Webinar:

Drones - Technology enhancing agricultural insurance

Questions & Answers

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Foreword

On June 9, 2020, AgroInsurance International and Skyglyph hosted a webinar "**Drones: Technology enhancing agricultural insurance".** The webinar touched upon the use of remote sensing technologies with an accent on drones applied for crop insurance purposes. The webinar panelists were Ian V. Shynkarenko (CEO of Agroinsurance), Roman Shynkarenko (Technical Director, AgroInsurance), and Victor Yermak (CEO of Skyglyph).

The webinar covered major technology operational aspects of practical drone use for the needs of underwriting and loss adjustment in agricultural insurance. Topics covered the classification of drones and key challenges of the drone industry: regulatory issues, certification requirements, and operation specifics for various needs in crop insurance. Panelists highlighted the challenges experienced in practice by crop surveyors and loss adjustors, provided key recommendations on how to make the field survey more efficient.

More than 60 online participants representing insurers, reinsurers, consulting agencies, technology, and service providers from 25 countries joined the webinar and contributed to the discussion by asking specific technical questions adding more insights from the customers on technical aspects of drones' use. Such questions and answers were collected and are presented in this document.

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* Title page photo credits: DroneDeploy, https://www.dronedeploy.com

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What will be the most important drone type for agriculture applications in the future?

In the future, we will see some autonomous drones that will cover greater areas. Drones will become more functional with longer flight time and provide more useful information. The key challenge with such types of drones will be what kind of information we get, how we can interpret this information and how the information will be used for insurance purposes, including underwriting and claims management.

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Identification of damage to insured crop by animals: I wonder what kind of animals can be identified with your method: locusts? grazing animals? others?

It is easy to detect the damage caused by animals because you can visually see it with the help of drones.

There was a case in Australia – damage by cows. It was possible to identify the herd trails as they were entering the field. You cannot see the damage online with satellites as the visiting is currently done once in 3-5 days, and with drones, you need to have it hanging over the area all the time. But in case of insurance claims, damage by animals can be identified by considering specific damage characteristics, like digging the ground, etc. And understanding the nature of this damage we can see the kind of damage – specific peril or some animal.

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What services delivery shown on forestry damages including burnt area or the like?

It is quite useful and beneficial because we can use satellite and drones not only for tracking the burnt area, but we can estimate the timber volume generated, how the timber is progressing (where are some applications already available).

In Australia, we do cover the replanting costs and infrastructure damage by fire. If we need to know when the client is harvesting the timber and then do replanting we can keep track of all of his work. In Australia, the replanting is usually required to be done within 6 months after the fire event. The insurers usually make payouts after replanting and infrastructure repairs have been completed. All these can be checked with the help of drones and satellites without the need to visit plantations. However, with drones in Australia, there may be some issues because in some areas there is no good mobile coverage and sometimes drones just cannot take off. Thus, in some cases, satellites are much more reliable than drones for countries like Australia.

How can you address the moral hazard risks if you settle claims based on drones? In other words, how can you differentiate between crop shortfalls due to bad weather (e.g. drought) and saving on ag technology by farmers (e.g. lack of fertilizer)?

This is the case when we do not use drones only for settling the claim, we use them as a helpful tool to make more precise estimations. In most claim cases, even with the index covers - they require calibration of loss estimations (eg. crop cutting experiments (CCE) and random fields for yield assessment would still be required for yield index products). Same with the cause of the damage to crop – one can be sure only by being physically present on the field.

For moral hazards risks, satellites are more reliable because with drones you cannot survey on the regular basis in contrast with satellites which revisit the location and take images more regularly (every day with microsatellites, and up to 4-7 days with satellites like Sentinel, MODIS, etc.)

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What is your professional opinion on the use of passive microwave earth observation satellites for agro insurance? This allows us to see soil moisture globally at a high resolution and can be used to insure crops against drought. It is not hindered by clouds.

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If we measure topsoil moisture (5 cm) with orbital microwave instruments, it is not sufficient to identify severe drought effects (and between other risks) caused to certain crops, as it is related more to specifics of plants' root system, vegetations stage at the time of specific risk, and other important factors attributed to crop production technology. As an insurance product, it is probably ok, but with this type of observation, we still have an open issue of moral hazard and precision in the application of satellite technologies. The basis risk for such type of insurance would remain quite high.

How much does the certification cost for drones?

It depends on the country's internal regulation. It could cost 0 USD/EUR, or online certification may cost hundreds or even a thousand euros. One needs to check on these specifics with the local regulatory authorities (aviation and space). Both drones and pilots may require local certification.

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How long approximately does it take to prepare to use a simple drone - e.g. DJI?

Usually, it takes 10 minutes, or less. Experienced experts may take a few minutes to deploy and fly their drones. Rotors drones (like DJI) are quite easy to start. Wing drones require more time for deployment – sometimes up to 30 min, but they cover significantly larger areas when compared to rotor drones (copters).

For a field up to 100 ha it takes about 15-20 minutes to make an aerial survey, depending on crop type, terrain, damage characteristics, and objectives of the survey.

Once the drone is damaged is there a possibility to recover it. Who can fix it? Is there any warranty applied to such cases?

Depends on the vendor of the drone and warranty conditions. Some of the vendors provide limited warranty terms. However, drone vendors usually don't cover bird attack, high-speed wind gusts (>40m/s), hitting electric poles and wires, etc. It is reasonable for the first time to apply cheaper models to get used to flight operation.

Software errors also could be under warranty. Mission Planner (software which manages drone operation) saves a flight log, which is analyzed by the manufacturer to conclude on the warranty application.

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To process the data received after using a drone we need an app, which is included in the price of a drone or it should be bought separately?

Usually, the software can be found free of charge for planning the mission in fields. In the case of processing software, one needs to comply with its user license and possibly subscribe for a fee. Prices depend on the service provider.

What is the min volume for outsourcing services by the drone companies?

Usually, service companies look for the volume not less than 500-1000 ha.

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How far away are we from fully automatic drones? What area could be potentially covered by such?

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They are already here. In November 2016 there was a use of a military drone in Australia for assessing crop losses after a large hail event. The drone took off from Melbourne flew about 1000 km one way, took images of fields damaged and landed back in Melbourne. All this was done in one flight. The data obtained, allowed insurers to quickly assess the damage and plan loss assessment assignments better. The cost was affordable. In Australia and other countries, there are commercial drones that fly up to 100-150 km to the site from their base station. Such drones can cover huge areas of thousands square kilometers. The resolution is very good. In case of using military drone in 2016 in Australia, the resolution was up to 3 cm which provided very fine imagery suitable for insurance purposes.

Fully automatic mode depends not only on the characteristics of drones but also on safety and security issues. You need to be sure that your automatic drone won`t hit a helicopter or a bird. Thus, some companies provide a service that navigates drones like aircraft through a system called unmanned traffic management system.

Do you have experience in using drone technology for harvest estimation?

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Drones are used for calibration of vegetation indices for yield estimation, for example, to find the relation between NDVI or VARI and density of plant, the height of plants, etc. Drones do not collect the number of grains or soil moisture data, as in most cases they collect visual features/spectral data which has to be interpreted finally by the specialists.

With the impact of the COVID-19, is it possible to implement drones in fields that function automatically (without the requirement of man force)?

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Someone should deliver the drone close to the field. In includes some minimum man force, but it can also be a farmer. Remote operations will exclude farmers from flying. His/her function may be limited to switch on/off the drone. The alternative is to use long-range drones but these may not be suitable (from price perspective) for small areas or individual farms.

Is it possible to use drones for claims from hail or spring frost?

Here we need to talk about not the type of damage but the extent of the damage. In case of a total loss, the damage will be evident and by characteristics of the damage, we can identify the reason for such damage. Spring frosts are usually larger in scale and it is potentially possible to detect their effects, considering the specific location of risk event occurrence is known and confirmed. In this case, drones and satellites will complement each other.

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How can it be useful to quantify Hail Damage on Vineyards?

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This is difficult. Grapes' insurance is challenging – it depends on production methods and vegetation stage of grapes for wine, table grapes, grapes for drying, etc. Drones and satellites currently can't be the major technology to quantify the hail damage on grapes. It still requires an assessment by a loss adjuster.

Is there a manual intervention required to analyze the output from the drone, or is there a layer of algorithms that are configured to provide the expected results as shown in your couple of images?

In almost every case you still need human intervention, but it depends on the objectives and methods applied – in a quick express analysis by NDVI we fully rely on the professional competences and experience of the loss adjustor. If we are talking about machine learning, we need to take the adjustor's knowledge to get a proper assessment example of a damaged area, and then apply machine in the automatic regime to assess the damage further. However, currently available algorithms still rely on human intervention greatly.

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Could drones provide more detailed information about partial plants' damage on the fields, for example, in winter crop insurance or in cases with hail damage? Could drones be used instead of agronomist?

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The physical presence of the loss adjustor is still required in many cases. Drones may collect very precise photos from low altitudes (5-10m) and bring to adjuster a very precise damage scene to assess one remotely. From the financial point of view - drones use might be quite expensive, so satellite-based remote sensing may be cheaper and more appropriate in cases when a regular (weekly/monthly) crop insurance portfolio monitoring is considered.

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Could you please share your experiences in loss adjustment of storm damages in corn?

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Usually, Digital Elevation Model (DEM) of the canopy is useful for the detection of lodging. DEM may be generated from photos produced by a visual camera. In our presentation slide we have shown the detection of sunflower lodging with the help of DEM.

Use of the technology for the farmers, in what ways they can use it?

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That relates to the given farmer's production practices and the specifics of a country. Usually, the more commercialized farmers are, the more they tend to apply modern technologies and younger farmers are keen to try something more advanced. In Australia the penetration of drones is good – the farmers already use drones for mustering the livestock, checking the paddocks, etc. The farmers consider drones quite efficient as you don't need to spend fuel to visit remote fields while you can fly with a drone and get the required information. In some countries, penetration of drones and new technologies is extensive, it is more of an issue for developing countries.

What kind of software can be used to collect and aggregate data from the field, and what kind of data can be collected? Can you suggest some software?

Usually, 3 software classes are used together with drones: (i) mission planning software, (ii) data processing software, and (iii) software for data analysis.

Mission planners are usually supplied by drone manufacturers, as the software is connected to the drone hardware and autopilot (onboard processor which controls the drone).

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For data processing and analysis, ortophotogrammetry software is often used, which allows generating orthophoto maps of fields, vegetation indices, etc. Examples of such software are cloud-based DroneDeploy, Pix4D, or standalone package like Agisoft.

Skyglyph also provides cloud-based corporate software, Skyglyph Aerial Intelligence for Insurance, which covers all major business processes, connected to drones: asset management, mission planning, flight execution, data processing and further analysis.

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