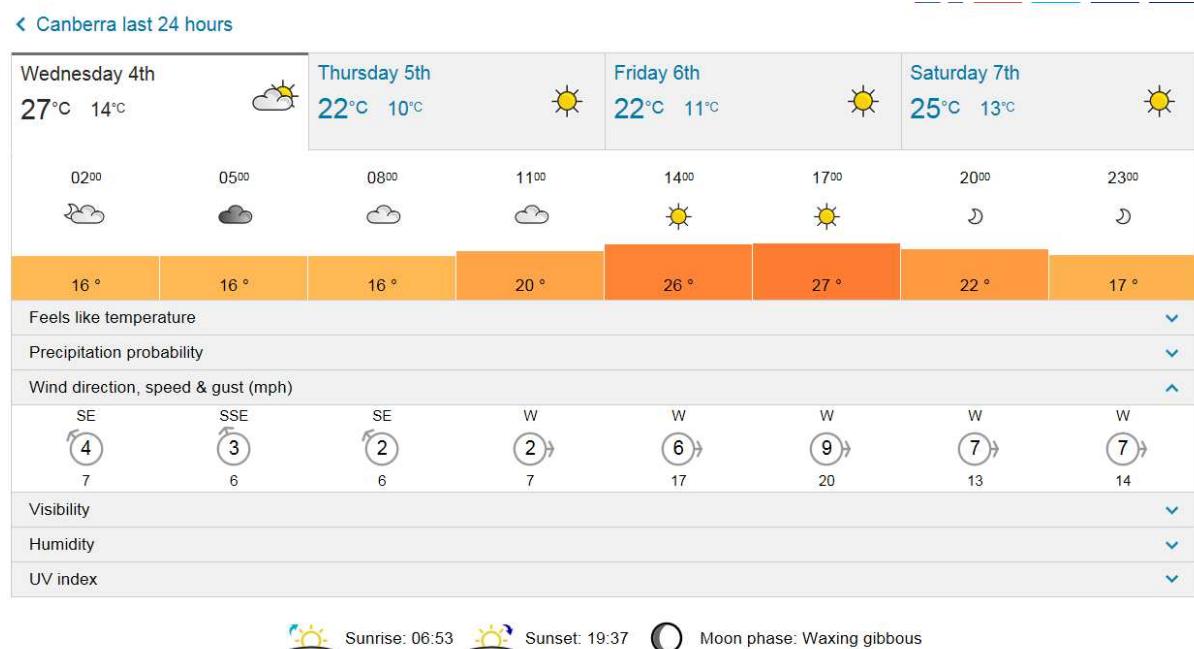
What is the quality of the Met Office international forecasts?

Unlike UK forecasts, the PWSCG does not routinely monitor the accuracy of the Met Office international forecasts. The Met Office is not the “authoritative voice” for weather forecasts outside the UK, so when providing forecasts for sites in other countries could be thought of as just another global weather provider. The Met Office and other global weather providers need to consider whether their forecasts in other countries is inconsistent with that provided

¹ World Meteorological Organisation – UN specialised agency responsible for global coordination of weather, climate and water issues.

² The Network of European National Meteorological Services: an Economic Interest Grouping for NMSs of which the Met Office is a member.

by the local NMS, and so potentially put lives at risk from severe weather. The example used here is Australia, which uses the Met Office Unified Model for its operational forecasts so there can be no argument that its forecasting capability is not equivalent to that of the Met Office. Figure 3 shows the 24 hour forecasts from the Australian Bureau of Meteorology and the Met Office for Canberra for 4 March 2015. Although no severe weather warnings are associated with this day, it should be noted that maximum temperatures differ by 3C, and the Australian Bureau of Meteorology forecast contains two advisories (fire risk and UV index) which would be of relevance for UK citizens. The recorded maximum temperature was 30.1C for 4 March 2015 at Canberra showing that, in this example, the local NMS produced the most accurate forecast.



Wednesday 4 March



Min **14** Max **30**

Cloud clearing.

Chance of any rain: **20%**

Rainfall amount: **0 mm**

Fire Danger - Very High

UV Alert from 9:40 am to 4:50 pm, UV Index predicted to reach 11 [Extreme]

Canberra area

Partly cloudy. Slight (20%) chance of a shower. Light winds becoming westerly 15 to 20 km/h in the late afternoon then becoming light in the evening.

Figure 3: Met Office (top) and Australian Bureau of Meteorology (bottom) forecasts for Canberra for the 4 March 2015 (issued 3 March 2015). The actual maximum temperature for that day was 30.1C.

How should the Global Site Forecast Service evolve?

There is no strong argument for the PWS to further expand the Global Site Forecast Service in terms of number of sites. The current offering appears to meet the needs of the UK

travelling public with worthwhile usage but small as a proportion of total visits to Met Office forecast sites. The Met Office needs to take care that its service does not lead to inconsistencies with the local NMS forecast, especially when that NMS is recognised as having state of the art capability like the Met Office. Also, there are many other (commercial) providers in this space, and the PWS output should not exceed what is necessary to deliver its aim of supporting the safety of UK citizens overseas.

Recommendation 1: The PWSCG maintain the current scope of the Global Site Forecast Service.

Meteoalarm <http://www.meteoalarm.eu/>

In principle, engagement in Meteoalarm offers the PWS two benefits:

- Additional reach for Met Office warnings, potentially to European visitors to the UK;
- Access to other European countries severe weather warnings helping to protect UK citizens overseas.

In practice, as Meteoalarm is a EUMETNET programme, the Met Office has influence, but not control, over the effectiveness of Meteoalarm's reach. Also, the Meteoalarm website is not updated as frequently as the Met Office website, so there is a risk that the warnings shown on Meteoalarm are not current. However, Meteoalarm does include links to the NMS warnings pages where the authoritative warnings are issued. Regarding the use and access to Meteoalarm through Met Office web pages, there is a lot of scope for the Met Office to do a better job as the current links to Meteoalarm are not located with the warnings or international forecast pages. The international forecast offering through the Global Site Forecast Service could be enhanced by including links to Meteoalarm for forecast sites in countries covered by Meteoalarm, strengthening delivery of the objective to protect UK citizens overseas. As shown in Table 2, many other European NMSs include links to Meteoalarm prominently within their website.

Recommendation 2: The PWSCG request the Met Office to provide more visible and accessible links to Meteoalarm on its international forecast web-pages.

Global Incident Forecasts

What is the Global Incident Forecast service?

Several times a year the Met Office provide a specific forecast to DFID and FCO to assist in the response to high impact events that require evacuation of British citizens and humanitarian efforts.

The global incident services are primarily delivered through government departments (DFID and FCO) but significant events are also supported by the Press Office and guidance/forecasts provided direct to the public via the web site. The current service is focussed on meeting the priorities of FCO and DFID, and these are influenced by a variety of factors including priorities from other departments. For example, support by the MOD in DFID's response to the Ebola Crisis in Sierra Leone.

Global Incident Forecasts are provided to both warn of potentially severe events and to support post-disaster recovery. Examples of Global Incident Forecast output for Tropical

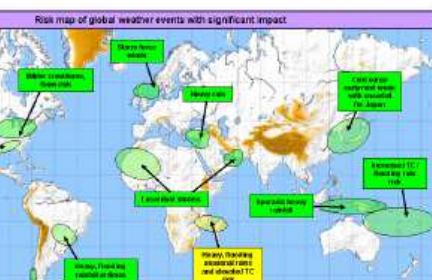
Cyclone Pam which hit Vanuatu in March 2015 is shown in Figure 4. These forecasts are not available directly to the public.

Global weather impacts – all times/dates in UTC

Issued on Monday 9th March 2015 at 1100 UTC

HEADLINES

- Potential floods over Madagascar, northern Mozambique and southern Tanzania.
- Increased risk of tropical storm formation across SW Pacific Islands.
- Heavy rain across southern USA.



Risk map of global weather events with significant impact

Legend: Impact (High/Low)

Annotations on map:

- Extreme heavy rain, flash flooding, severe winds (USA)
- Heavy rain, flooding (Madagascar, Mozambique, Tanzania)
- Heavy rain, flooding (SW Pacific)
- Heavy rain, flooding (South America)
- Heavy rain, flooding (Vanuatu)
- Heavy rain, flooding (Timor Sea)
- Heavy rain, flooding (Philippines)
- Heavy rain, flooding (Australia)
- Heavy rain, flooding (New Zealand)
- Heavy rain, flooding (South Africa)
- Heavy rain, flooding (India)
- Heavy rain, flooding (China)
- Heavy rain, flooding (Japan)
- Heavy rain, flooding (Russia)
- Heavy rain, flooding (North America)
- Heavy rain, flooding (Europe)
- Heavy rain, flooding (Africa)
- Heavy rain, flooding (Antarctica)

Global Assessment

Severe Weather Assessment

Severe Weather Assessment for Tropical Cyclone PAM

Issued on Sunday, 15th March 2015 at 1200 UTC

Summary Tropical Cyclone Pam is currently a Category 2 storm centred 600 km to the northeast of the coast of the North Island of New Zealand. Pam is moving southwards at around 30 knots, with sustained winds of around 80 knots, weakening to a Category 1 storm through today (Sunday – UK time), however sustained winds will remain very strong (around 60 knots) over the coming days. Good agreement between the Met Office Global Model (GM), EC, GFS and Ensembles for southeasterly trade today (Sunday). Pam's centre is expected to pass within around 200km of New Zealand's East Cape Sunday evening (UK time).

Impacts – Vanuatu
 Satellite derived rainfall estimates across Vanuatu show that an estimated 200-250mm fell across the islands over the past few days with the passage of Pam, though actual amounts could have been greater. The destruction across the islands is now becoming clear from news reports, with the major damage probably having been a result of the wind, likely over 130 knots during the peak of the storm, though no official surface observations were available. Reuters are reporting that up to 90% of the buildings in Port Vila were affected by the storm with no power or running water and limited information of the needs of other affected communities away from the capital. Media reports are suggesting there may be dozens of residents dead, which seems like a reasonable assumption considering the damage, however this is not officially confirmed.

Forecast – Vanuatu
 Although Pam has passed well to the south of Vanuatu, it remains in an unstable airflow with further heavy showers and thunderstorms likely over the coming 24 hours, with the more northern islands likely to see the highest rainfall totals with another 40mm of rain possible locally through the rest of Sunday into Monday morning (UK time), becoming later after Monday. This improved weather situation is expected to continue through the rest of next week across Vanuatu helping the recovery efforts. There is a consistent signal amongst models for a settled period through the rest of next week.

Forecast – New Zealand
 There is confidence that Cyclone Pam will track southeastwards to the northeast of New Zealand through Sunday. However, gusts to 60m/s are possible across the North Cape and East Cape, with up to 100mm of rainfall possible in this region in 24 hours. Very large waves are also expected for time around the north of North Island on Sunday and Monday. These conditions could produce local flood impacts, a risk of power loss and damage to buildings, but Auckland looks likely to escape the worst conditions, with only a low probability of Pam taking a track far enough south to produce high impact conditions in Auckland.

Figure 4: Met Office Global Assessment highlighting risk of Tropical Cyclone landfall on Vanuatu, issued 9th March 2015, and Severe Weather Assessment for Tropical Cyclone Pam issued 15th March. TC Pam hit Vanuatu on 14th March 2015.

How is the Global Incident Forecast service operated?

The FCO and DFID rate the Global Incident Forecast service highly, although it is not explicitly recognised by them as a PWS funded output. Some of the feedback the Met Office received from the FCO regarding Typhoon Hagupit is quoted below:

"I would like to extend my thanks to you and Met Office colleagues for your assistance to the Foreign and Commonwealth Office last week and over the weekend regarding Typhoon Hagupit.

As you are already aware, the FCO's Crisis Management Department stood up a Crisis Response late last week; we were very grateful for the speed at which the Met Office started supplying regular Severe Weather Assessments. The Crisis Centre generate cross-Whitehall Situation Reports during a crisis, and the information provided by yourselves was directly fed into this. Colleagues in the British Embassy Manila were also extremely grateful for your assessments, it really helped the crisis planning and assumptions on the ground. Fortunately we have now been able to come out of crisis mode as the worst of the weather has past and, thanks not just to the weakening of the storm itself but really good preparations on all sides as well, damage has been much more limited this time.”

“Just a quick email to say thank you for getting the ball rolling on Hagupit. Please pass on my thanks to the wider GGU team as well who have kept the updates coming thick and fast. We have been using them to inform our cross-Whitehall sit-reps. “

Despite this positive response from the users, it appears that the Met Office service is not as operationally robust as other PWS outputs. There is no clear process or decision criteria for when to “push” output to the FCO or DFID: this seems to fall mostly to the Met Office Strategic Account Manager (SAM) for FCO and DFID. Also the SAM is the primary point of contact for FCO or DFID requesting information. Although sometimes the FCO and DFID do contact the GGU direct, relying on a relationship/account manager as a contact point for a 24/7 operational service appears a point of weakness.

The Met Office has placed an advisor within FCO and DFID teams to assist in interpretation of weather information. This has been funded by the Met Office, and although well-received by both FCO and DFID there are no plans for this to become a permanently funded service.

How should the Global Incident Forecast service evolve?

The Global Incident Forecast service is an important part of the PWS support to UK citizens overseas, and in support of the objectives of other government departments. However, the Met Office should consider how they can enhance the operational robustness of the service, so it can consistently meet FCO and DFID’s needs.

Recommendation 3: The PWSCG to invite the Met Office to present proposals to a future meeting on how it will strengthen the existing Global Incident Forecast service.

Global Pollution Response Service

This service is similar to the Global Incident Forecast service except for environmental hazards such as volcanic ash or nuclear accidents. Recent examples of such events include Icelandic volcanic eruptions and the Fukushima nuclear incident in Japan. By its nature this service is rarely used, although when it is, it is for high impact events.

Support for Local Service Delivery

This covers the outputs of the Met Office’s involvement in the WMO Voluntary Cooperation Programme (VCP) through which developed country NMSs provide support to developing country NMSs so they can effectively participate in the programmes of the WMO. In practice, this means enabling the developing country NMSs to provide observations for sharing with other NMSs, including the Met Office, to help improve global forecasts. Detail of the Met Office VCP activity is provided in Annex 1.

There is a question whether the Met Office involvement in VCP should be described as a PWS output, and perhaps it is better phrased as a commitment as part of the UK’s membership of WMO. The Met Office VCP activity and plans should also be subject to annual review by the PWSCG (through the Secretariat or PAG) to provide assurance that the spend is meeting the broader strategic requirements of the PWS, the UK and Met Office engagement in WMO.

Recommendation 4: The PWSCG consider the Met Office involvement in VCP as an international commitment, and request Secretariat to undertake an annual review of the activity.

Global Long-range Outlook

<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks>

This product is part of the Met Office's international commitments with WMO as a Global Producing Centre (GPC) for Long-range Forecasts. A selection of global and regional plots for three-monthly periods up to six months ahead is provided through the website. These are technical in nature and aimed at other NMSs, rather than the public. It is very clear on the website that this is provided on behalf of WMO for use by international forecast centres, and that it does not constitute seasonal forecasts for a given location.

The evolution of this product is at the behest of WMO Members who may change the requirements for GPCs through the resolutions of the decision-making bodies of WMO. In practice, significant changes are unlikely to occur without consensus from existing GPCs, so the risk of the requirements becoming excessive or undeliverable is small.

Recommendation 5: The PWSCG request that the definition of the Global Long-range Outlook is updated to make it clear that it is part of the International Commitments of the PWS and that the requirements are set by the WMO.

The utility of these products for the UK users will be considered in a future consultation on seasonal forecasting.

Hurricane Season Forecasts

This is an annual product, issued by the Met Office in May, which forecasts the number of hurricanes that will occur over the Caribbean-North Atlantic basin in the forthcoming season.

There is marginal interest in this product (total of just over 5000 page views per year).

However, the Met Office tropical cyclone pages do receive over 30,000 views per year, with a notable peak around the Hurricane season from July to October. In particular, the Storm Tracker service, which shows forecast tracks of tropical cyclones across the world, receives over 100,000 views a year. An example of Stormtracker output is shown in Figure 6.

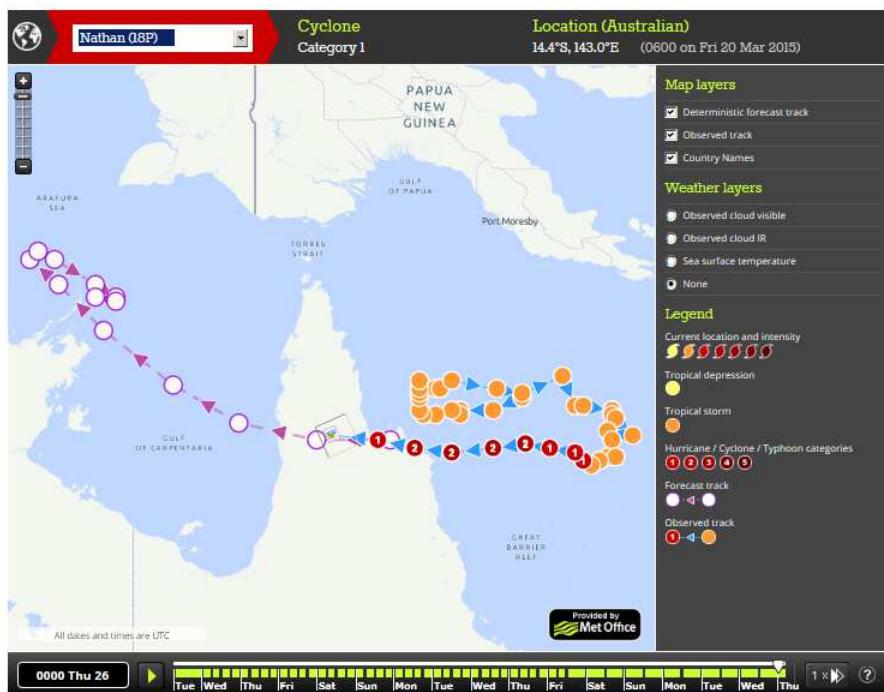


Figure 6: An example of the Met Office Stormtracker output from 20 March 2015

The monthly breakdown for this service for 2014 is shown in Figure 7. Note the peaks in August and October 2014 which presumably related to ex-Hurricanes Bertha and Gonzolo which crossed the UK, although Hurricane Gonzolo caused significant impacts on Bermuda, a British overseas territory.

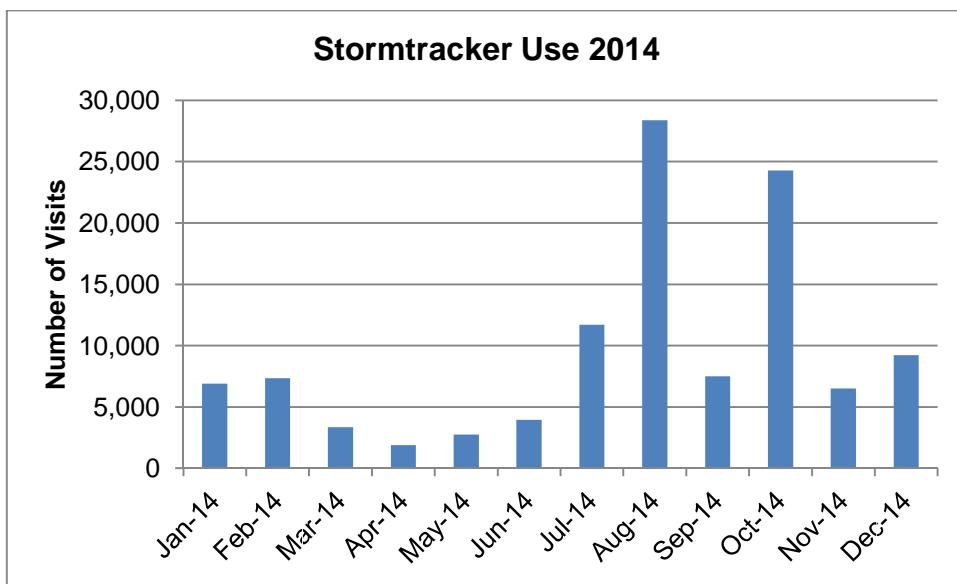


Figure 6: Use of the StormTracker web-pages for 2014 (Source: Met Office)

How should this service evolve?

Tropical cyclones present a significant risk to UK citizens in certain parts of the world, and so there is interest, not just from the public, but also FCO and DFID, in their accurate forecast.

This interest is global, not just for the Caribbean-North Atlantic hurricane season. The popularity of Storm Tracker, as opposed to the other pages, and indeed the PWS output of the Hurricane Seasonal Forecast, suggests that the PWS outputs described in the service catalogue do not represent either the available output, or meet the users' needs.

Recommendation 6: The PWSCG invite the Met Office to present a proposal for a more coherent package of global tropical cyclone information, based on the existing pages, to become part of the PWS international outputs.

Summary

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Overall, it appears that the current set of international services and products are valued by the public and government, in that they are used and the feedback is positive. That international forecasts make up 2.2% of the total forecast use seems appropriate given the service is aimed at UK citizens when overseas, and given the correlation between popular sites and UK residents travel, it suggests that, in the main, it is the right set of products. But given this proportion of use, it does not present a strong argument for further PWS investment in international products, especially increasing the number of international forecast sites. However, the consultation did identify a few specific areas where the PWS international services could evolve, in particular that:

- Better use is made of Meteoalarm;
- The Global Incident Forecast service is made more operationally robust; and
- A coherent set of tropical cyclone forecast pages are included as PWS outputs rather than just the Hurricane Seasonal Forecast.

Annex 1: VCP Report for 2014/15



PWSCG Report April
2015 V1.0.pdf