

Weather apps and their application in agriculture

Dr Johan Malherbe

ARC-INSTITUTE FOR SOIL, CLIMATE AND WATER

Conduct a search for “Weather Apps” in the Android Play Store or the Apple iStore and hundreds of results appear. They range in simplicity and type and provide information that is beneficial to a wide range of users, including those who make day-to-day farming decisions.

AVAILABILITY OF WEATHER information that can be downscaled to a specific location, holds much promise for the various facets of farming. With a fairly simple understanding of the impact of weather conditions on planned activities, these applications (apps) can assist in planning practical daily- to weekly time frames.

Weather forecast data, as produced by global forecasting systems, is reproduced in an easily understandable fashion for a wide range of users of smartphone apps. The related information is obtained from data that, not too long ago, was only at the disposal of weather forecasters working at national Met offices. The data is updated daily or at shorter intervals, as made possible by the ever increasing production speed of forecasts, resulting in some apps using significant amounts of data.

It is important to appreciate the inherent characteristics of the data used in these applications. This becomes especially important for users that make management decisions based on the forecasts which could have economic implications. In most cases, the information provided in the apps is derived by pinpointing a location on the raster (block) of forecast data, as produced by a forecast model. The original input forecast models used will typically produce outputs that have spatial resolutions ranging between 15 km and 120 km.

For this reason, information may not be representative of all areas within the larger block for which specific weather conditions are forecasted. For example,

minimum temperatures can vary significantly based on land cover, aspect, and altitude within an area smaller than the scale of the original data used as input for the weather application. It is important, therefore, for a user to develop a feeling for the variation in his area of interest that cannot necessarily be resolved in the data intended for large scales.

Some apps provide information for relatively long periods ahead – often exceeding 7 days. Here, again, it should be noted that the inherent accuracy of forecasts is low. Due to the forecast methodology and the chaotic nature of the climate system, forecasts beyond 5 to 7 days become quite inaccurate. In this regard, general trends may still be valid. Updates for specific days can be followed and revealed trends may be a further indication of developments to come. However, characteristics such as cloud cover, temperature and precipitation may change more often than not as the period approaches and this will be reflected in the shorter-range forecasts in subsequent days. Information becomes more reliable within the 5-day timespan.

Here already, there are several potential applications for some of the elements forecasted. Temperature, humidity and wind thresholds play an important role for several farm activities while the presence or absence of rainfall may have important implications for a range of actions. A cooler and wetter first half of the week followed by hot and dry conditions may necessitate different planning than the opposite



AccuWeather daily



AccuWeather hourly

situation – or at least support different approaches to the same activities.

Several applications are available free of charge, while some have simplified free versions that can be upgraded at a fee to full functionality. Without intending to promote any specific apps, we had a look at the free versions of three apps widely used in agriculture that are functional on the Android platform, purely to demonstrate some of the important information feeds available.

WEATHERBOMB

This app gives users an outlook, at a glance, of expected conditions for a



The South African Weather Service and Agricultural Research Council, together with various Dutch companies (funded by the Netherlands Space Office), are developing an application (app) that will focus specifically on the agricultural activities in Southern Africa with attention to the decisions made by small-scale farmers.

specific location and also rainfall and cloud patterns for a wider area, as chosen by the user. Any focus locations, as chosen by default based on the location of the user, or as chosen from a name list or map, can be added to a quick-access list.

The app provides maximum and minimum temperature information at a glance for the next 10 days. It also indicates periods of cloud and rain together with the wind speed and direction. The information is provided at a 3-hourly temporal resolution. For users that may be slightly more familiar with the weather-related information or those who are interested in context, one of the strongest features of the app is that it has a slider which allows the user to integrate expected cloud and rainfall patterns spatially during the forecast period.

The area of interest can easily be resized, for example, between provincial, national or sub-continental level. The spatial information allows the tracking of large weather systems such as cold fronts or tropical cyclones, which can add an extra dimension to the information obtained by users.

ACCUWEATHER

Information in this app is conveyed in a more simplified manner, for example, making use of cloud/sun symbols to indicate cloud cover. Locations can easily be chosen to obtain the forecast for any place. A quick look overview of current conditions is given, complimented with a short narrated forecast (one sentence) for conditions during the next few hours. For the first 24 hours, an hourly breakdown is given of temperature, sensible temperature (what it actually feels like) and rainfall.

This can easily be interpreted to give the hourly breakdown also for relative humidity, wind speed and expected UV index. Depending on the accuracy of the original input forecast, this app provides detailed information for planning on a specific day going forward. For the period following the first day, information for days 2 to 14 is given on a 12-hourly basis, consisting of expected maximum and minimum temperatures, rainfall probability, general wind direction and strength and sunrise and sunset times.

There is also the option to look at an animation of cloud and rainfall patterns for the last few hours, based on ob-

served satellite data (not the forecast). Apart from the observed satellite data, the rest of the information (the forecast component) is only specific for the location, and spatial context for the forecast is generally lacking.

WINDGURU

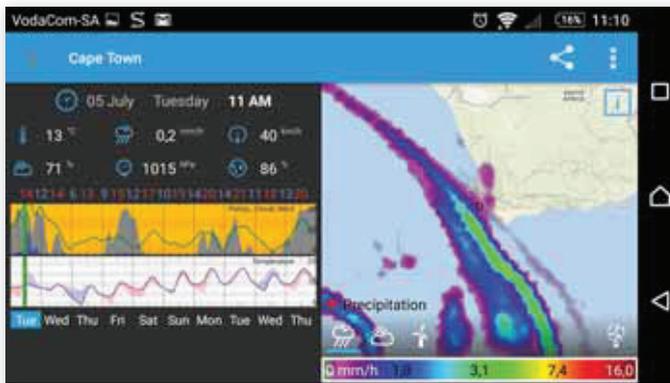
Windguru provides a very user-friendly overview, in a table or graph format, of conditions at 3-hourly intervals over the coming 10-day period for a chosen specific location. Colour codes used are intuitive and a user will very quickly learn how to interpret relevant information at a glance.

There is a rather strong focus on wind and for coastal locations, there is an option to include the 3-hourly wave forecast. The app is first and foremost geared to serve the surfing community or other users near the coast and therefore has somewhat less information than Accuweather. However, with

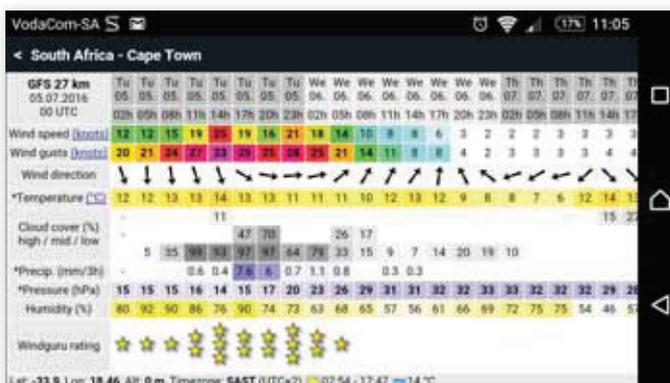
colour-coded 3-hourly breakdowns of wind speed, temperature, cloud cover (at various levels), precipitation, pressure and humidity, the app can certainly be of assistance in planning for agricultural activities in any area over the interior.

Functionality and details differ between apps and the information above is only provided to give some indication of the typical interfaces. It is up to the user to find the app that best suits his/her needs. Some of the functionalities of the above-mentioned apps are illustrated for comparison purposes in the screenshots taken on 5 July 2016. The location in all was set to Cape Town.

The apps discussed above are not specifically geared towards farming applications and users need to make their own assessments of expected weather conditions and contextualize this in their planning. So choose a few weather apps from the store, and explore the possibilities. ❖



WeatherBomb



Windguru