

Center for Strategic and International Studies

TRANSCRIPT

Event

**AI for Food Security Forum
Technical Demonstrations – NASA Harvest**

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FEATURING

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CSIS EXPERTS

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Zane Swanson: All right. OK. Thank you, everyone. I hope everybody got to enjoy that coffee break, the last one of the day before our reception this evening. This is also our last tech demo, so very exciting.

Please join me welcoming Mike Humber and Fernanda Argueta. I want to get that right. So Mike Humber, Fernanda Argueta, who are joining from NASA Harvest, where Mike serves as data lead for NASA Harvest and Fernanda as co-lead for markets, trade, and supply chains. For this demo, they're going to be talking about how they're linking satellite data and information from Earth observation to markets, trade, and economic insights that can drive food security here and around the world.

With that, I'm going to turn it over to Mike, who will then turn it over to Fernanda for the second half of the presentation. Mike, over to you. (Applause.)

Mike Humber: Great. So thank you, Zane, and Caitlin, and everyone else here from CSIS for having us. Also want to start off thanking NASA, USGS, and Google.org. Google in some way, shape, or form contributed to this project here.

So I'm actually really excited that we are following the panel. We just thought it was a great panel. I'm also excited I want to follow it immediately and you had a break, because that was really fantastic. So I'll go through my slides real quick here and then turn it over to Fernanda, because I think what she has to say is probably more interesting than what I'll say.

But I will start with NASA Harvest, which Joe Glauber actually gave some really nice overviews of the history behind this. So NASA Harvest is a NASA-funded consortium based out of the University of Maryland working on improving the adoption of satellite Earth observation data to better understand agricultural food production and supply around the world. And it has ties back to that G-20 GEOGLAM initiative that Joe had mentioned, which actually sprung out of some of the food price volatility crises from 2008 and the 2010 era. So I think what I really want to highlight here is that when I'm talking about supply we're talking about production and yield and things like that, but we're also talking about the trade component of this.

So part of the problem that we're trying to address here is that the food system is extremely complex. This is a very incomplete, very messy diagram, but part of the point is that it is messy because there is a lot going on here. And given that we're focused on satellite observations, EO really is only able to address a very small part of this very

complicated system. And what we need to do from the NASA Harvest perspective is start to connect those EO-related indicators to the other socioeconomic and trade datasets so that we can magnify the impact of the data that we are producing related to food production.

So, thinking again back to supply, we need to consider the other parts of this chain – not just the domestic production part, but how do things like trade impact food security within a country. And in doing so, what we're trying to do is to be able to give us an idea of where we can identify what we're calling these sort of hidden threats to hunger based on where a country might have a high reliance on external food sources that, because of that reliance on input from other countries, might have these sort of external risks to where they are.

So what we've done is we've started building this platform, and we've actually put quite a lot of time into building this platform called Harvest2Market, which is where we try to link up our satellite Earth observations data to various other indicators. So step one is really sort of a problem-identification step – and this is work that we've done in collaboration with IFPRI, International Grains Council, FEWS NET, AMIS, and many others – looking at what are the types of indicators that we can use to understand that problem, and then start to link the datasets from there.

So we have relationships with these organizations, both on the user side but also on the data-producer side. So, if you dig into this dashboard, you'll start you actually see some datasets that were provided by IFPRI. Joe Glauber has contributed to several of these himself. And what we're really trying to do is get all the data in one place so that we can start to make that connection between what we see with the satellites and how we can link that to other parts of the hunger equation.

So one of the main driving engines behind this is a project that we've been running since 2013 called the Crop Monitor. And this is a largely EO-driven, consensus-based report where every month we're looking around the world to understand what food supplies look like in each country. And in places where we have abnormal conditions, whether they're abnormally good or abnormally bad, we're associating those conditions with a driver, whether that's drought, whether that's early rains, late rains, so on, so forth. And then, from there, we take those drivers that are related to things that are changing the condition of the – of the crop and then associating those with what we call Crop Monitor events. So it's a moment-in-time snapshot of what's really driving production in this region.

So this is really where we're starting from. And then we're starting to layer on all these other components – whether that's the agro meteorological indicators, the data coming out of FEWS NET Warehouse; Harvest Stat is a statistics database that we work on with FEWS NET as well – and really bringing this into a user-focused system where we have an easy way to search for data, display the data, and then start to analyze the data.

One thing I do want to sort of highlight in our design ethos here is that, going back to one of the points that Vivian had brought up, we don't want to replace the analyst. We want to help the analyst, because the thing that we can't really do is we can't model very specific things about disruptions to the – to the food supply chain. Export bans was the example that was brought up. In 2008 and 2010, you had droughts in Eastern Europe. Droughts, of course, are not all the same, but you had very, very different policy responses to those. One was an export ban and one was not. So we figured from our perspective it's better for us to bring that data into one place than guess at what's going to happen in things that we really don't have a basis for making those guesses.

So this is what the system looks like. We've actually – we're still, I always say, in our infancy in the AI integration here. What we're doing with AI is we're loading the Crop Monitor reports through RAG into the system here, and then we're using that to go out and find information from the other datasets that we have in the system, start to co-locate this in one place. So you can come in, ask a question, get a very quick overview of what's going on in that system, and then more importantly who is impacted downstream. So just here's a little bit more zoomed-in example of what you can get from our chatbot. And then what we're hoping to really bring forward from this is, based on what the user's looking for, recommending the datasets as well that they want to bring into the system so they can analyze those alongside their initial query.

So this is the last one for me here. But I think, again, you know, what we really want to do is help the analyst be the analyst and start to put together tools that are going to help establish a basis for ongoing monitoring. We're not looking to solve the question at this point. What we're doing is creating a basis for saying these are places where we expect to have issues so that we can then bring in our EO data in real time throughout the season and monitor that as that situation starts to develop.

So at that point I'll turn it over to Fernanda, who's going to show you a quick demo of some of the types of datasets that might be interesting for Bangladesh.

Fernanda
Argueta:

All right. Good afternoon, everyone.

And so, for our demo, we will be focusing on Bangladesh. And for some background, they are a major producer of rice but at the same time being a net importer, and that means that their population consumes more rice than they produce. And that's especially important given any impacts to their trade disruptions on inputs used in their crop production can have impacts on food access and food availability. And that's something that's, again, especially relevant right now given the near effective closure of the Strait of Hormuz impacting the majority of their fertilizer imports.

And that's something that we capture in Harvest2Market in our Crop Monitor events. We're not just looking at climate-related drivers, but also socioeconomic ones.

And then if we turn your attention to the video demo, which should start playing, on the left-hand side, again, you'll see the globe. So the different colors reflect the various different drivers that we track. And so clicking on a marker will reveal a popup, and at the very top is a description. So here we have the ongoing trade disruptions in the Strait of Hormuz risk constraining fertilizer imports and inflating input costs, while associated gas shortages could further suppress domestic fertilizer production. And then, below that, we have a list of attributes included. So impact is "minor negative." The sources are the linked news articles. Now, these Crop Monitor events have an expiry date of 30 days, but if the driver is still ongoing we do renew that. And then for crops impacted, they are rice. Again, the driver is socioeconomic. And at the very end we have a link to the latest Crop Monitor for early warning report, so that will take you to the latest version.

All right. And then clicking on a country boundary will end up updating the datasets on the right-hand side to the country of interest. And so this is the default layout. At the very top, we have export and import trade flows. You can look at that based on commodity and also at the country level to look at trade relationships. We've also included an option to look at that in a chart view as well.

But if we want to look at maybe specific datasets, look at that based on keywords, we've included the "filter cards" option. So here I'll add in satellite or Earth observation datasets that we have in Harvest2Market. And then, on the left-hand side, you'll see the country boundary along with the option to select the different crop conditions, both the latest and also view them historically. And then, at the bottom, we have the AGMET Earth observation indicator, so able to look at the subnational

level, the different plots that we have on NDVI, precipitation, temperature, and so on.

And then we also have here the Global Agriculture Monitoring System. This is, again, available at the country level, so you're able to select a dataset, and then also at the subnational level.

And now I'm including here food security related datasets that we have, and I'm also including yield ones as well. And so we have here IFPRI's Food Security Portal indices. We have the food import dependence ratio, share of caloric intake, and the Food Import Vulnerability Index. All these, again, are – you can toggle the different views. And then just calling up the Food Import Vulnerability Index, that assesses a country's vulnerability to price shocks of the commodities listed on the left-hand side.

We also have the IPC acute food insecure classifications. That's directly pulled from their API. You can look at the population or percent of population within each of these different IPC phases.

And then, here at the bottom, we have the crop statistics. So depending on the crop grown in that country you could look at area production and yield, as well as a breakdown for the season that it was grown.

And so this just touches on a bit of the datasets we have available. I kind of want to go back to the Crop Monitor event that I had highlighted earlier that flagged the fertilizer disruptions to Bangladesh. And that's something that, as the situation progresses, we want to continue to monitor, continue to update these datasets to be able to answer questions like, you know: How does a farmer adapt to these – the rising costs of fertilizer prices? How does that translate into the crop production, to yield as well? And who's most vulnerable and who is most impacted? And on top of that, be able to integrate AI into this to be able to filter down the datasets, and to provide also recommendations and context as well as limitations to what would best answer any questions or any sort of exploratory research analysis. And that's what we will continue to also develop in the coming months.

I invite you all to visit Harvest2Market, accessing via the link listed there. We also have a guided tour available, and we recommend accessing it via a desktop. The link is still there at the top.

And I just want to give acknowledgments to the organizations and the partners that have made this work possible, and also thank you to CSIS having us here. So thank you so much. (Applause.)

Mr. Swanson: Thank you for that. A really impressive – incredible, really – amount of information that you have packed in there. I know that there are going to be many, many, many questions for you all. Unfortunately, we don't have time right now. Luckily, after the next session, which is the last of the day, we have our reception. So please find Fernanda or Mike and ask them all the questions I'm sure you have based on their amazing tool.

(END.)