

Estimating Mid-season Crop Area for Commodity Markets



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USDA's Foreign Agricultural Service (FAS),
Office of Global Analysis (OGA)

International Production Assessment Division (IPAD)



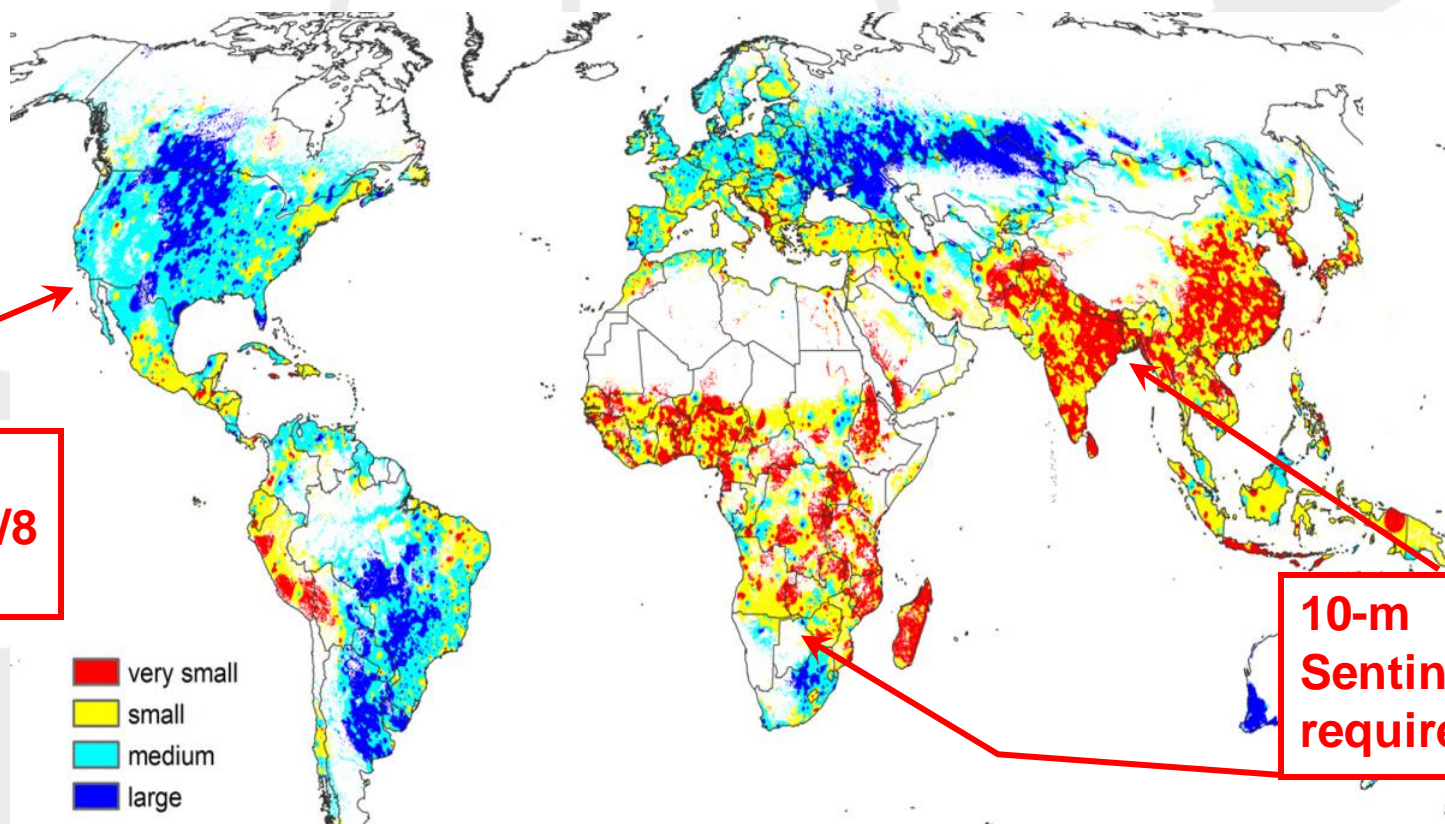
What's New and Free?

- Free Landsat (2009)
- Free Sentinel-2A (2016)
- Free Sentinel-2B (Nov. 2017?)
- Free Google Earth Engine (GEE)
- Segmentation and Object-Oriented Classification on ESRI's Image Service cloud (free for USG staff)



Perfect World?

- Free Landsat(30m), Sentinel-2A/2B(10m) & GEE tools to complement annual crop area estimates from mid-season to end-of-season.
- Every Ministry of Agriculture (MoA) employee 5-10 GIS/RS staff to publish annual Crop Data Layers (CDLs) for their country.
- GFSAD-10m?



**30-m
Landsat-7/8
sufficient**

**10-m
Sentinel-2A/2B
required**

Source: Fritz, et al, 2015, Mapping global cropland and field sizes, Fritz, et al, Global Change Biology (2015)<http://onlinelibrary.wiley.com/doi/10.1111/gcb.12838/pdf>

Landsat & Sentinel Imagery Archives on GEE

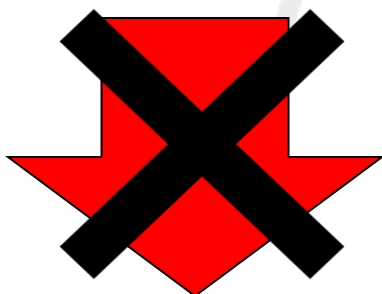
Landsat only

Landsat & Sentinel (after June 2015)

Traditional Approach

Landsat from USGS
Earth Explorer

Download
Landsat
Imagery
(>TB's)



Process
Data
(>TB's)



Training
Sites

Image Classification
or Crop Area Estimates
by Admin. Unit

Cloud Approach

Google Cloud

Process
Data
(>TB's)

Upload
(<GB)



Area of Interest
(AOI) processing

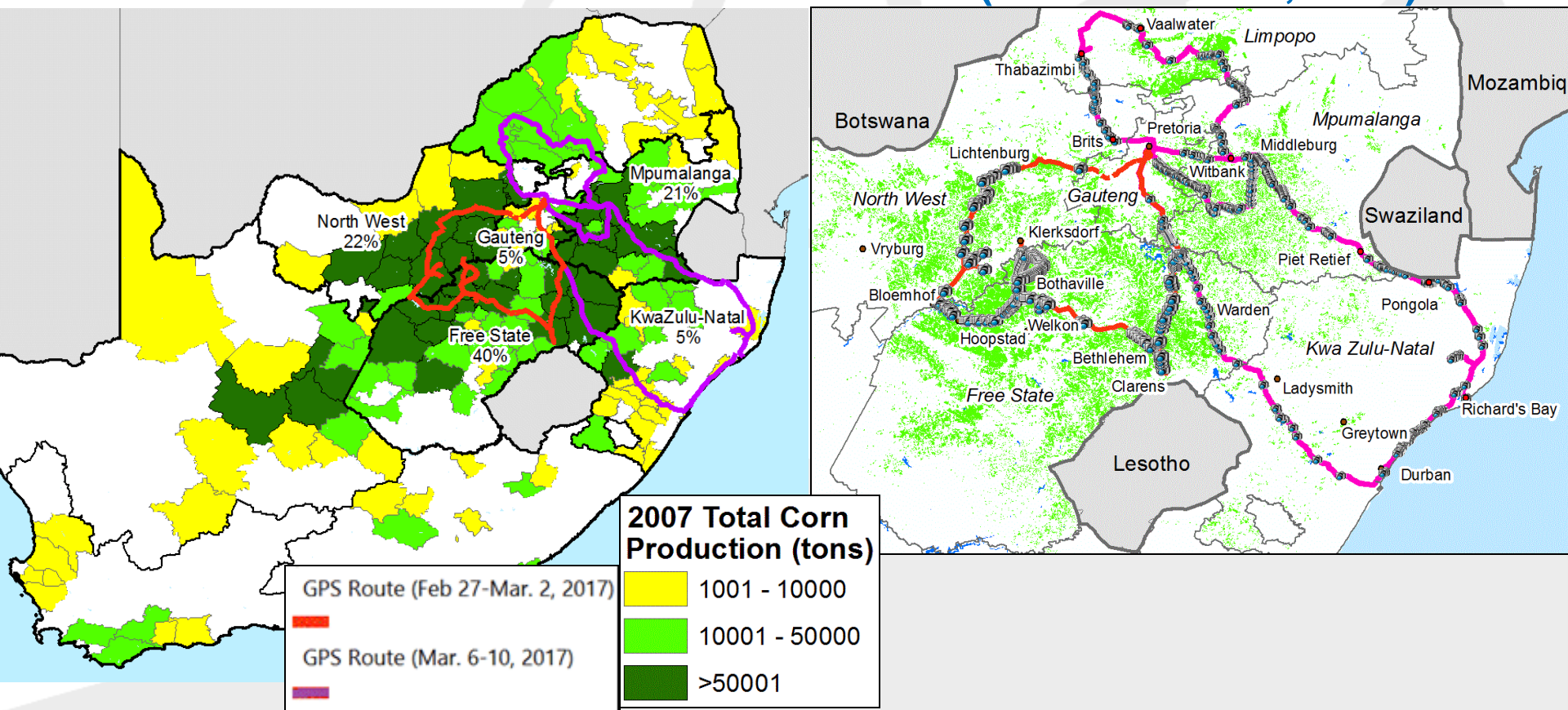


Download
Data
(<GB)

Example: Training Sites Collected in March 2017

South Africa Corn Production

GPS Route: 1496 photos
(Feb 27-Mar 10, 2017)

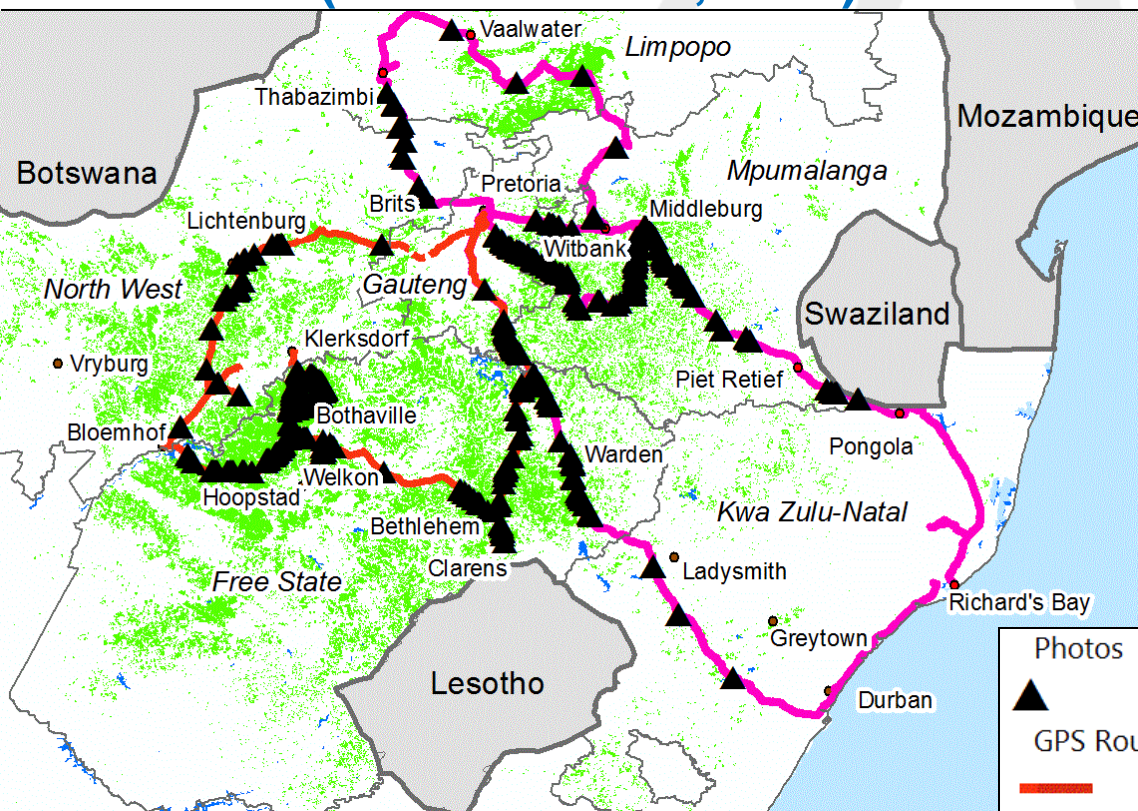


Data Sources:

- 1). Percentage value indicates province's percent production of 2011/12 total.
- 2). District corn production from 2007 Census of Commercial Agriculture, Statistics South Africa, 2011.

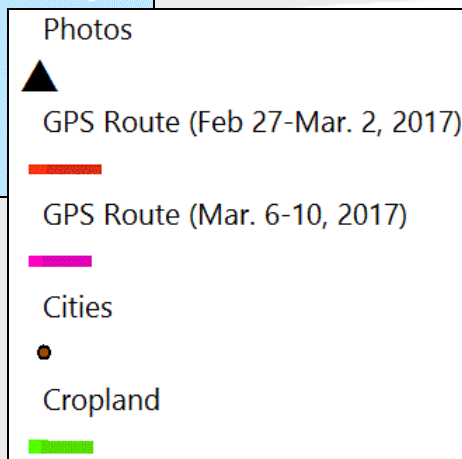
Training Sites for Supervised Classification

Roadside GPS Photos Relocated to Fields (Feb 27-Mar 10, 2017)



“Training sites” = 1145 photos for supervised crop type classifications:

- Maize = 810 photos to training sites
- Soybeans = 135 photos
- Sugarcane = 115 photos
- Sunflower = 44 photos
- Orchards = 41 photos



Summary Geotag Equipment & Software

GPS Garmin (for 15-sec. track log)



GPS Camera (& eCompass)



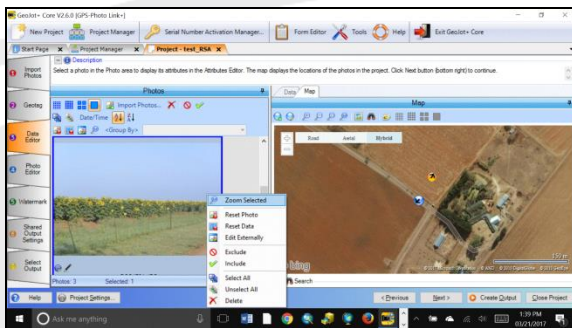
Smart Phone (with GPS & eCompass)



Useful for Car Surveys lasting several days (>100 photos/day)

Desktop Software = Geojot+

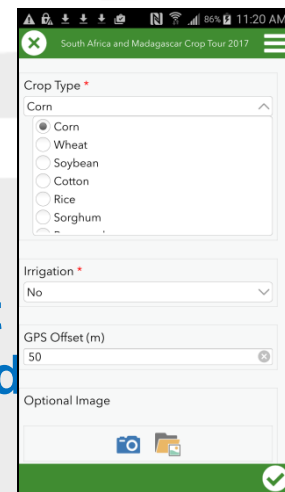
- Write Crop Type
- Relocate photo from roadside to field or calculate GPS offset



Useful for Crowd Sourcing & few photos (<100 photos/day)

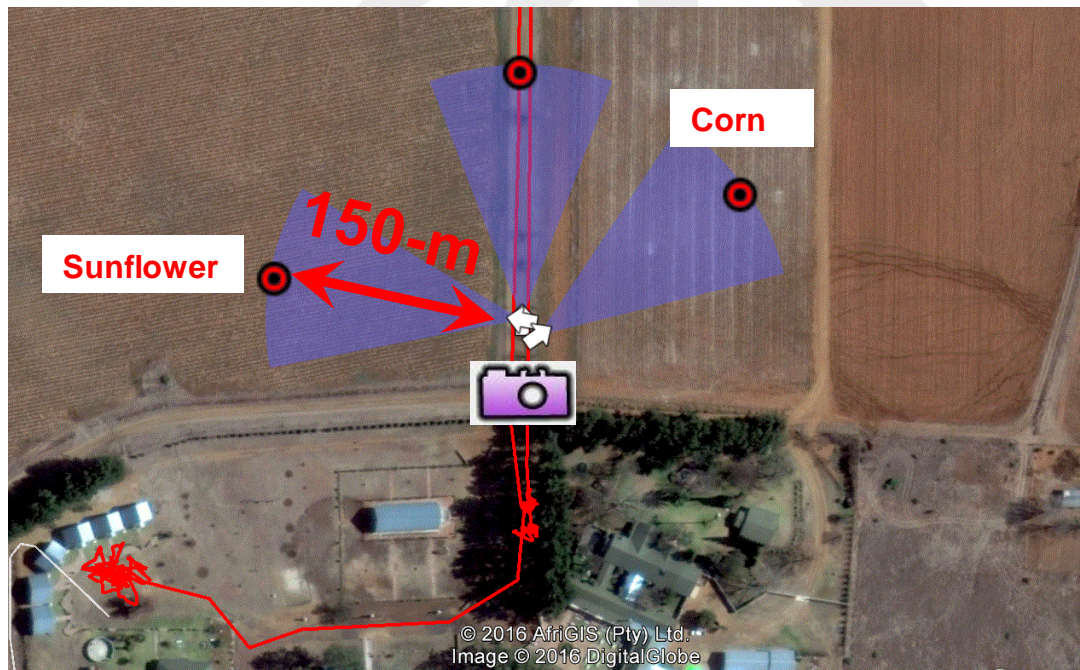
Mobile Apps = ESRI Collector, Survey123 + Many Others

- Write Crop Type
- Calculate GPS offset from roadside to field



GPS Offset (>150-meters) from Roadside to Field

La Rouge Farm, Vierfontein, South Africa (March 1, 2017)



- Legend**
-  GPS Offset (100-meters)
 -  Field of View (FOV)
 -  GPS Photos on Roadside

Offset Latitude: S 27° 04' 23.10"
Offset Longitude: E 26° 43' 25.17"
Sunflower
Offset Distance: 100 m



E 26° 43' 27.74"
S 27° 04' 20.81"
Photo Direction: SW 225°
03/01/2017
7:45:05 AM

Offset Latitude: S 27° 04' 18.95"
Offset Longitude: E 26° 43' 24.77"
Road
Offset Distance: 100 m



E 26° 43' 27.75"
S 27° 04' 20.80"
Photo Direction: NW 305°
03/01/2017
7:45:12 AM

Offset Latitude: S 27° 04' 17.51"
Offset Longitude: E 26° 43' 28.07"
Corn
Offset Distance: 100 m

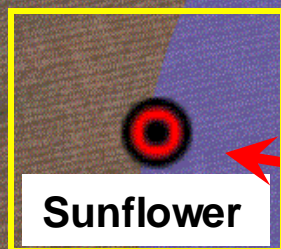


E 26° 43' 28.07"
S 27° 04' 20.75"
Photo Direction: N 0°
03/01/2017
7:44:57 AM



Training Site = Sample Box = 90-meters x 90-meters

**GPS Offset =
Training Site Sample =
3-pixels by 3-pixels =
90-meters by 90-meters**



150-m

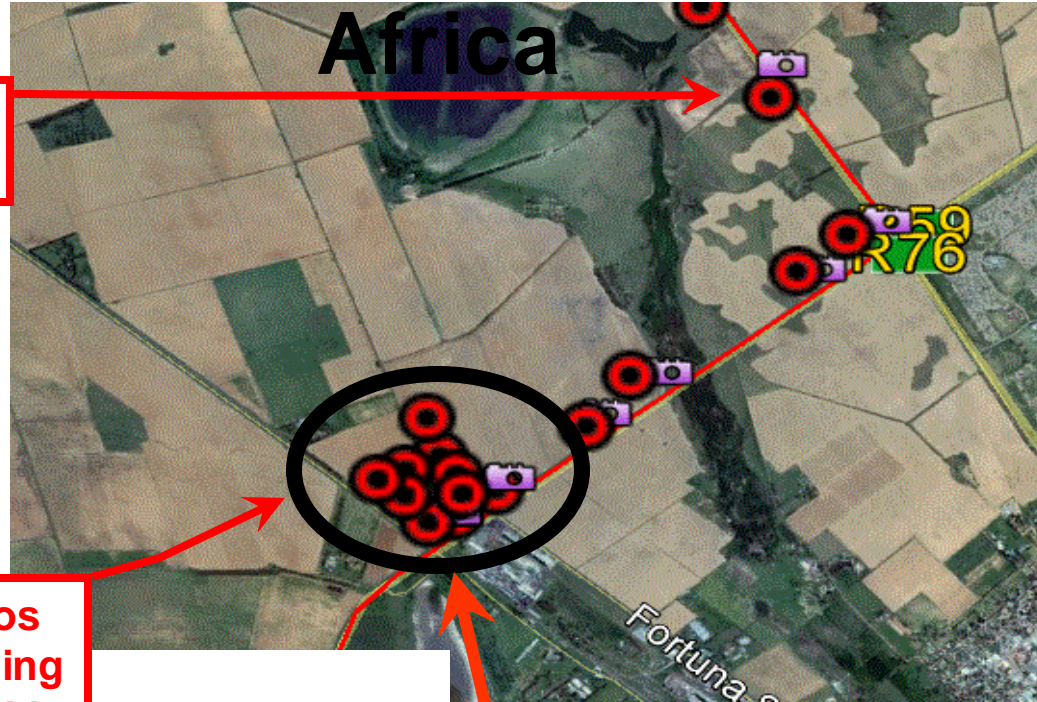
90-m



Corn



Corn Training Sites at Viljoenskroon, South



Roadside Photos & GPS "Training Sites".

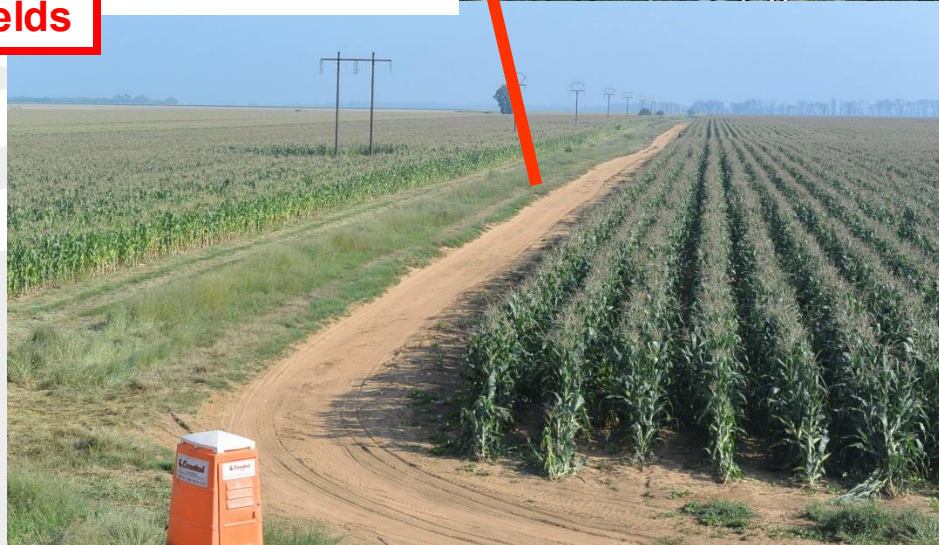
Several GPS Photos Relocated to "Training Sites" for Maize Fields



GPS Photos on Roadside



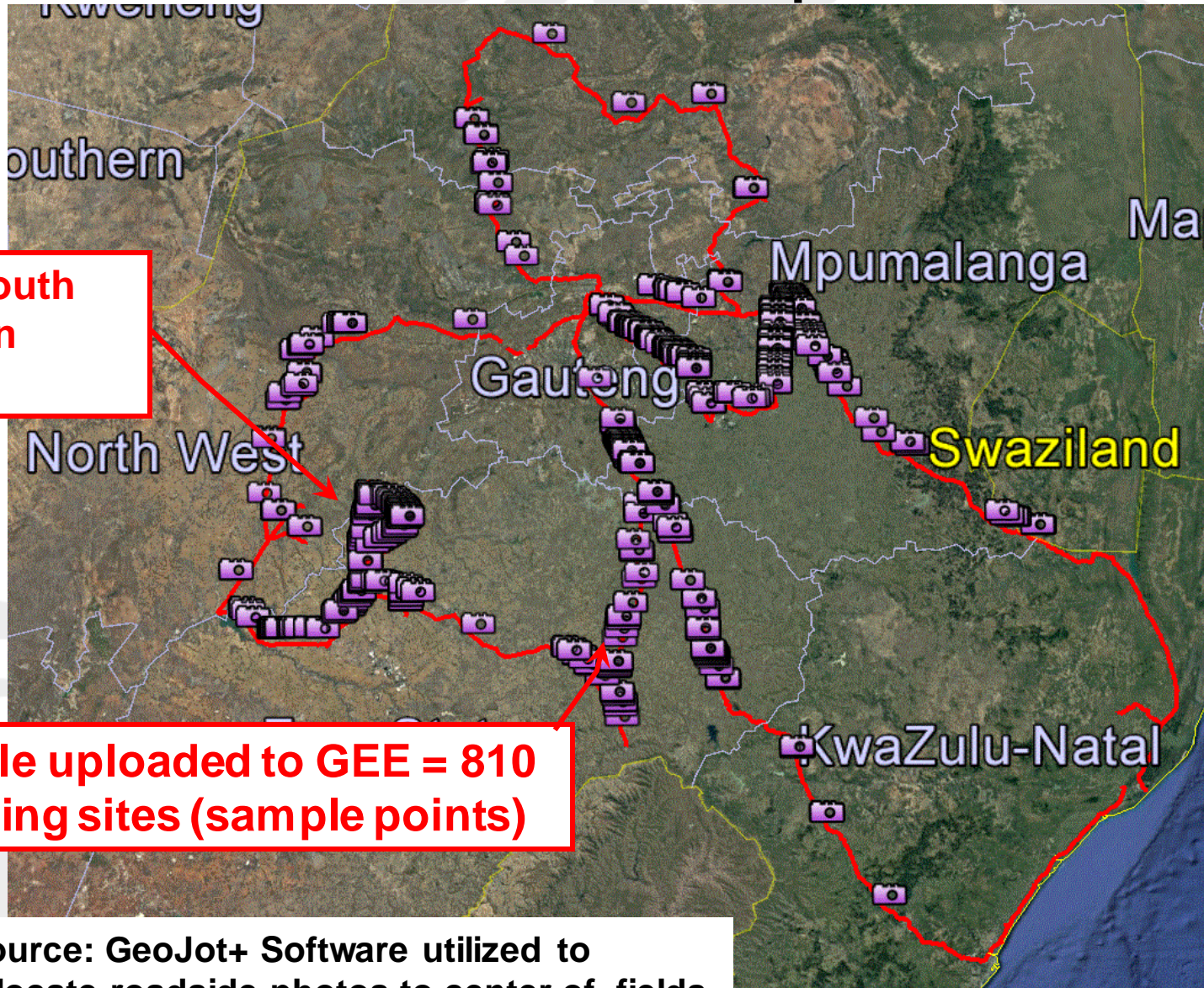
"Training Sites" with GPS Field Locations & Crop Type



E 26° 54' 42.81"
S 27° 12' 00.29"

03/01/2017
8:24:20 AM

Roadside Corn Photos Collected from Feb 27-Mar 10, 2017; Relocated to Center of Fields and Uploaded to GEE



Photos in South Africa's main maize belt.

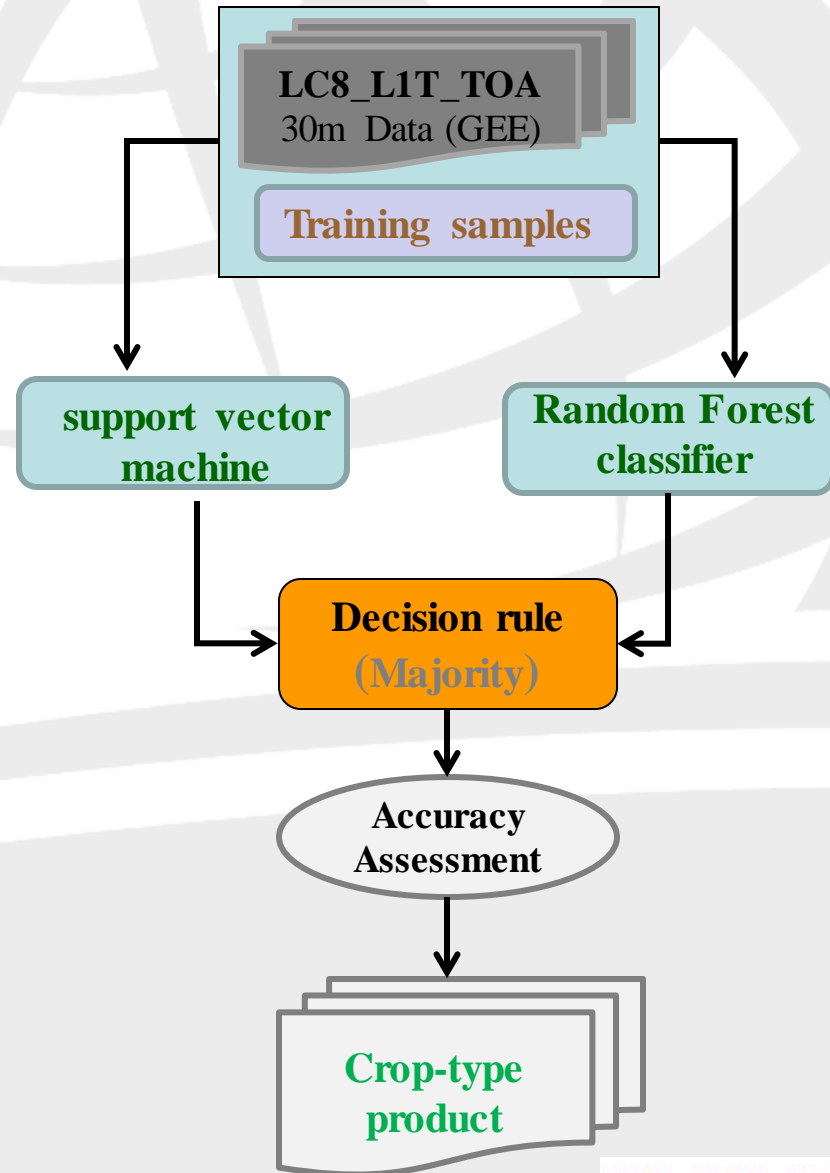
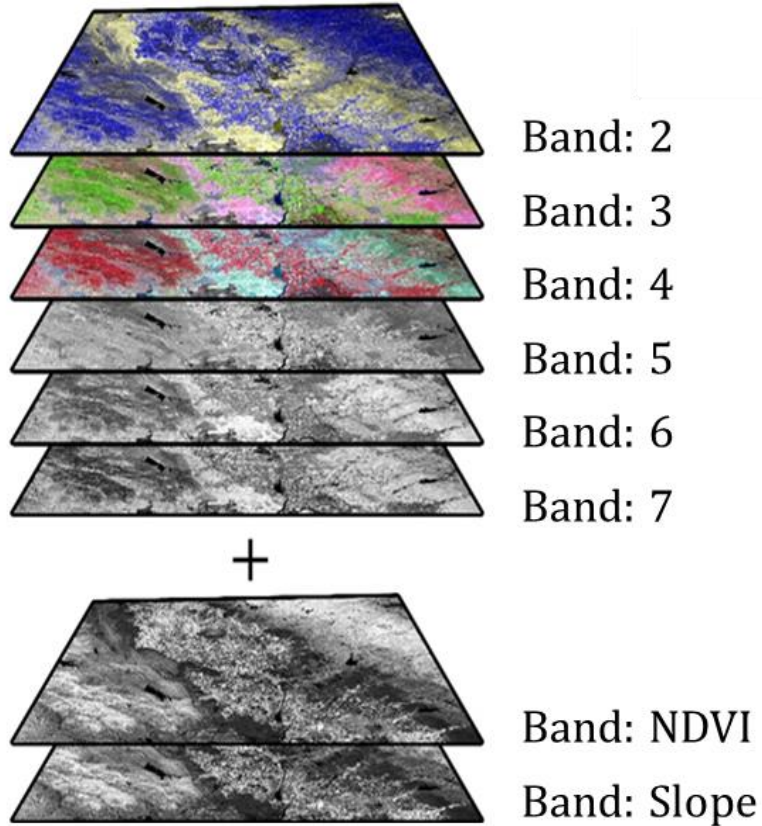
 **KML file uploaded to GEE = 810 maize training sites (sample points)**

Source: GeoJot+ Software utilized to relocate roadside photos to center of fields

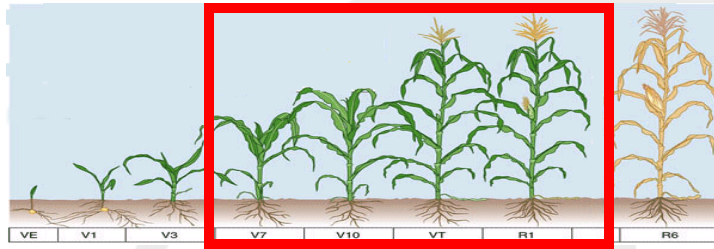


Ensemble Classification on GEE

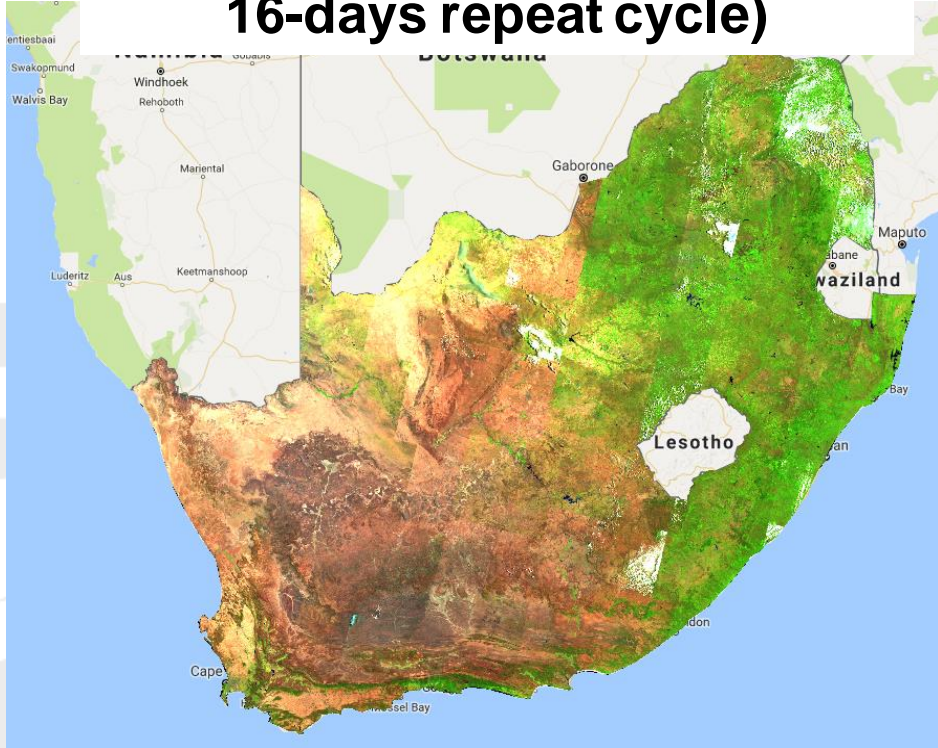
Landsat bands and indices



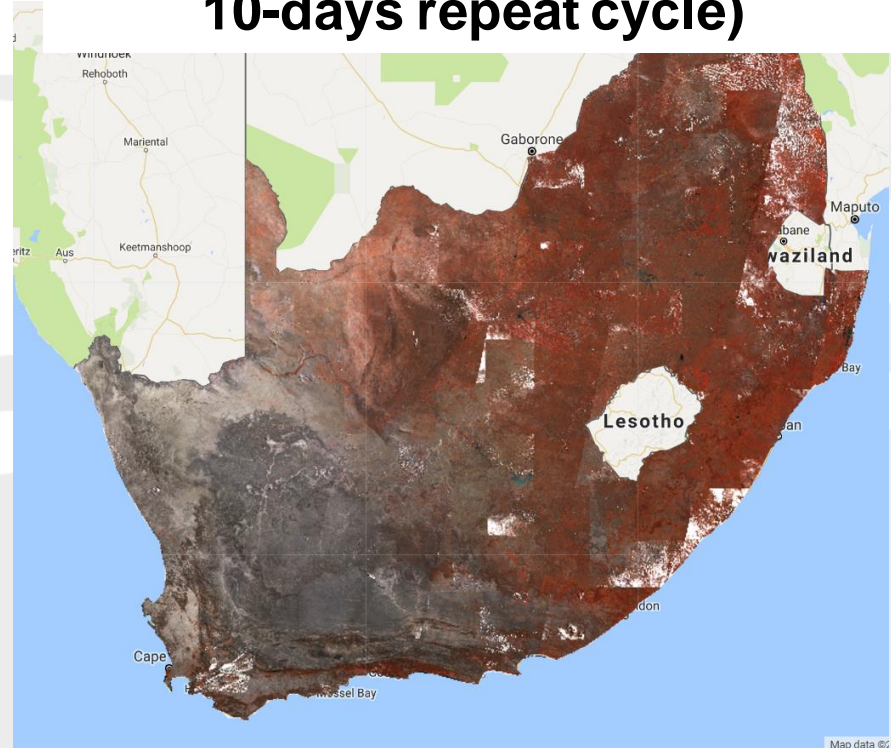
Landsat-8 & Sentinel-2 Imagery on GEE



Landsat-8 (Jan 1- Mar 30, 2017)
(30-meters, bands 2-7,
16-days repeat cycle)

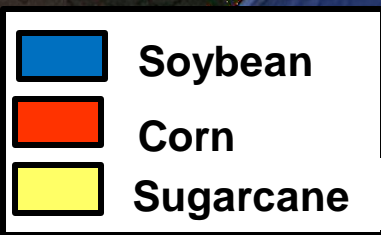
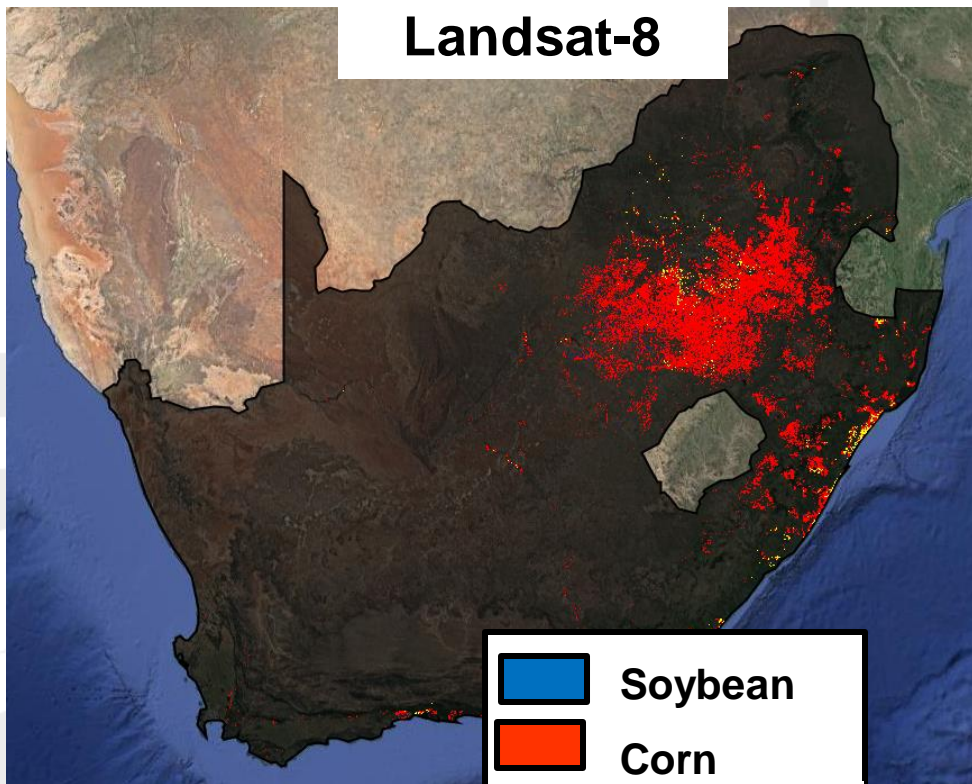


Sentinel-2 (Feb 1- Mar. 30, 2017)
(10-meters, bands 6,5,4,
10-days repeat cycle)

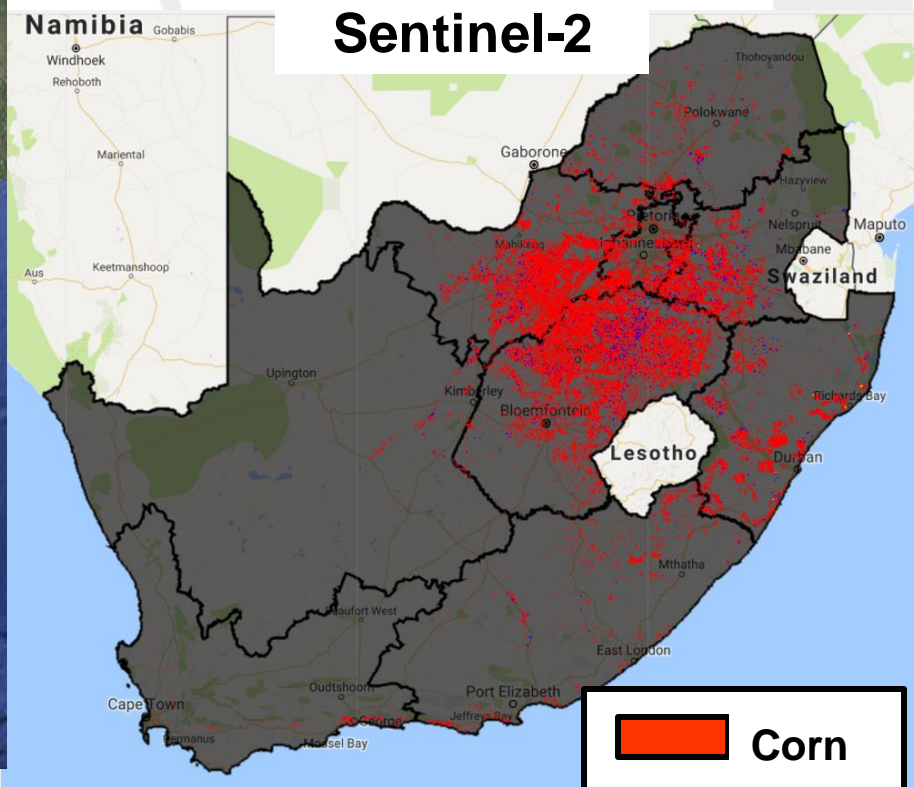


Corn Area (L-8) = Corn Area (S-2A) = South Africa Crop Estimates Committee (Aerial Survey)

Landsat-8



Sentinel-2



ESRI's ArcPro 1.4 (ArcMap 10.5) = Segmentation & Object-Oriented Classification



Training Sites for South Africa (March 2018)

South Africa (March 2018)

Landsat

Sentinel-2A/2B
(not yet on ESRI's cloud)

Corn area estimates (March 2018)

= ESRI(L-7/8-30m) = ESRI(S-2A/2B-10m)
= GEE(L-7/8-30m) = GEE(S-2A/2B-10m)



Complement National Crop Area Statistics with Supervised Classifications on GEE

- Free Landsat (30-m) and Sentinel-2 (10-m) Imagery
 - *Increased image frequency matters for higher classification accuracy!*
- Free GEE Cloud Storage & Computing Power.
- Collect & upload *training sites* during *mid-season*.
 - Roadside GPS photos to training sites.
- Finalize with *end-of-season* products.
 - Classified Geotiff image after each crop season.
 - Extract crop area statistics by Administration Unit

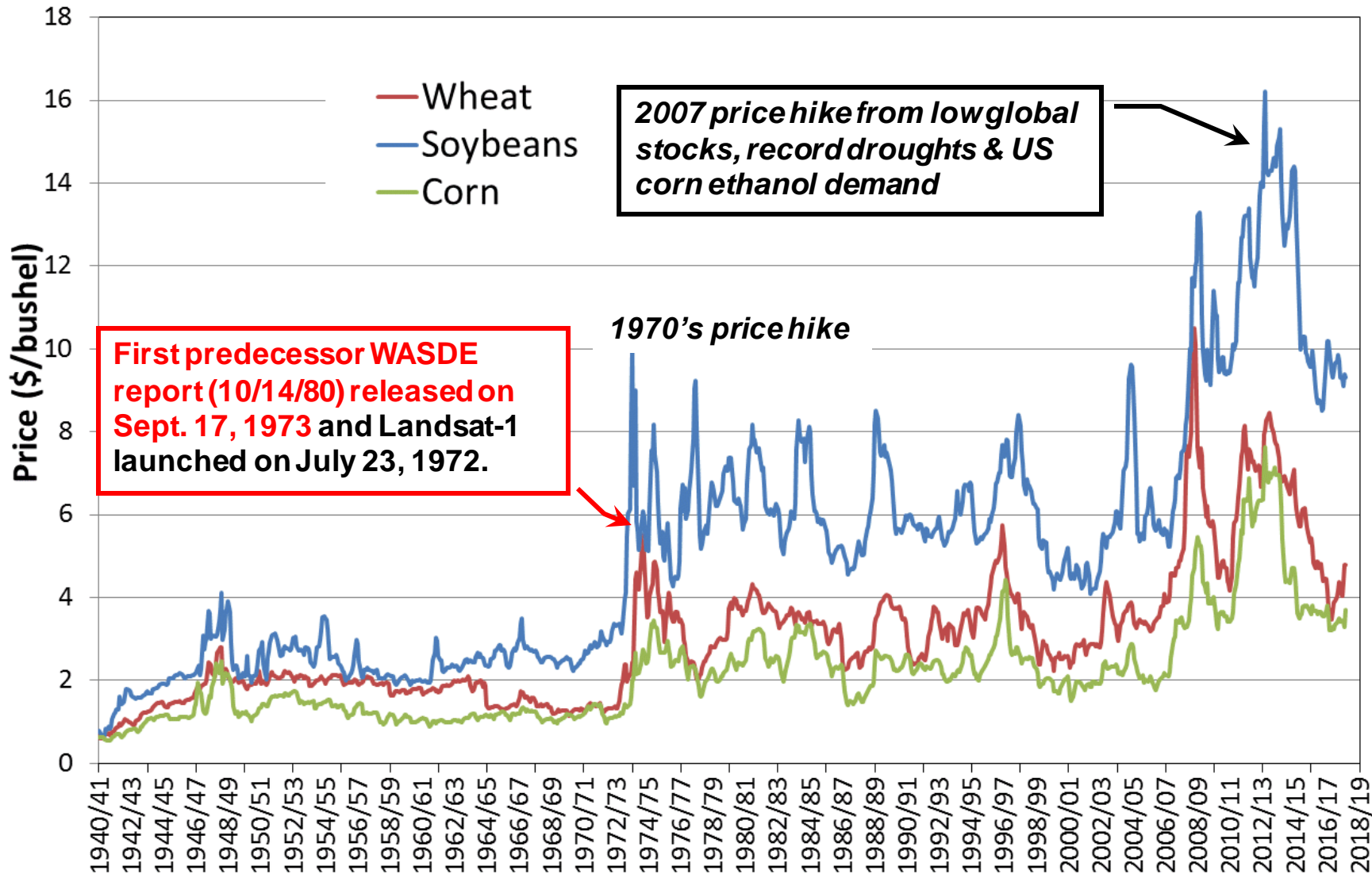
The Day of Lock-up

- **Why:** Maintain data integrity & protect market sensitive information.
- **How often:** Monthly
- **When:** Second week of month, between 9-12th.
- **Where:** Secured wing in South Building, 5th floor.
- **What:**
 - Incorporate NASS domestic estimates.
 - Secretary of Agriculture & Chief Economist briefed at 11:30 a.m..
 - WASDE report released 12 Noon.
 - FAS reports & databases released between 12:00 - 1:00 p.m.
- **NASS & WAOB Lockup Slides available at:**
 - https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf
 - http://www.usda.gov/oce/commodity/wasde/Secretary_Briefing.pdf



WASDE Provides Global Information for Price Stability

Average Monthly Price Received by US Farmers (\$/bushel)

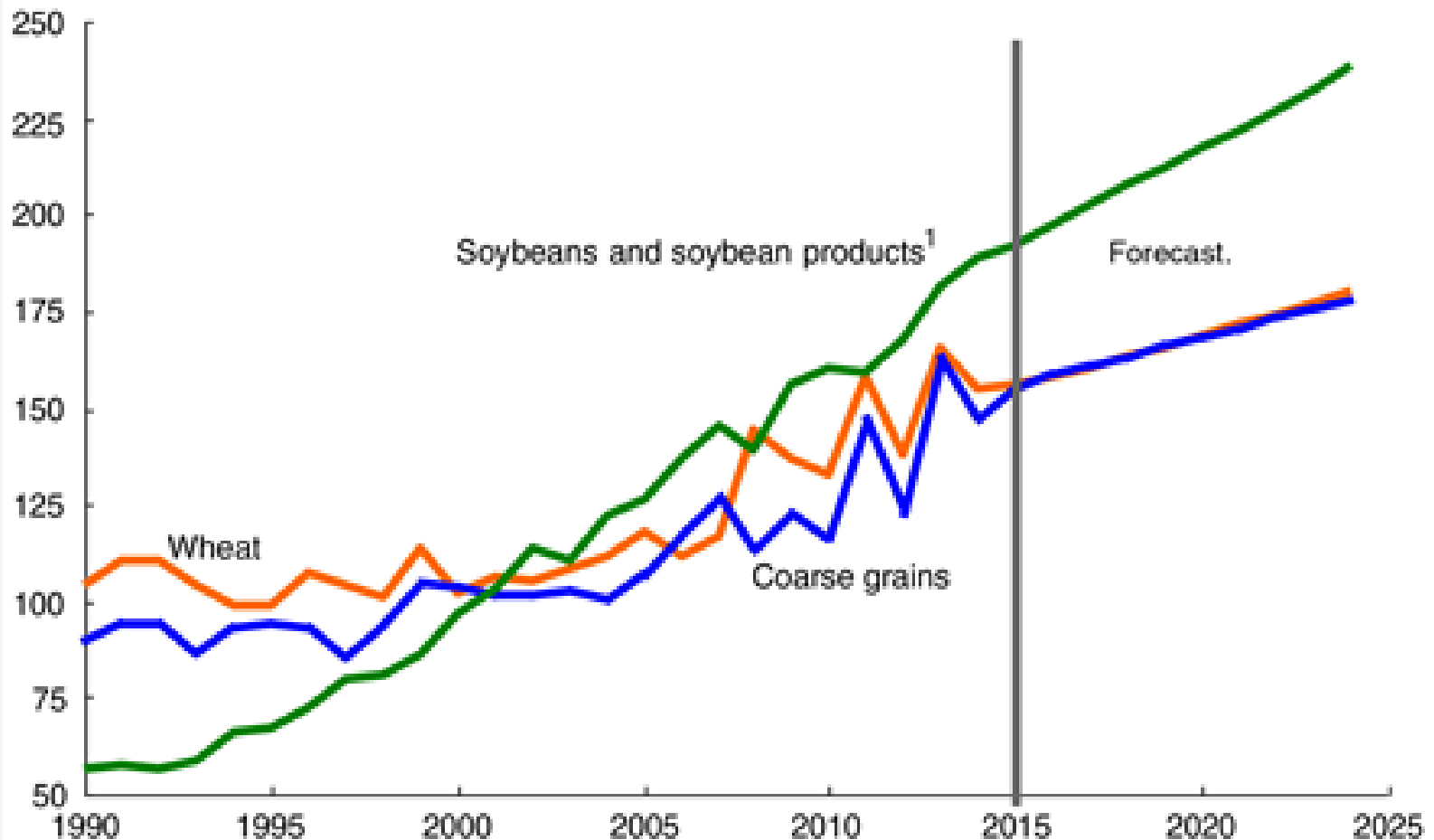


Source: USDA/NASS Agricultural Prices
http://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/



Global trade of wheat, coarse grains, and soybeans and soybean products

Million metric tons

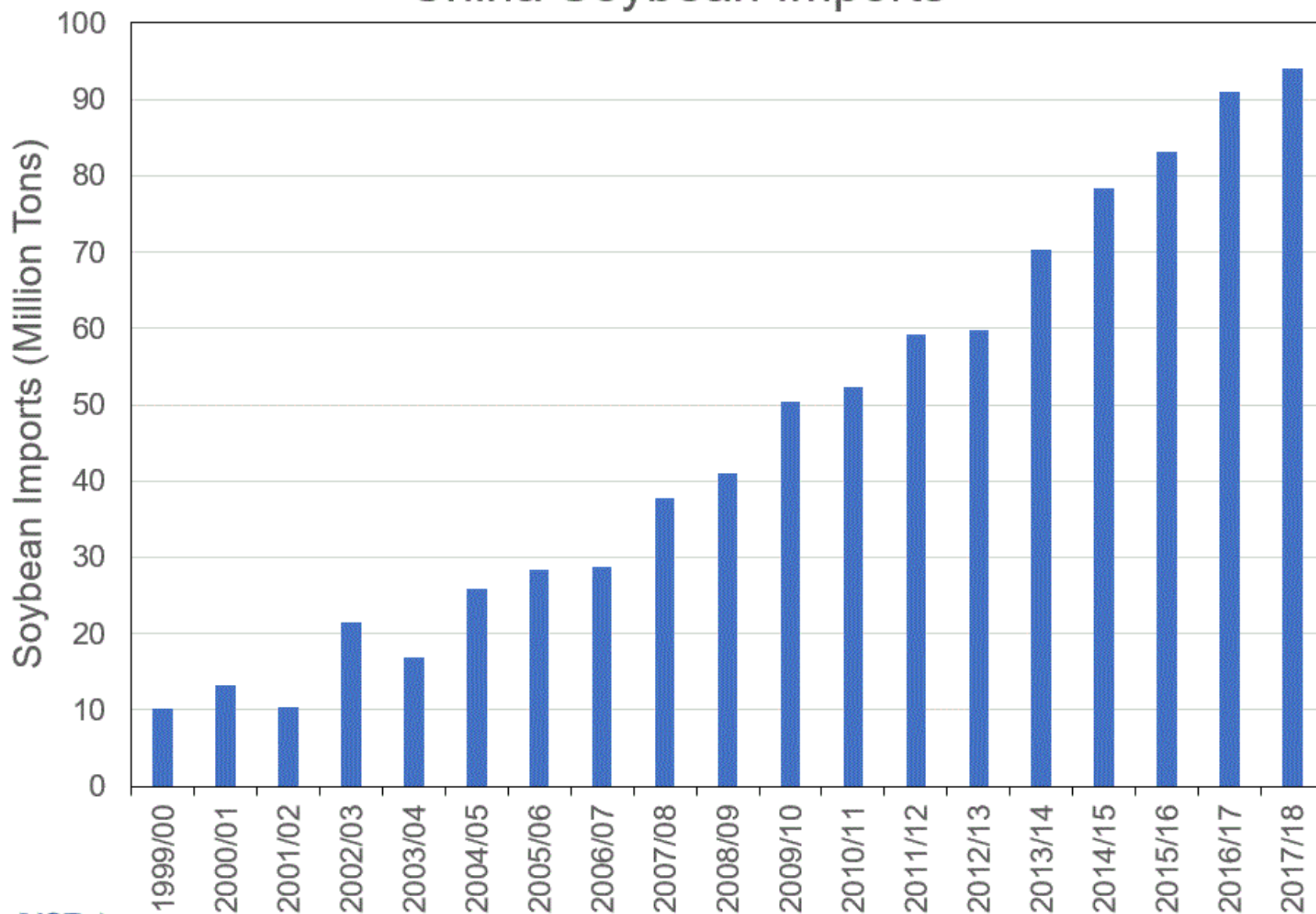


Note: Data for 2015-2024 are forecast.

¹Total of soybeans, soybean meal, and soybean oil

Source: USDA, Economic Research Service, Agricultural Projections to 2024, February 2015.

China Soybean Imports

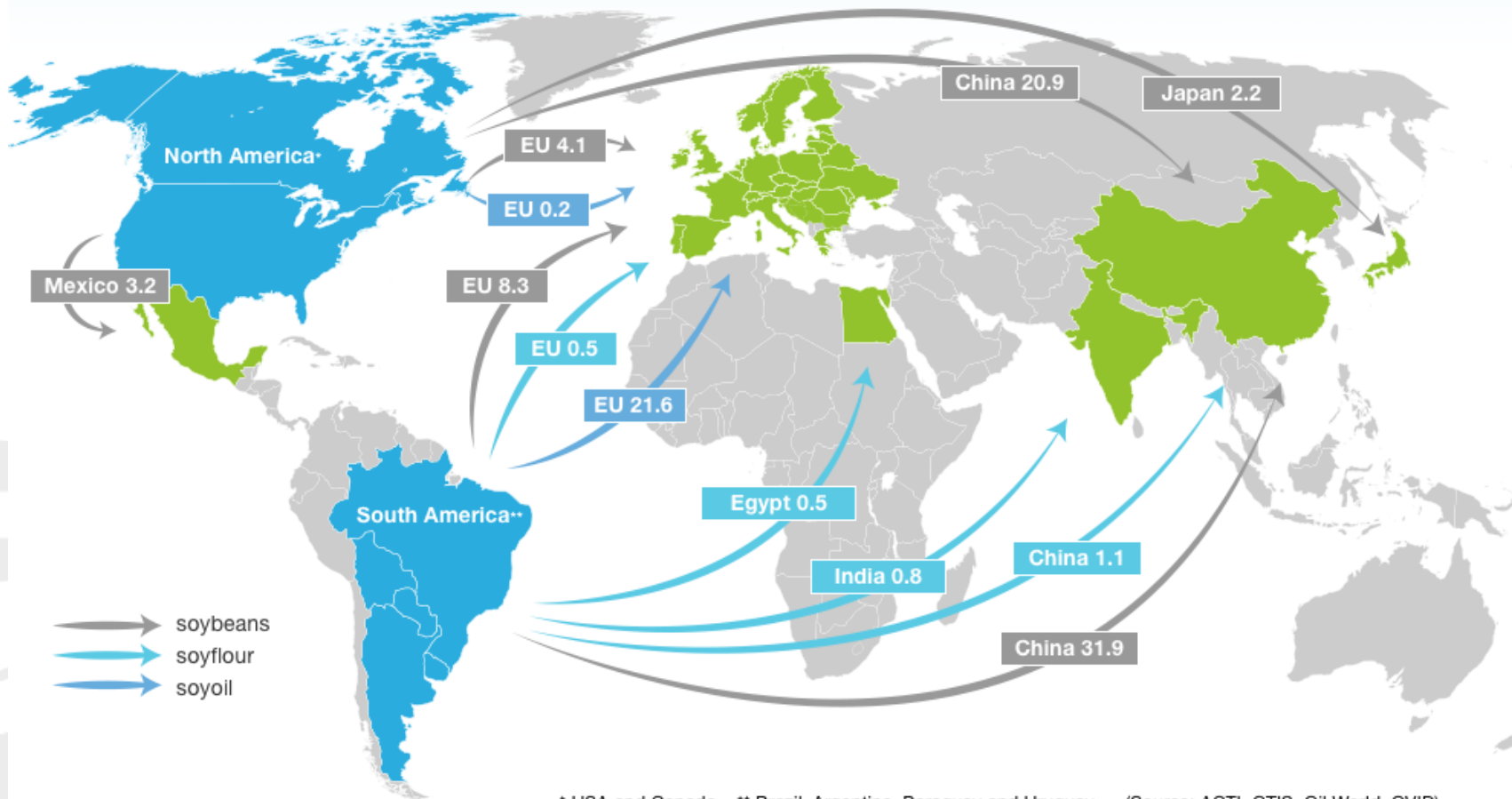


Source: USDA's PSD Online-<https://apps.fas.usda.gov/psdonline/app/index.html#>

Global Soybean Trade

Increasing meat consumption driving up soybean exports

Soybean trade 2011/12 (in million tons)



* USA and Canada ** Brazil, Argentina, Paraguay and Uruguay (Source: ACTI, GTIS, Oil World, OVID)

USDA's Marketing Year Cycle

- ~ February 20th: USDA's Outlook Conference
- ~ May 10th: WASDE begins new Marketing Year
- ~ August 10th: WASDE/NASS releases objective yield estimates for corn, soy, cotton and winter wheat. Free Sentinel-2A (2016).
- ~January 10th: WASDE/NASS releases final annual estimates.

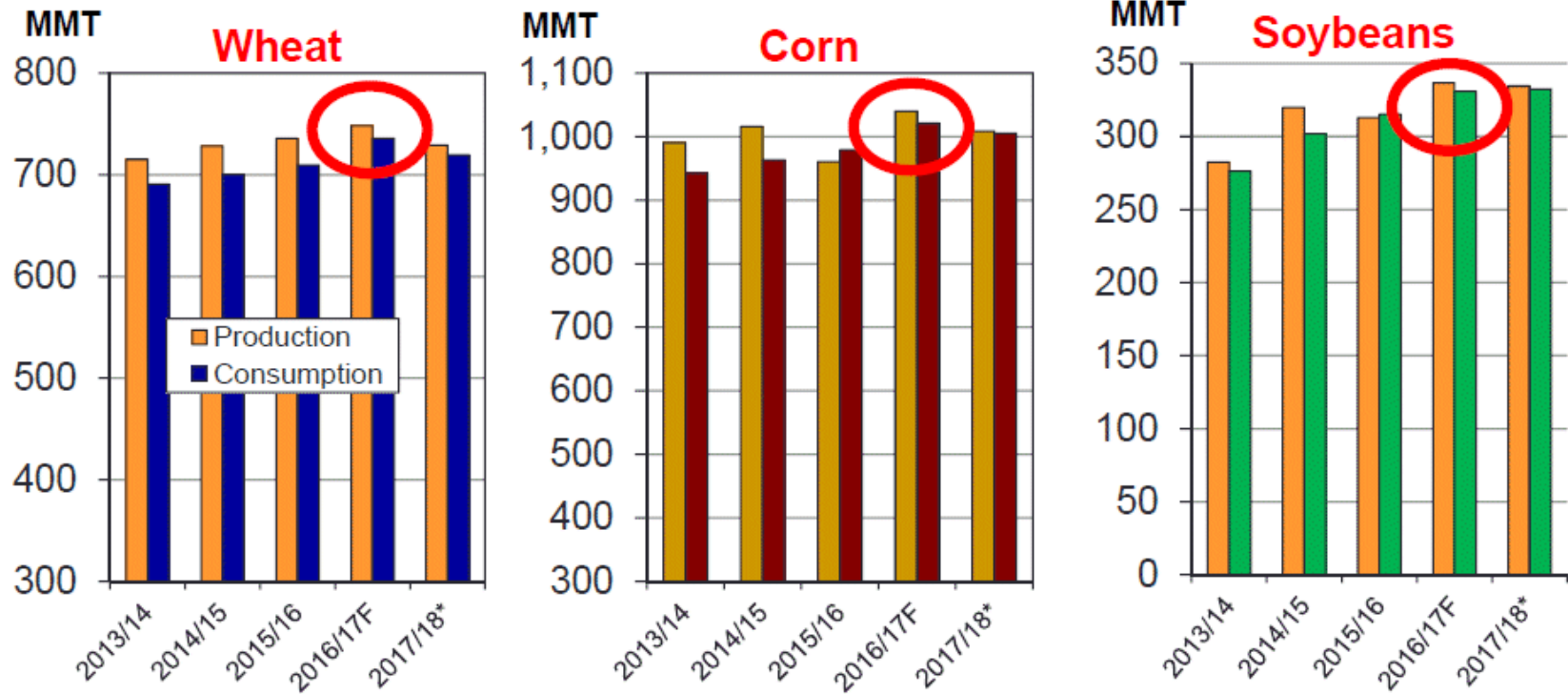


WASDE= World Agricultural Supply and Demand Estimates
<https://www.usda.gov/oce/commodity/wasde/>

USDA/FAS/OGA/IPAD

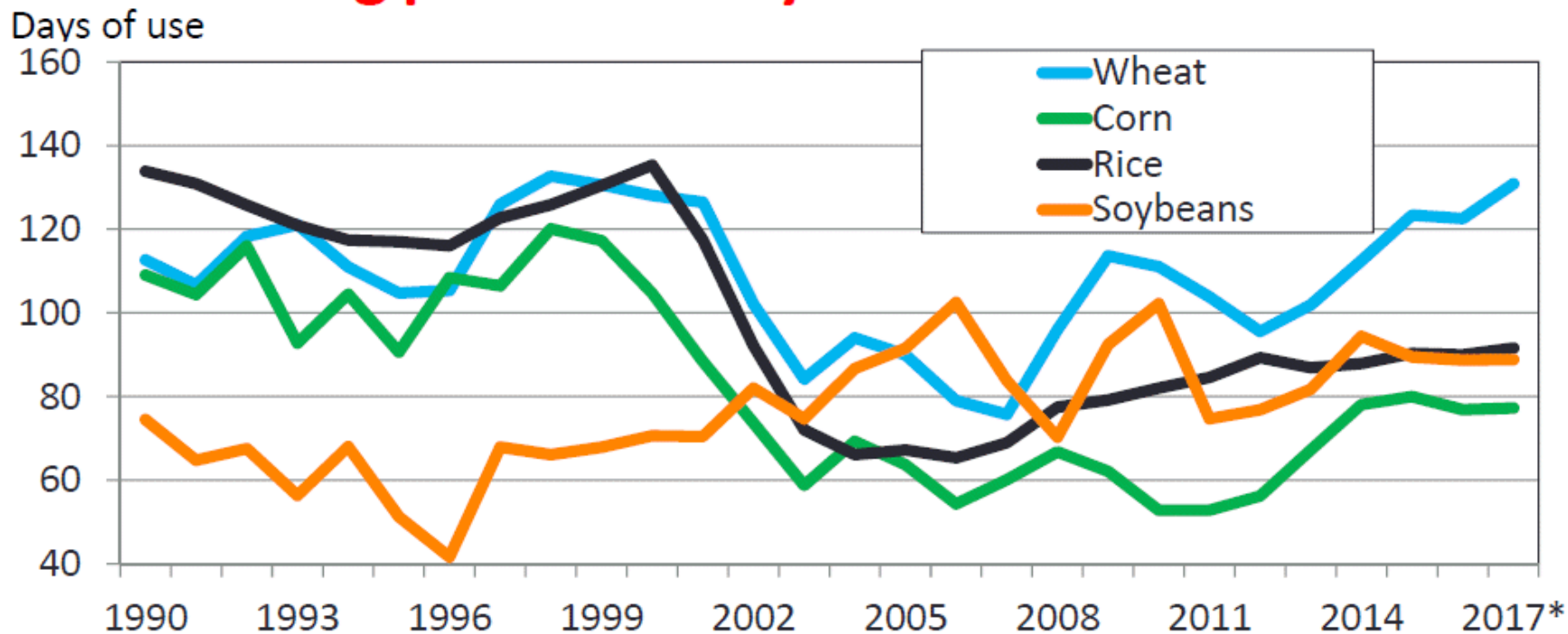


Global 2016/17 production and consumption at record highs



Data: USDA-OCE, USDA-FAS, *FAPRI data used for 2017/18 global consumption.

Global ending stocks remain above 2002/03, moderating price volatility



Data: USDA-OCE, USDA-FAS, *FAPRI data used for 2017/18 global consumption.

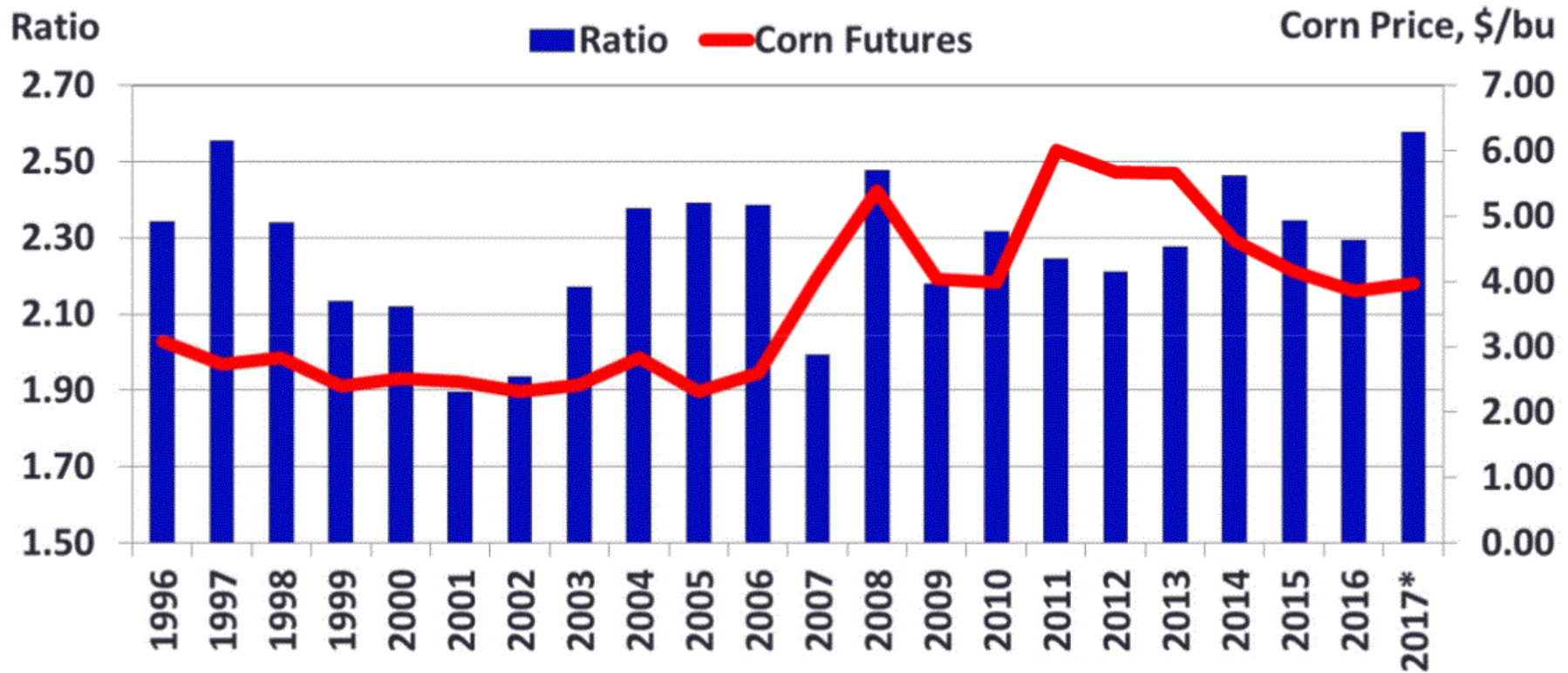


Source: USDA's Outlook Conference, Feb. 23, 2017
https://www.usda.gov/oce/forum/past_speeches/2017/index.htm

USDA/FAS/OGA/IPAD



New Crop Soybean-to-Corn Ratio During February



Data: USDA-OCE.

Source: USDA's Outlook Conference, Feb. 23, 2017
https://www.usda.gov/oce/forum/past_speeches/2017/index.htm

USDA/FAS/OGA/IPAD

Cropland area down again from last year

Crop (mil. acres)	2012	2013	2014	2015	2016	2017F	%Δ
Corn	97.3	95.4	90.6	88.0	94.0	90.0	-4.3%
Soybeans	77.2	76.8	83.3	82.7	83.4	88.0	5.5%
Wheat	55.3	56.2	56.8	55.0	50.2	46.0	-8.3%
All cotton	12.3	10.4	11.0	8.6	10.1	11.5	14.2%
Other feedgrains	12.6	14.6	12.9	15.2	12.6	11.7	-7.1%
Rice	2.7	2.5	3.0	2.6	3.2	2.6	-17.4%
Total 8 crops	257.4	255.9	257.6	252.1	253.4	249.8	-1.4%
CRP	29.5	26.8	25.5	24.2	23.8	23.5	-1.3%
8 crops + CRP	286.9	282.7	283.1	276.3	277.2	273.3	-1.7%

Source: USDA-OCE. All cotton, includes both upland and ELS cotton.



Source: USDA's Outlook Conference, Feb. 23, 2017
https://www.usda.gov/oce/forum/past_speeches/2017/index.htm

USDA/FAS/OGA/IPAD



U.S. Soybean Supply and Demand

	2016/17 estimate	2016/17 change from July 12	2017/18 forecast	2017/18 change from July 12	Change from 2016/17
Planted area (million acres)	83.4	--	89.5	--	6.1
Harvested area (million acres)	82.7	--	88.7	1.4	6.0
Yield (bushels per acre)	52.1	--	49.4	1.4	-2.7
<i>Million bushels</i>					
Beginning stocks	197	--	370	-40	174
Production	4,307	--	4,381	121	74
Imports	25	--	25	--	0
Total supply	4,528	--	4,777	81	248
Crush	1,890	-10	1,940	-10	50
Seed and residual	118	--	136	1	18
Domestic use	2,008	-10	2,076	-9	68
Exports	2,150	50	2,225	75	75
Total use	4,158	40	4,301	66	143
Ending stocks	370	-40	475	15	105
<i>Percent</i>					
Stocks to use ratio	8.9	-1.1	11.1	0.2	2.1
<i>Dollars per bushel</i>					
Average market price	9.50	--	8.45/10.15	-0.10	-0.20

-- No change

August 10, 2017

Source: WAOB, Lockup Slides, August, 2017

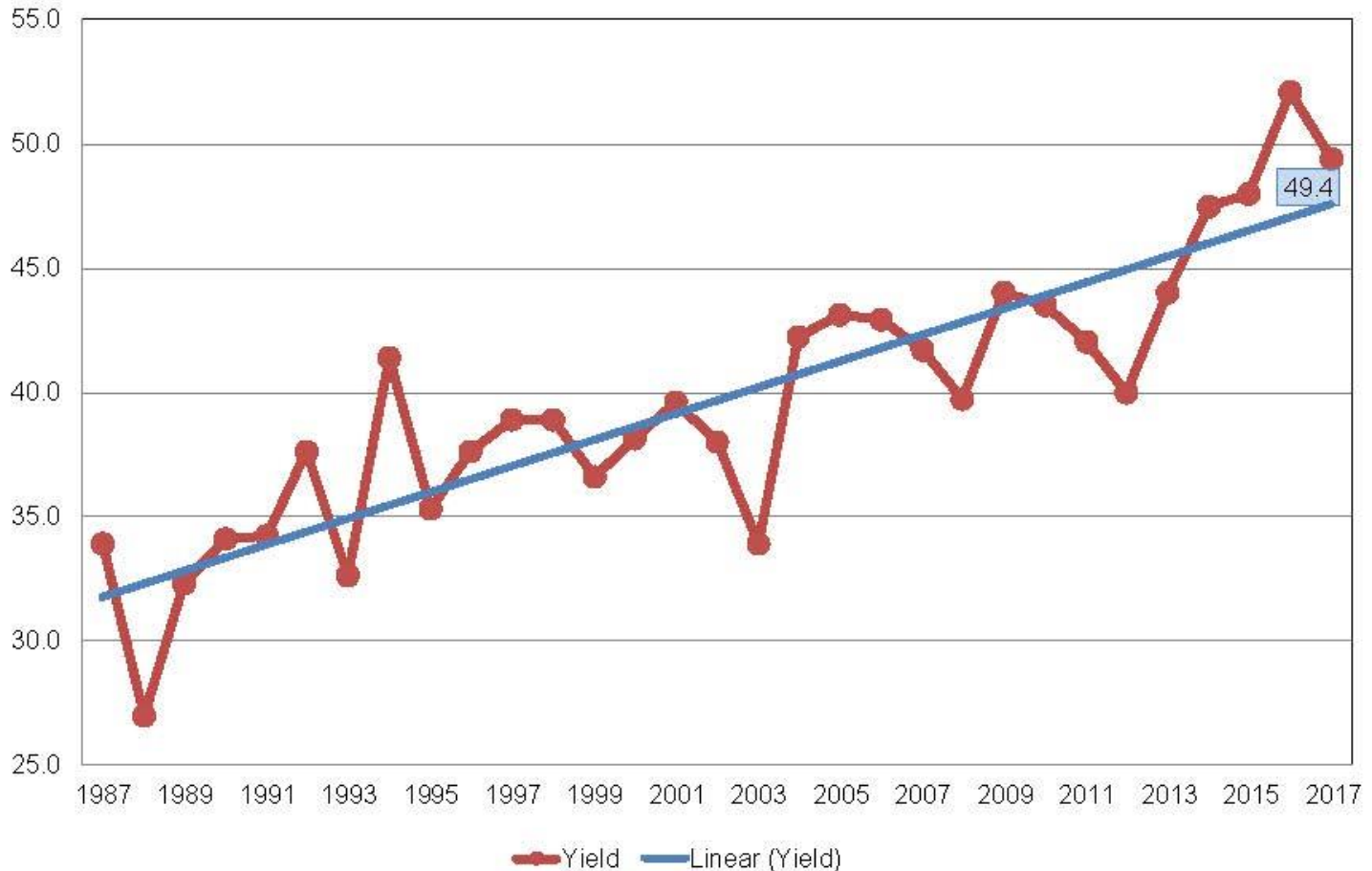
http://www.usda.gov/oce/commodity/wasde/Secretary_Briefing.pdf

USDA/FAS/OGA/IPAD



Soybean Yield United States

Bushels per Acre



USDA-NASS
8-10-17

Source: NASS, Lockup Slides, August, 2017

https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

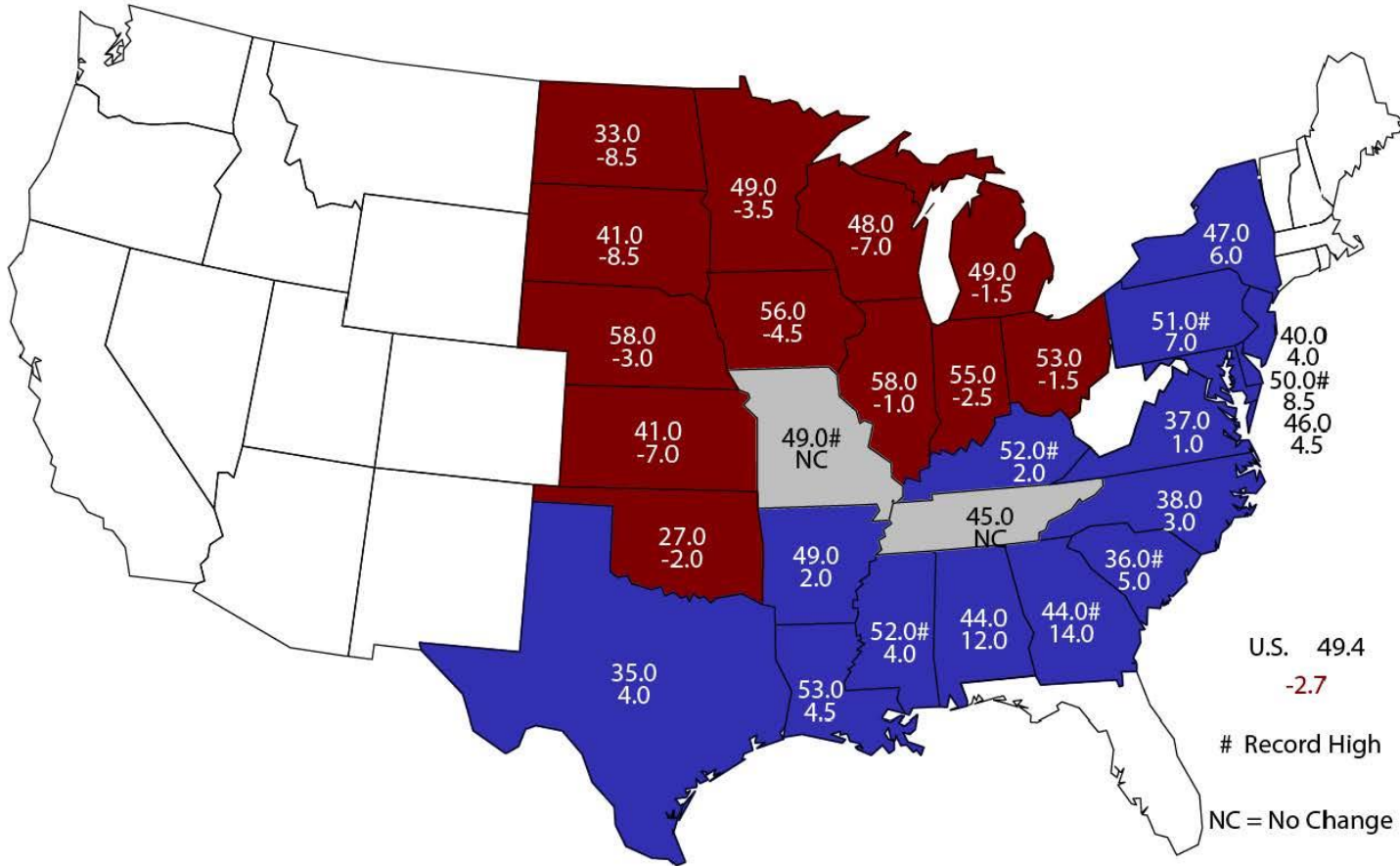
USDA/FAS/OGA/IPAD





August 1, 2017 Soybean Yield

Bushels and Change From Previous Year



U.S. 49.4
-2.7

Record High

NC = No Change

USDA-NASS
8-10-17

Source: NASS, Lockup Slides, August, 2017

https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

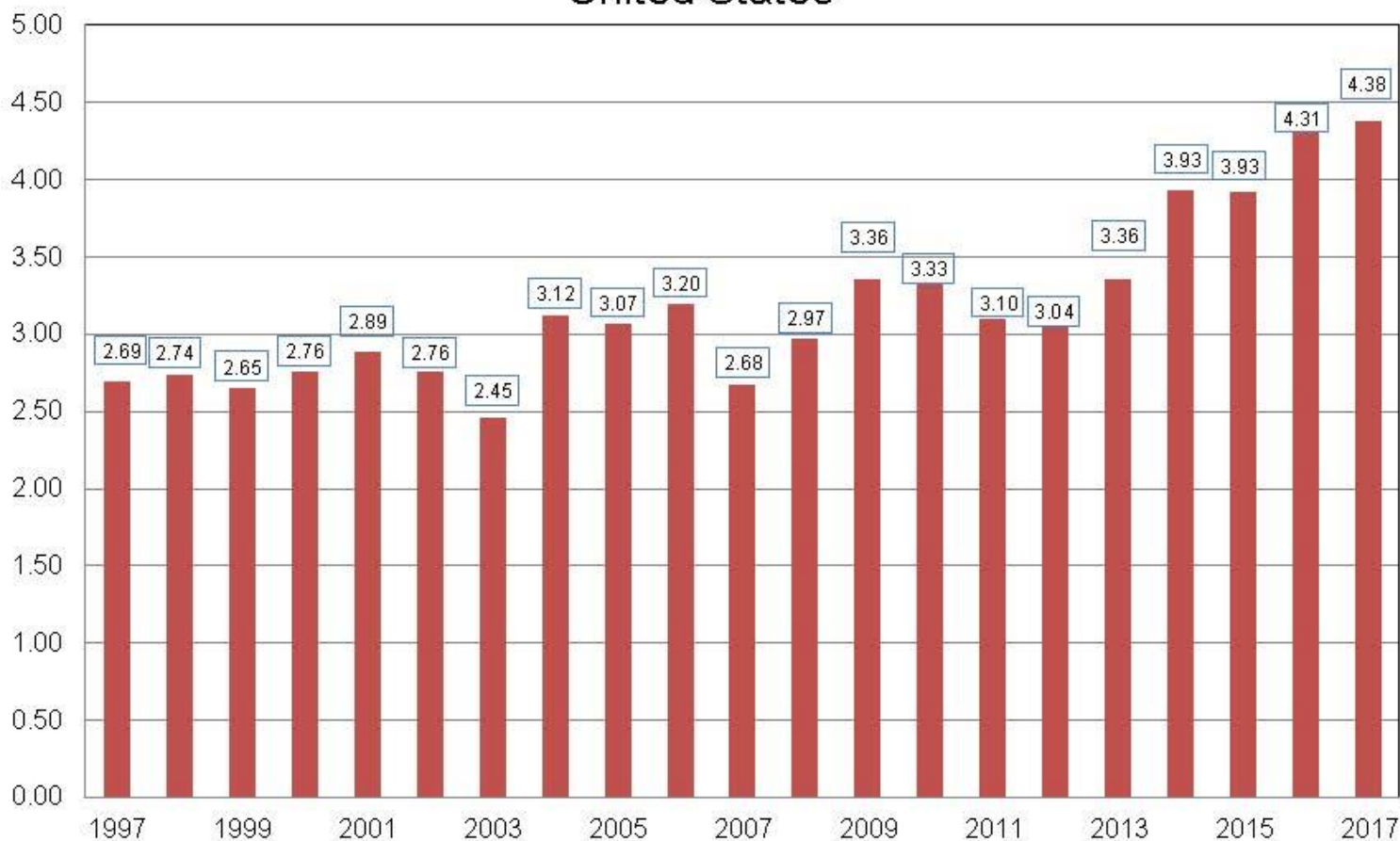
USDA/FAS/OGA/IPAD





Soybean Production United States

Billion Bushels



USDA-NASS
8-10-17

Source: NASS, Lockup Slides, August, 2017

https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

USDA/FAS/OGA/IPAD

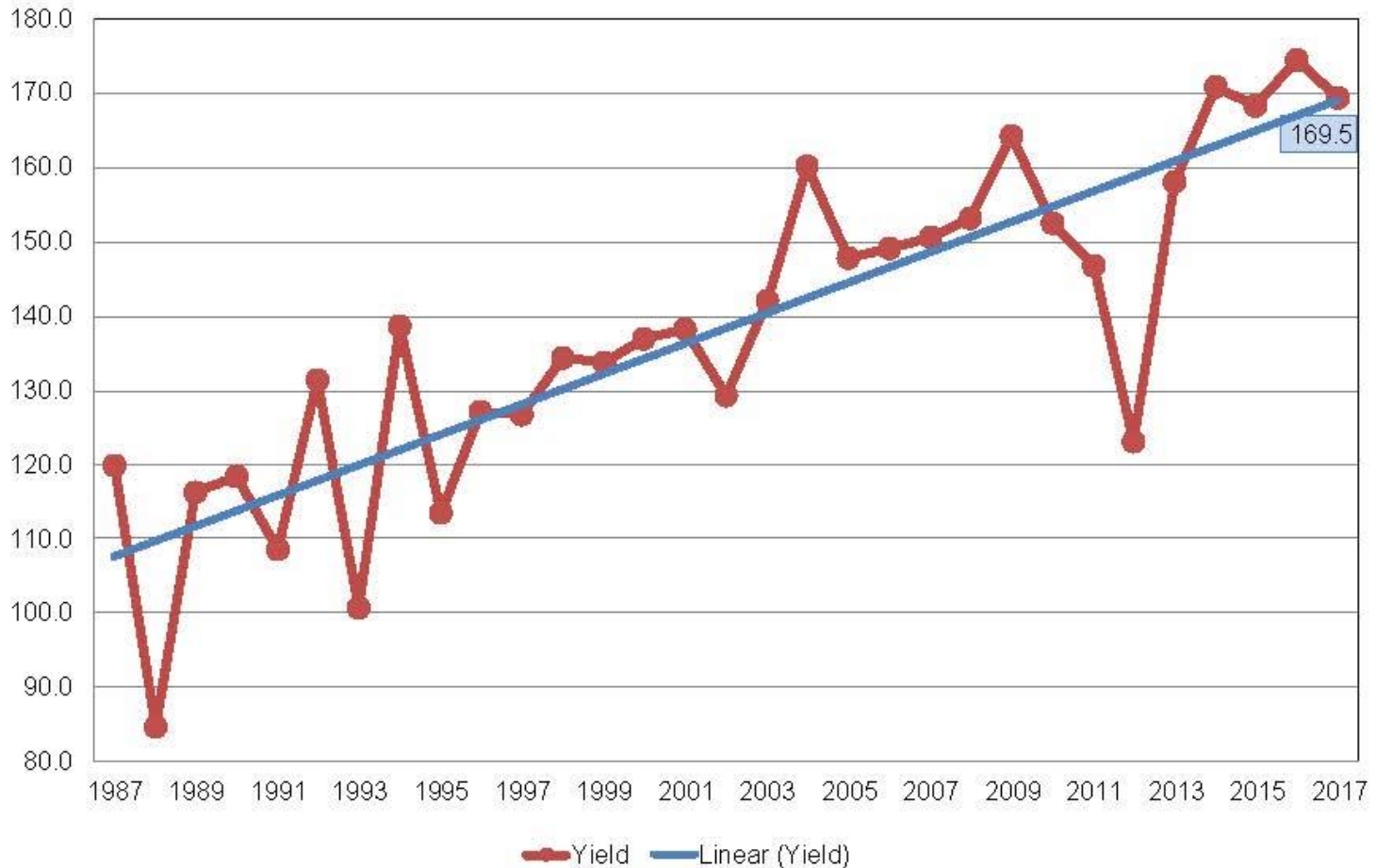




Corn for Grain Yield United States

Bushels per Acre

10 tons/ha=
~159bpa



USDA-NASS
8-10-17

Source: NASS, Lockup Slides, August, 2017

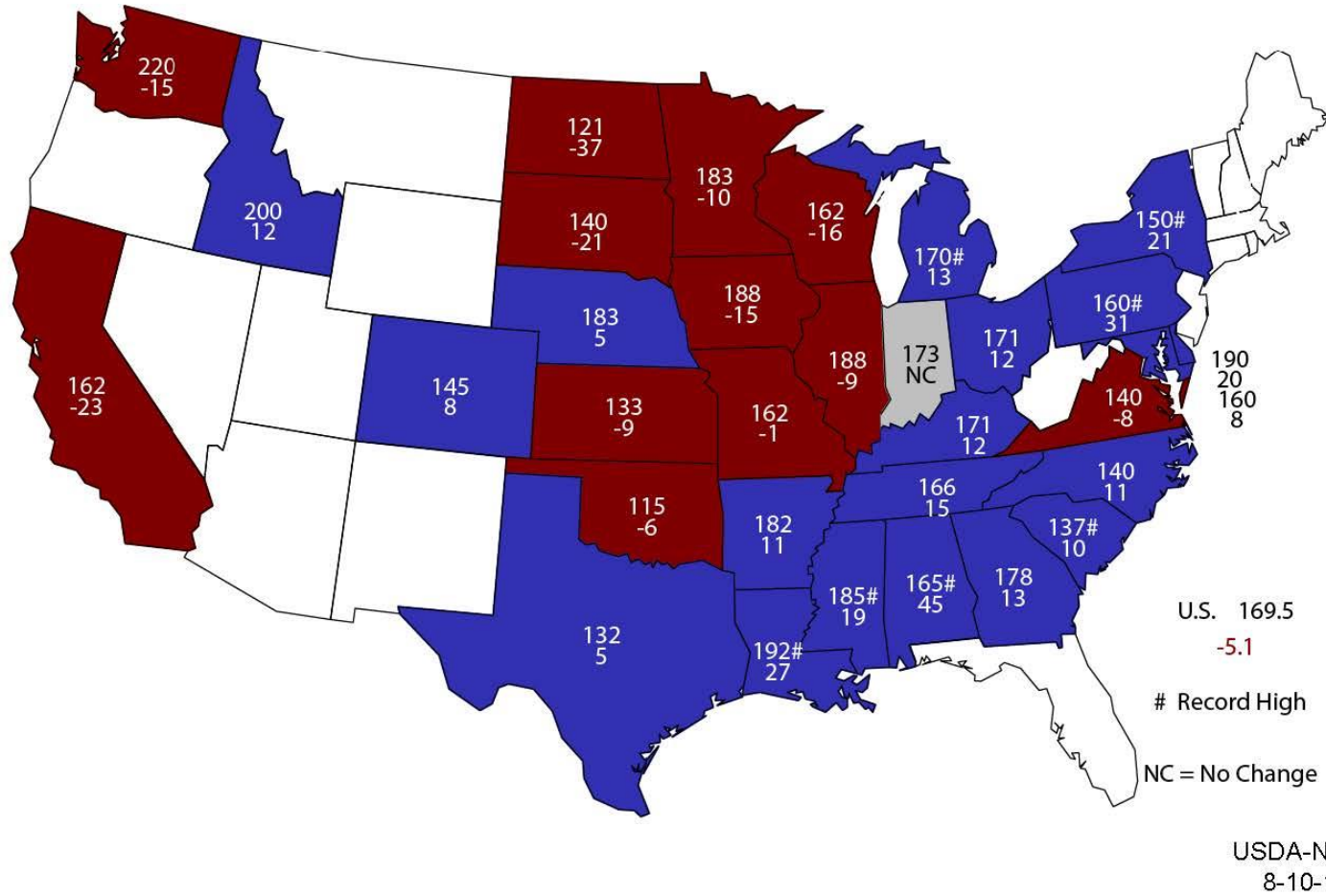
https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

USDA/FAS/OGA/IPAD





August 1, 2017 Corn Yield Bushels and Change From Previous Year



Source: NASS, Lockup Slides, August, 2017

https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

USDA/FAS/OGA/IPAD





Corn for Grain Production United States

Billion Bushels



USDA-NASS
8-10-17

Source: NASS, Lockup Slides, August, 2017

https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

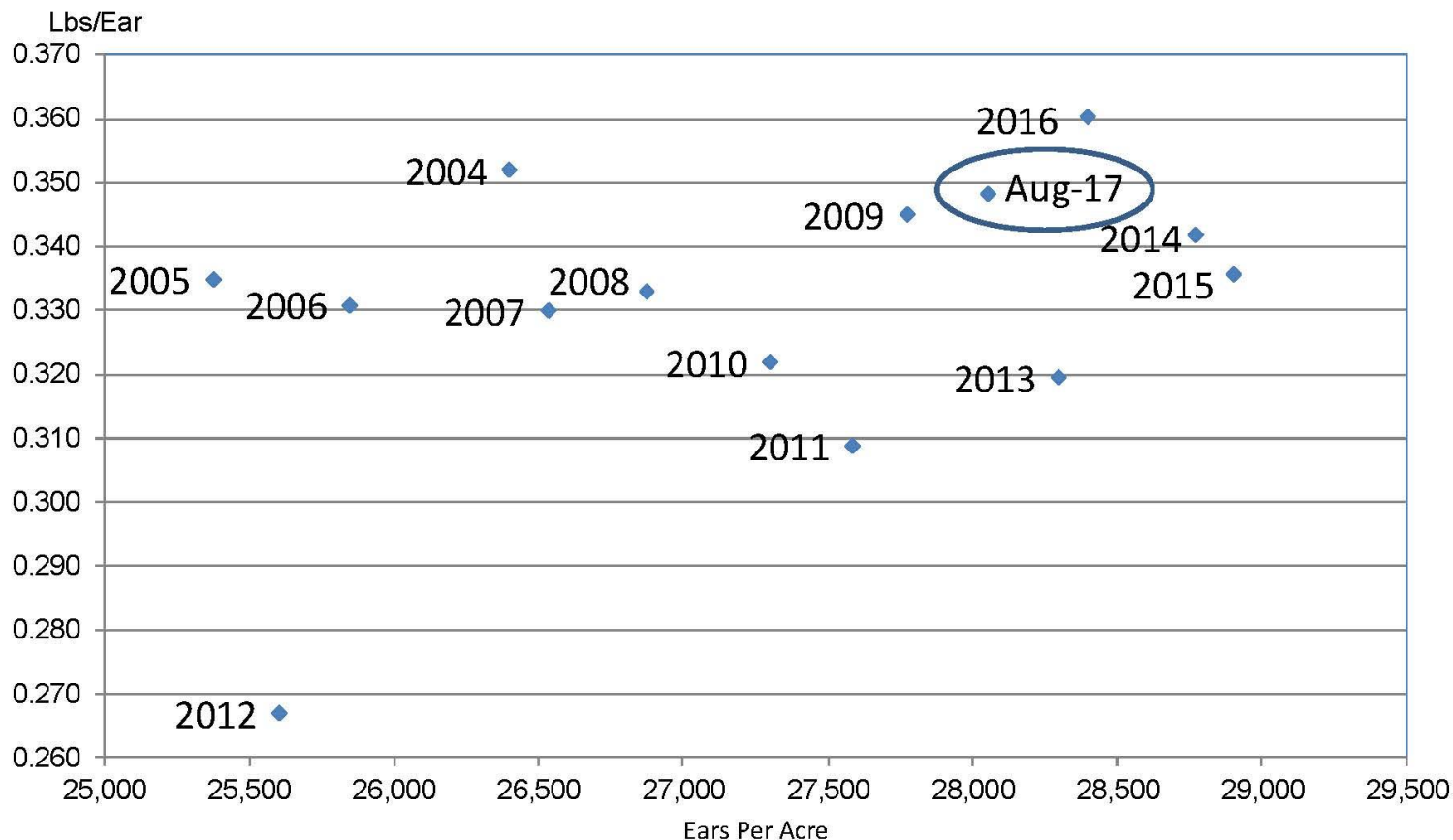
USDA/FAS/OGA/IPAD





Corn Objective Yield Region

Ears Per Acre vs. Implied Ear Weight



Implied Ear Weight = (Published Yield * 56) / Ears

USDA-NASS
8-10-17

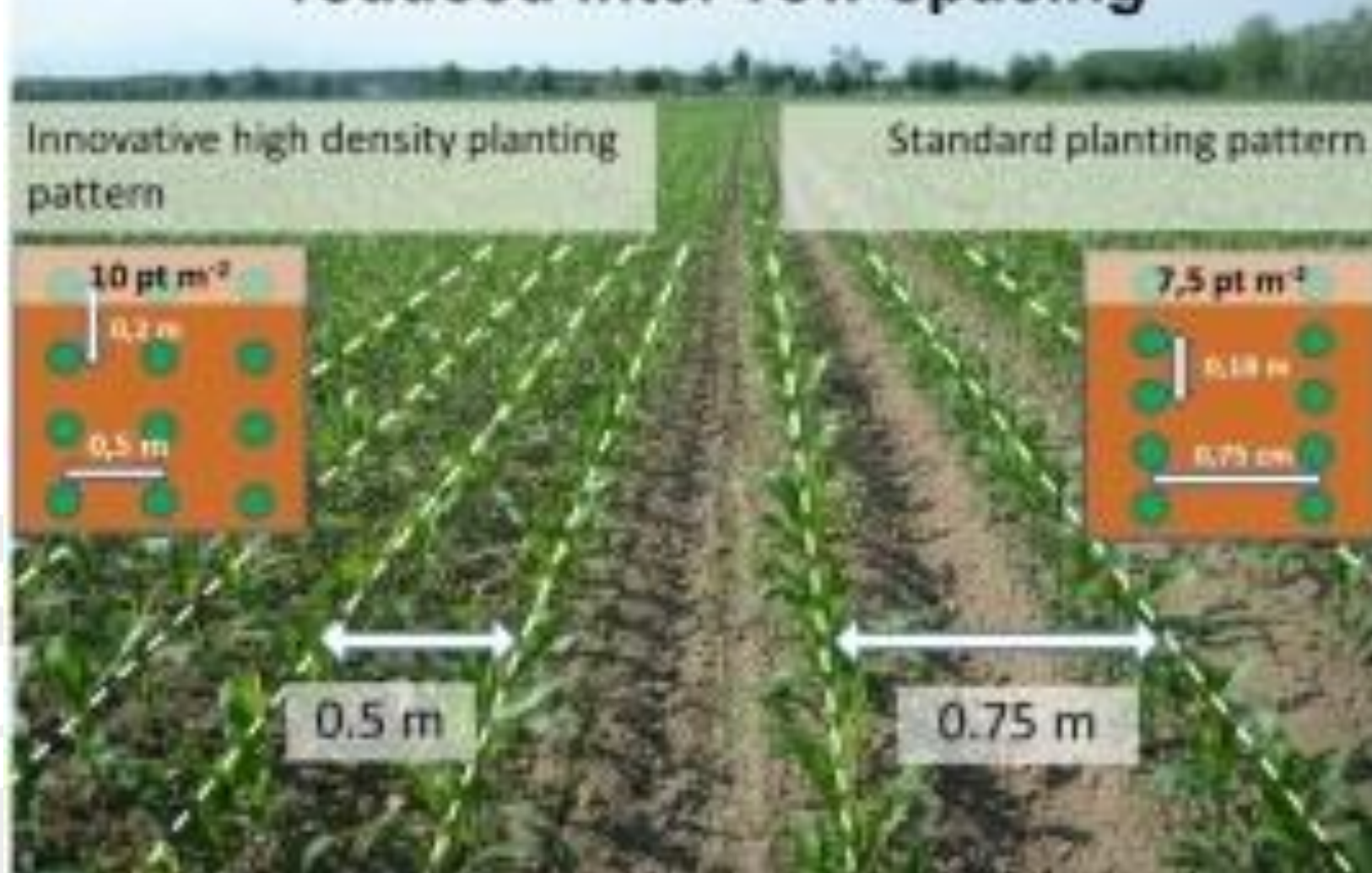
Source: NASS, Lockup Slides, August, 2017

https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

USDA/FAS/OGA/IPAD



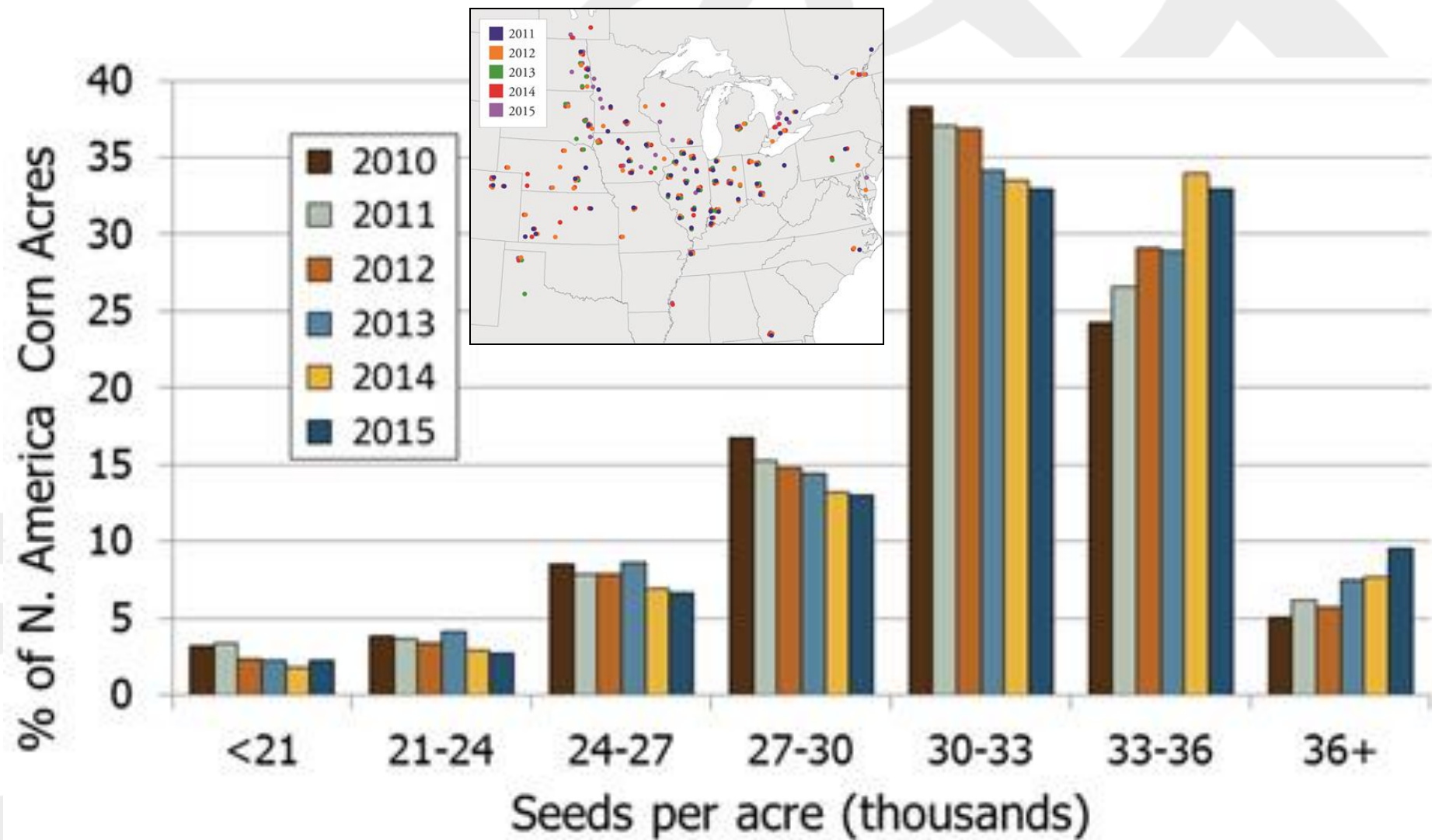
Increased planting density on reduced inter-row spacing



Source: Testa, G., et al, 2016. Maize grain yield enhancement through high plant density cultivation with different inter-row and intra-row spacings.

Volume 72, January 2016, Pages 28–37

Distribution of reported U.S. and Canada corn seeding rates



Source: Pioneer

<https://www.pioneer.com/home/site/us/agronomy/library/corn-seeding-rate-considerations/2015-5-23>

August 2017 Crop Production

Crop	Unit	August 2017	% Change From Previous Estimate	% Change From Previous Season
Winter Wheat				
Harvested	Mil Ac	25.8	NC	-14.8
Yield	Bu/Ac	50.0	+0.6	-9.6
Production	Bil Bu	1.29	+0.6	-23.0
Other Spring Wheat				
Harvested	Mil Ac	10.5	NC	-7.1
Yield	Bu/Ac	38.3	-5.0	-18.9
Production	Mil Bu	402	-5.0	-24.8
Durum Wheat				
Harvested	Mil Ac	1.86	NC	-21.4
Yield	Bu/Ac	27.2	-12.0	-38.2
Production	Mil Bu	50.5	-12.1	-51.5
All Wheat				
Production	Bil Bu	1.74	-1.2	-24.7

August 1, 2017 Other Spring Wheat Yield

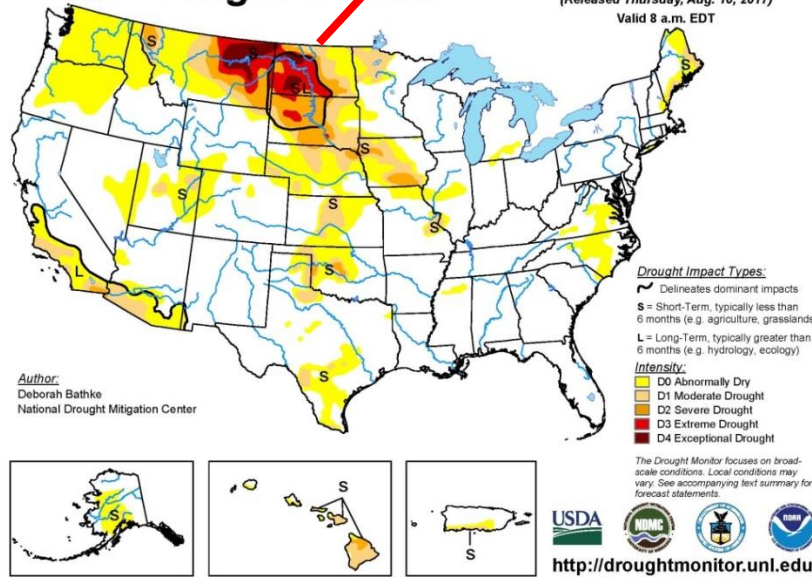
Bushels and Change From Previous Month



USDA-NASS
8-10-17

U.S. Drought Monitor

August 8, 2017
(Released Thursday, Aug. 10, 2017)
Valid 8 a.m. EDT



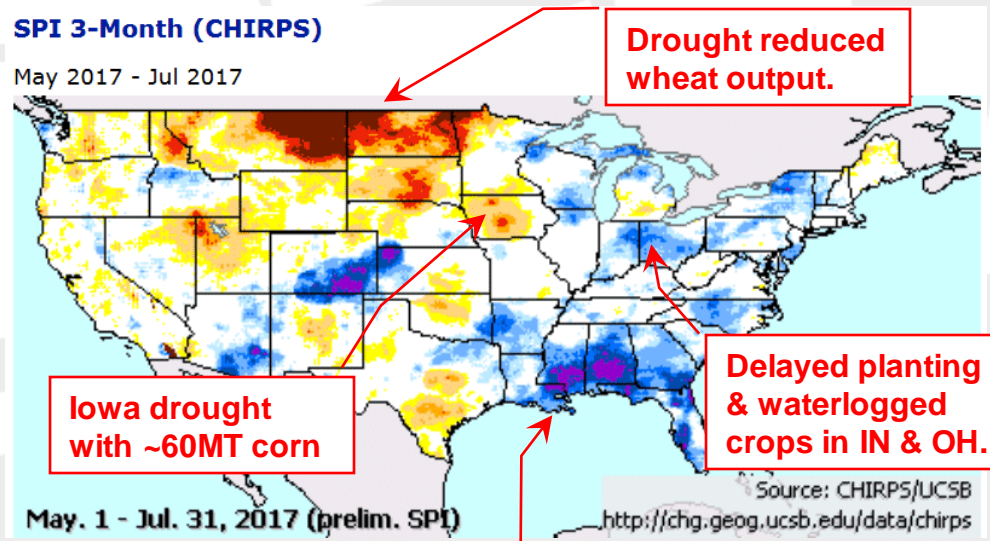
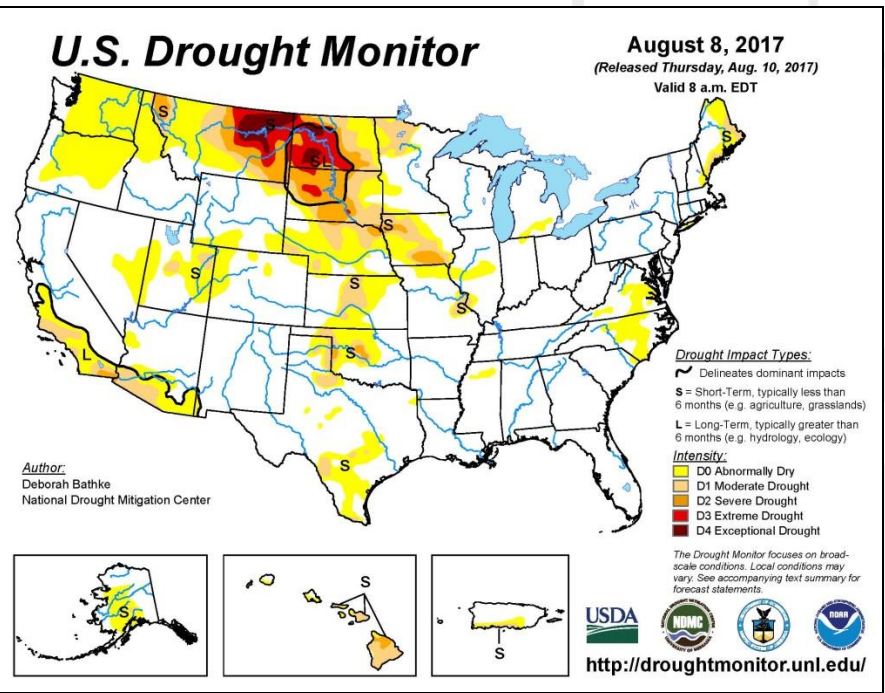
Source: NASS, Lockup Slides, August, 2017

https://www.nass.usda.gov/Newsroom/Executive_Briefings/2017/08_10_2017.pdf

SPI-CHIRPS (on GEE) Applies US Drought Monitor Techniques

Standardized Precipitation Index (SPI)

- "The Lincoln Declaration on Drought Indices", Universal Meteorological Drought Index Recommended, WMO Drought Indices Workshop, Lincoln, Nebraska, Dec. 2009,
 - http://www.wmo.int/pages/prog/wcp/agm/meetings/wies09/documents/Lincoln_Declaration_Drought_Indices.pdf
- Consensus: **"SPI can be used to characterize meteorological droughts around the world."**
- Requires 30-years of historical precipitation data which is provided by 5-km CHIRPS (Climate Hazards Group InfraRed Precipitation Station) data.

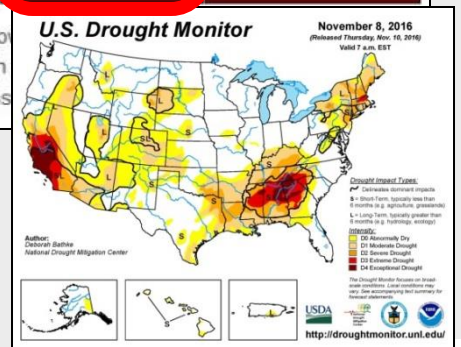


Drought Severity Classification Scheme

(D0, D1, D2, D3 and D4 Droughts)

Drought Severity Classification			Ranges				
Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: <ul style="list-style-type: none"> short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none"> some lingering water deficits pastures or crops not fully recovered 	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	<ul style="list-style-type: none"> Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested 	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	<ul style="list-style-type: none"> Crop or pasture losses likely Water shortages common Water restrictions imposed 	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	<ul style="list-style-type: none"> Major crop/pasture losses Widespread water shortages or restrictions 	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	<ul style="list-style-type: none"> Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies 	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

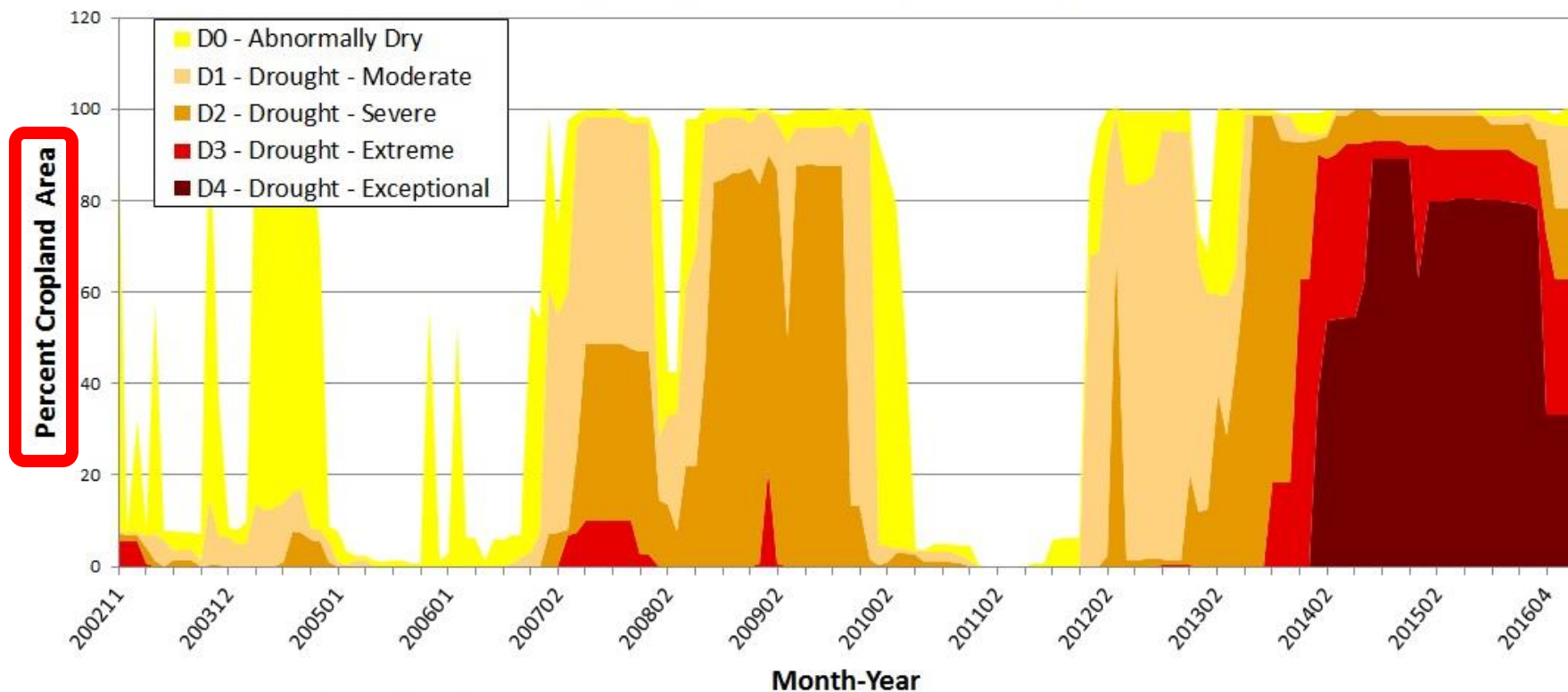
Short-term drought indicator blends focus on 1-3 month precipitation. Long-term blends focus on 6-60 months. Additional indices used, mainly during the growing season, include the Palmer Drought Severity Index (PDSI), Keetch-Byram Drought Index (KBDI), and NOAA/NESDIS satellite Vegetation Health Indices. Indices used primarily during the snow season and in the spring include the Palmer Drought Severity Index (PDSI), Keetch-Byram Drought Index (KBDI), and NOAA/NESDIS satellite Vegetation Health Indices. Other indicators include groundwater levels, reservoir storage, and pasture/range conditions.



Source: US Drought Monitor Classification Scheme
<http://droughtmonitor.unl.edu/AboutUs/ClassificationScheme.aspx>

Drought Severity over California's Cropland

California Cropland Area Located in Drought



Source: Drought data is from NOAA NCDC North American Drought Monitor, and Percent Cropland Area estimated from IIASA Global Hybrid Cropland data layer.

Note: Missing data was interpolated for Aug 2003, Feb 2004, March 2006, Feb 2012.

Pending: CE 2.1 will produce time-series graphs for percent cropland area experiencing D0-D4 droughts.

- InuTeq already produces graphs for North American Drought Monitor.
- Time series graphs to be generated from SPI-CHIRPS.



U.S. Department of Agriculture (USDA)
Foreign Agriculture Service (FAS)
Office of Global Analysis (OGA); International
Production Assessment Division (IPAD)

USDA/FAS/OGA/IPAD

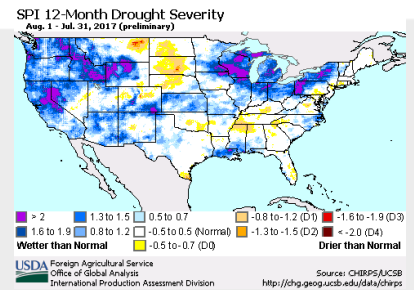
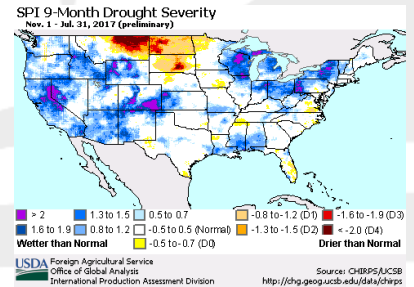
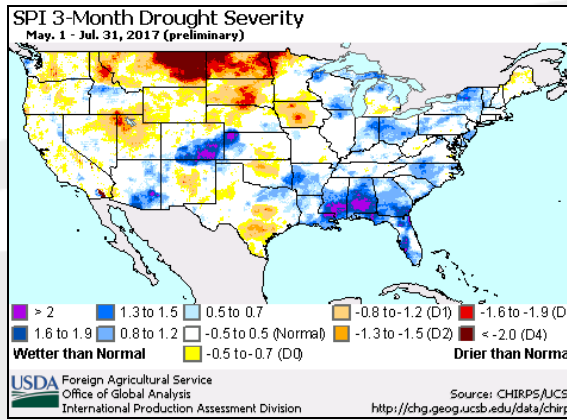
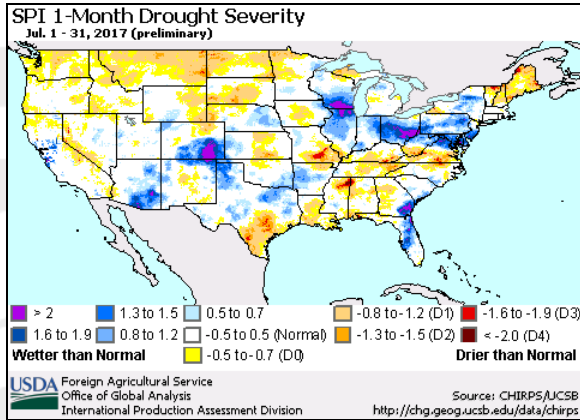
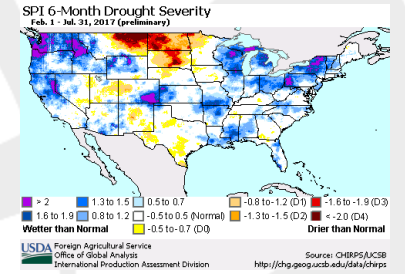
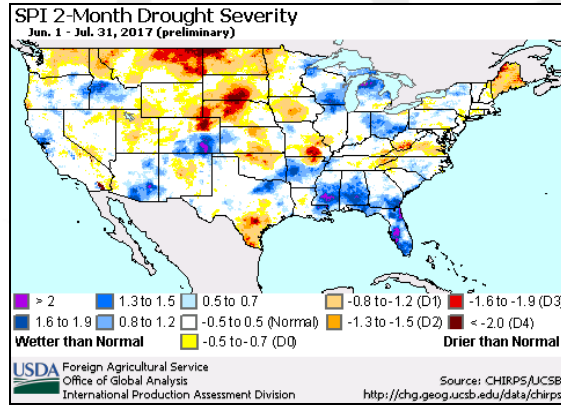
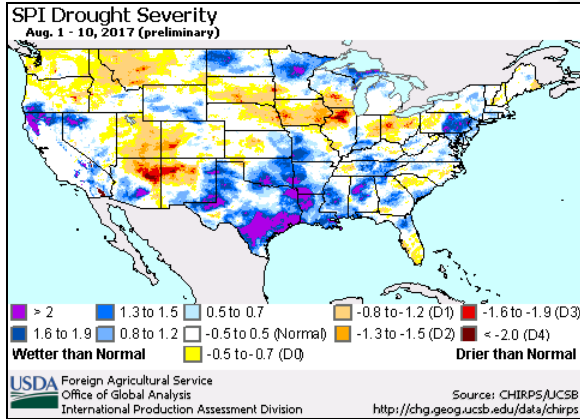


Drought Severity Index

(D0-D4 Droughts measured for different time-steps)

Agricultural droughts
(10-days, monthly, 2-months, & 3- months time steps)

Hydrological droughts
(6-, 9- & 12-months).



U.S. Department of Agriculture (USDA)
Foreign Agriculture Service (FAS)
Office of Global Analysis (OGA); International
Production Assessment Division (IPAD)

USDA/FAS/OGA/IPAD



Thank you for sharing your research, innovations and cropland products.

GFSAD30 workshops assist us to:

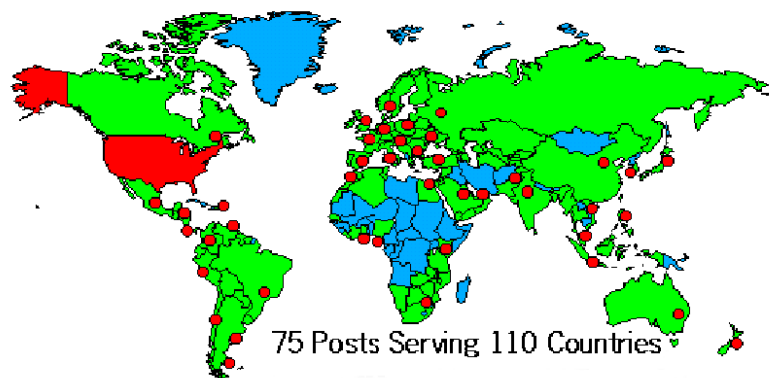
- Re-evaluate our imagery (L-7/8 & S-2A/2B) data flows
- Estimate crop area more timely & accurately on the cloud.



Foreign Agricultural Service (FAS) of USDA

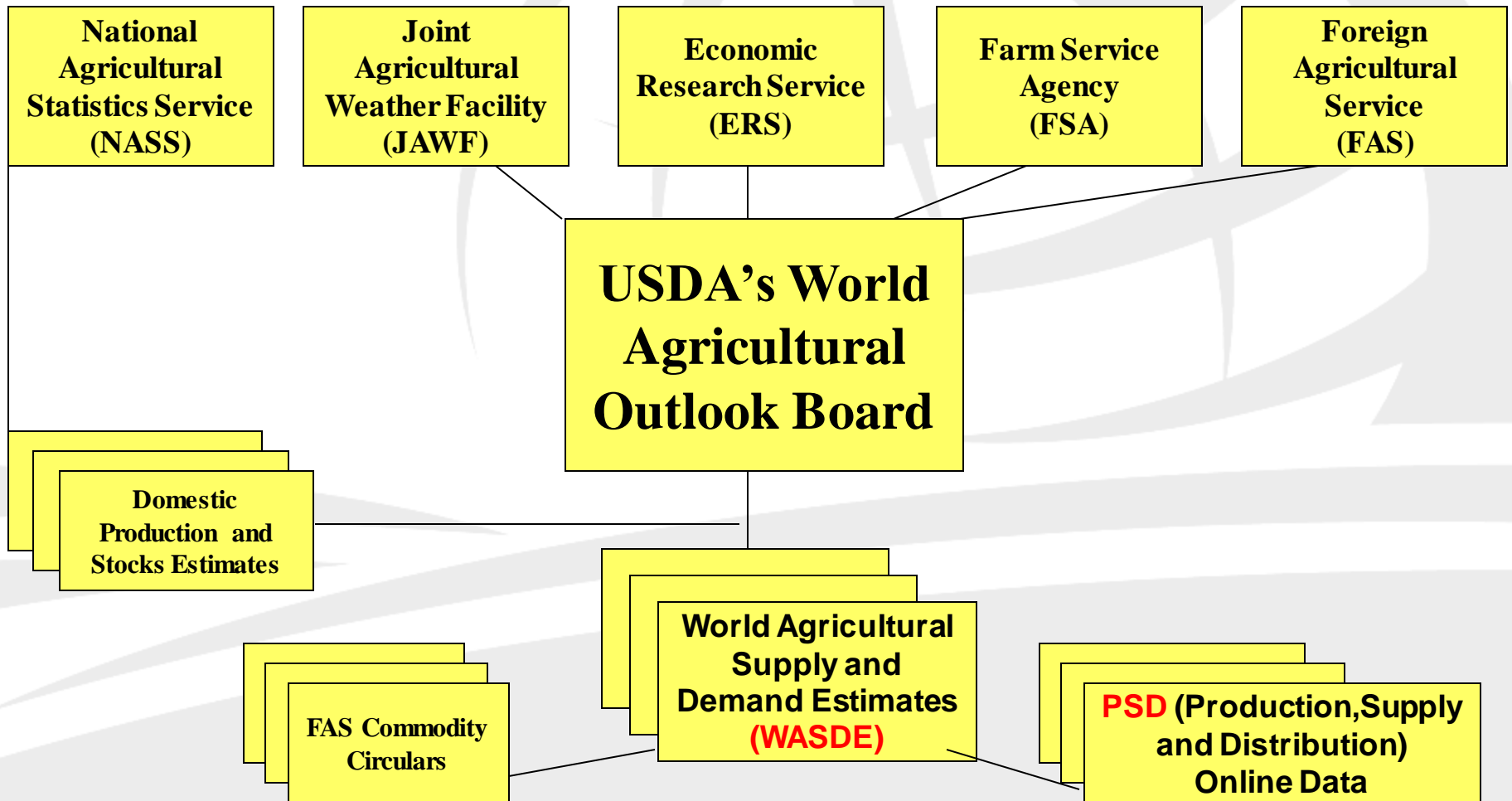
Create economic opportunity for American agriculture by expanding global markets.....

FAS Attachés Cover Over 70% of Global Land Area, and 85% of Foreign Global Population



- FAS is primarily responsible for USDA's:
 - Overseas activities with attachés located at 75 posts
 - Market development,
 - International trade agreements and negotiations,
 - Collection and analysis of statistics and market information.
- <http://www.fas.usda.gov/aboutfas.html>

USDA's Economic Information System



USDA's Economic Intelligence System

WASDE (World Agricultural Supply & Demand Estimates) **since 1973**

PSD (Production, Supply & Distribution) Online Archive **from 1960-current**

PSD Online stores historical estimates for crop production, imports, exports, consumption, & stocks for most commodities and countries.

USDA/FAS Economic Analysis

Chicago Board of Trade (CBOT) & other commodity markets

USDA Publications

- # Trade Policy
- # Exporter Assistance & Export Programs
- # Food Aid & Export Credit Programs
- # UMR (Usual Marketing Requirements)

- # USDA decision-makers
- # U.S. Ag Producers & Traders
- # Commodity Price Discovery
- # Commodity Price Adjustments



USDA's Economic Intelligence System

- USDA's monthly **WASDE** (World Agricultural Supply & Demand Estimates) Circular is released on the **9-12th day of each month at 12:00 noon.**

- <http://www.usda.gov/oce/commodity/wasde/>

- **PSD Online** (historical archive from 1960-present)

- <http://www.fas.usda.gov/psdonline/>

- **Monthly World Production, Market and Trade Reports**

- <http://www.fas.usda.gov/currwmt.asp>

World Corn Supply and Use 1/ (Cont'd.)
(Million Metric Tons)

2016/17 Proj.		Beginning Stocks	Production	Imports	Domestic Feed	Domestic Total 2/	Exports	Ending Stocks
World 3/	Sep	209.25	1,026.61	130.22	622.66	1,016.40	139.83	219.46
	Oct	210.05	1,025.69	133.65	624.25	1,018.93	143.79	216.81
United States	Sep	43.58	383.38	1.27	143.52	312.43	55.25	60.55
	Oct	44.14	382.48	1.27	143.52	312.43	56.52	58.94
Total Foreign	Sep	165.67	643.23	128.95	479.14	703.96	84.58	158.92
	Oct	165.91	643.22	132.38	480.73	706.50	87.28	157.88
Major Exporters 4/	Sep	7.65	132.00	1.11	61.40	79.90	50.00	10.86
	Oct	7.90	133.00	1.11	61.40	79.80	52.00	10.21
Argentina	Sep	1.11	36.50	0.01	6.80	10.60	24.00	3.02
	Oct	1.11	36.50	0.01	6.80	10.50	25.00	2.12
Brazil	Sep	5.34	82.50	0.60	49.00	58.00	24.50	5.94
	Oct	5.34	83.50	0.60	49.00	58.00	25.50	5.94
South Africa	Sep	1.20	13.00	0.50	5.60	11.30	1.50	1.90
	Oct	1.45	13.00	0.50	5.60	11.30	1.50	2.15
Major Importers 5/	Sep	23.16	120.62	76.75	145.35	196.78	3.54	20.21
	Oct	22.45	119.20	79.05	146.05	197.38	3.44	19.88
Egypt	Sep	2.04	6.00	8.75	12.65	15.05	0.01	1.73
	Oct	2.04	6.00	8.75	12.65	15.05	0.01	1.73
European Union 6/	Sep	7.24	61.15	12.00	55.20	73.20	2.00	5.19
	Oct	6.84	60.28	13.50	55.80	73.80	1.70	5.12
Japan	Sep	1.25	0.00	15.00	11.50	15.10	0.00	1.15
	Oct	1.25	0.00	15.00	11.50	15.10	0.00	1.15
Mexico	Sep	5.72	24.50	13.50	20.30	37.20	0.80	5.72
	Oct	5.82	24.50	13.80	20.60	37.50	0.80	5.82
Southeast Asia 7/	Sep	4.63	28.81	13.30	33.85	41.85	0.73	4.16
	Oct	4.23	28.26	13.80	33.65	41.55	0.93	3.81
South Korea	Sep	1.89	0.08	10.00	7.80	10.10	0.00	1.86
	Oct	1.89	0.08	10.00	7.80	10.10	0.00	1.86
Selected Other	Sep	1.50	12.35	1.50	7.80	13.30	0.60	1.45
	Oct	1.49	12.50	1.50	7.80	13.30	0.70	1.49
China	Sep	110.67	216.00	3.00	159.00	226.00	0.02	103.65
	Oct	110.71	216.00	3.00	159.00	226.00	0.02	103.69
FSU-12	Sep	1.87	44.06	0.42	19.49	22.27	21.90	2.19
	Oct	1.75	44.06	0.42	19.09	21.87	22.60	1.77
Ukraine	Sep	0.80	26.00	0.05	7.30	8.70	17.00	1.15
	Oct	0.68	26.00	0.05	6.90	8.30	17.70	0.73



United States Department of Agriculture

World Agricultural Supply and Demand Estimates

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WASDE - 558 Approved by the World Agricultural Outlook Board October 12, 2016

WHEAT: Projected U.S. ending stocks for 2016/17 are raised 38 million bushels as reduced supplies are more than offset by lower projected use. Production for 2016/17 is lowered 11 million bushels based on the latest estimate from the NASS September 30 *Small Grains Annual Summary*. Feed and residual use is reduced 70 million bushels to 260 million reflecting the September 1 stocks that indicated lower-than-expected June-August disappearance. Exports are raised 25 million bushels on increased competitiveness of U.S. wheat particularly in North Africa where the EU has lost some market share because of lower production and quality problems. The marketing year average price received by producers is raised \$0.10 per bushel at the midpoint to a range of \$3.50 to \$3.90 on higher-than-expected NASS prices to date.

Global wheat supplies for 2016/17 are lowered 1.6 million tons on a 0.4-million-ton production decrease and lower beginning stocks. A 2.0-million-ton production decline for the EU is partially offset by a 1.0-million-ton increase for Canada and a 0.8-million-ton increase for Australia. The Australia increase is attributed to continued excellent growing conditions, and yields are projected to be record high. Global exports are raised 1.9 million tons led by a