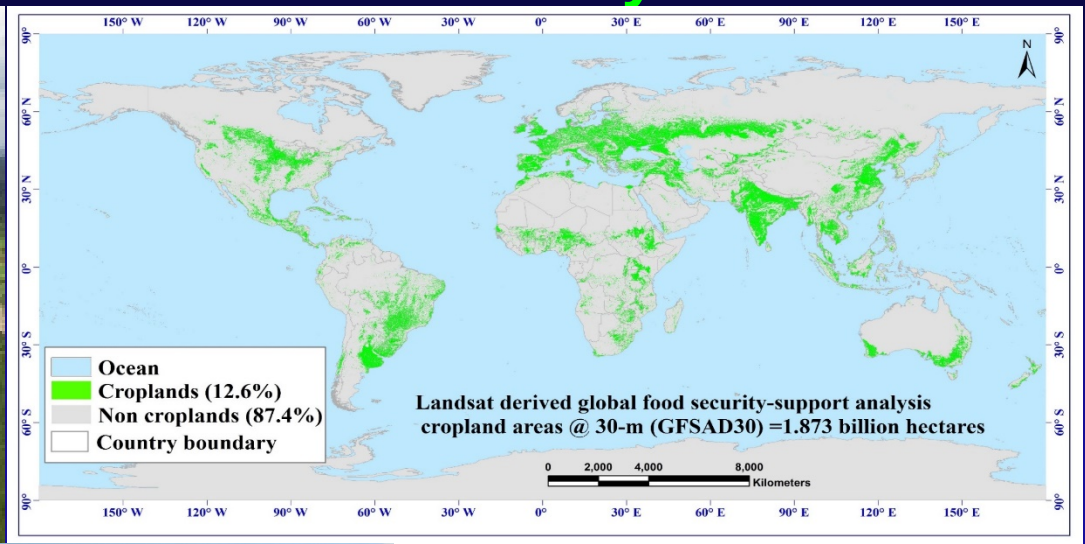
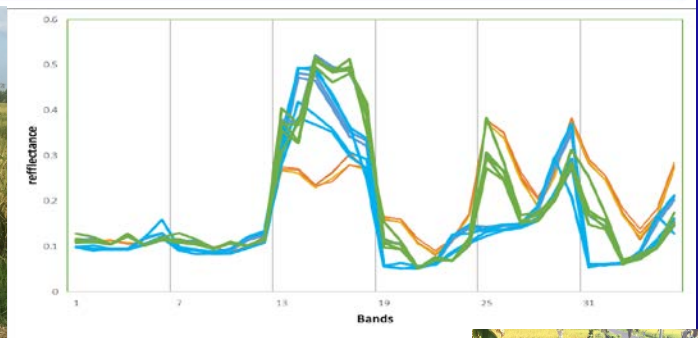
Landsat Time-series Derived 30-m Cropland Extent Product in Support of Food and Water Security





Dr. Prasad S.Thenkabail

Research Geographer @ the

U. S. Geological Survey (USGS)

April, 3-5, 2018

Presented @ the LCLUC Spring Science Team Meeting, 2018

Gaithersburg, Maryland, USA

USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global Food Security-support Analysis Data @ 30 m (GFSAD30) Project
PI, co-Is, and Project Team

PI and co-Is who wrote the proposal (original team that wrote the proposal):

Dr. Prasad S. Thenkabail, PI, U.S. Geological Survey, Flagstaff, AZ;
Dr. Cristina Milesi, co-I, California State University @ Monterey bay\NASA Ames, CA;
Dr. Mutlu Ozdogan, co-I, University of Wisconsin, Madison, WI;
Dr. Russell G. Congalton, University of New Hampshire, Durham, NH;
Dr. Chandra Giri, co-I, United States Environmental Protection Agency (USEPA);
Dr. James C. Tilton, NASA Goddard Space Flight Center, Greenbelt, MD;

Funding: This research was funded by NASA MEaSUREs (Making Earth System Data Records for Use in Research Environments): 2013-2018. The United States Geological Survey (USGS) provided supplemental funding as well as numerous other direct and indirect support through its Land Change Science (LCS), Land Remote Sensing (LRS) programs, and Climate and Land Use Change Mission Area. The NASA MEaSUREs project grant number: NNH13AV82I, the USGS Sales Order number: 29039.

Three Main Contributors to today's presentation:

Dr. Pardasaradhi Teluguntla, BAERI\USGS Scientist

Dr. Jun Xiong, BAERI\NASA AMES Scientist

Mr. Adam Oliphant, USGS Geographer

Complete team and their profiles @:
https://geography.wr.usgs.gov/science/croplands/team.html
www.croplands.org

USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Importance of Global Food and Water Security

Thoughts for this Talk

"Civilization as it is known today could not have evolved, nor can it survive, without an adequate food supply"- Norman Borlaug, Father of the Green Revolution and Nobel Laureate

To meet food and nutritional demand of 10+ billion people by the end of the century

'When the well is dry, we know the worth of water.' Benjamin Franklin, one of the Founding Father of the United States

USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

GFSAD30 Project Goals and Objectives

https://web.croplands.org/app/map

croplands.org

https://geography.wr.usgs.gov/science/croplands/index.html

U.S. Geological Survey
U.S. Department of Interior

Overarching Goal

Monitoring global croplands (GCs) is imperative for ensuring sustainable water and food security to the people of the world in the Twenty-first Century. However, the currently available cropland products suffer from major limitations such as: (1) Absence of precise spatial location of the cropped areas; (b) Coarse resolution nature of the map products with significant uncertainties in areas, locations, and detail; (b) Uncertainties in differentiating irrigated areas from rainfed areas; (c) Absence of crop types and cropping intensities; and (e) Absence of a dedicated web\data portal for the dissemination of cropland products.

The overarching goal of this project is to produce consistent and unbiased estimates of global agricultural cropland areas, crop types, crop watering method, cropping intensities, & Cropland Fallows using Multi-sensor, Multi-date Remote Sensing and mature cropland mapping algorithms (CMAs).

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

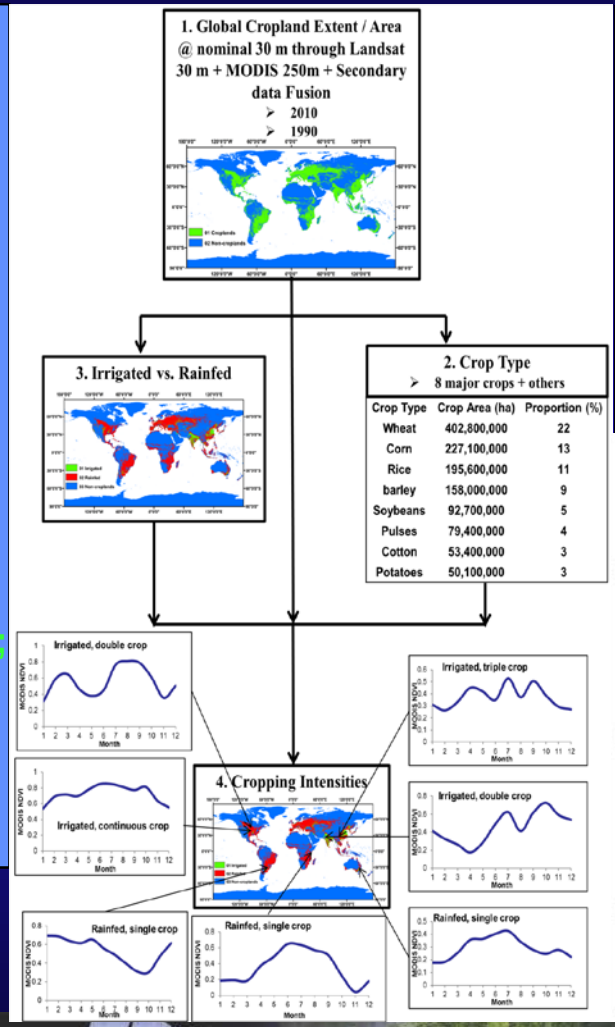
Global Cropland Products @ 30-m

@ 30-m Global Cropland extent Areas Accuracies

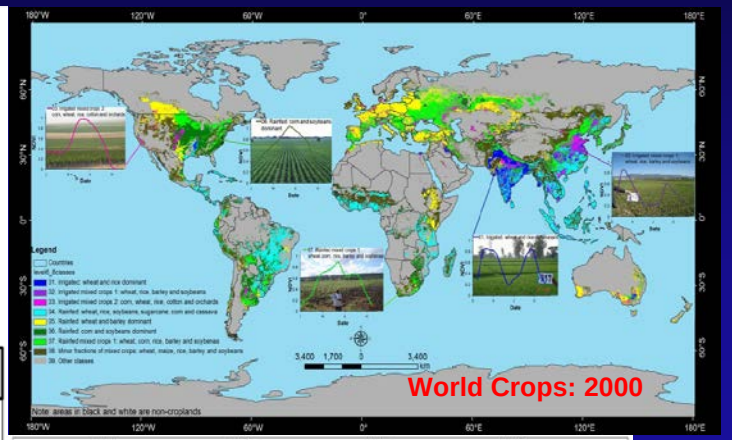
1. Cropland extent\areas;
2. Watering method (e.g., Irrigated versus rainfed);
3. Cropping intensity (e.g., single, double, triple, continuous);
4. Crop types (e.g., Major 8)
5. Croplands *versus* cropland fallows.

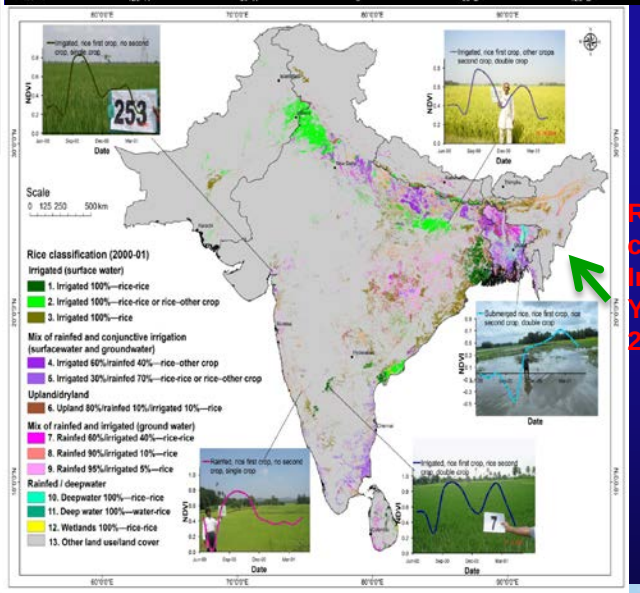
……the above products will lead to other higher level cropland products such as:

A. Crop productivity (kg\m^2);
B. Crop water use (m^3\m^2);
C. Crop water productivity ("crop per drop"; kg\m^3);



Crop Type	Crop Area (ha)	Proportion (%)
Wheat	402,800,000	22
Corn	227,100,000	13
Rice	195,600,000	11
barley	158,000,000	9
Soybeans	92,700,000	5
Pulses	79,400,000	4
Cotton	53,400,000	3
Potatoes	50,100,000	3



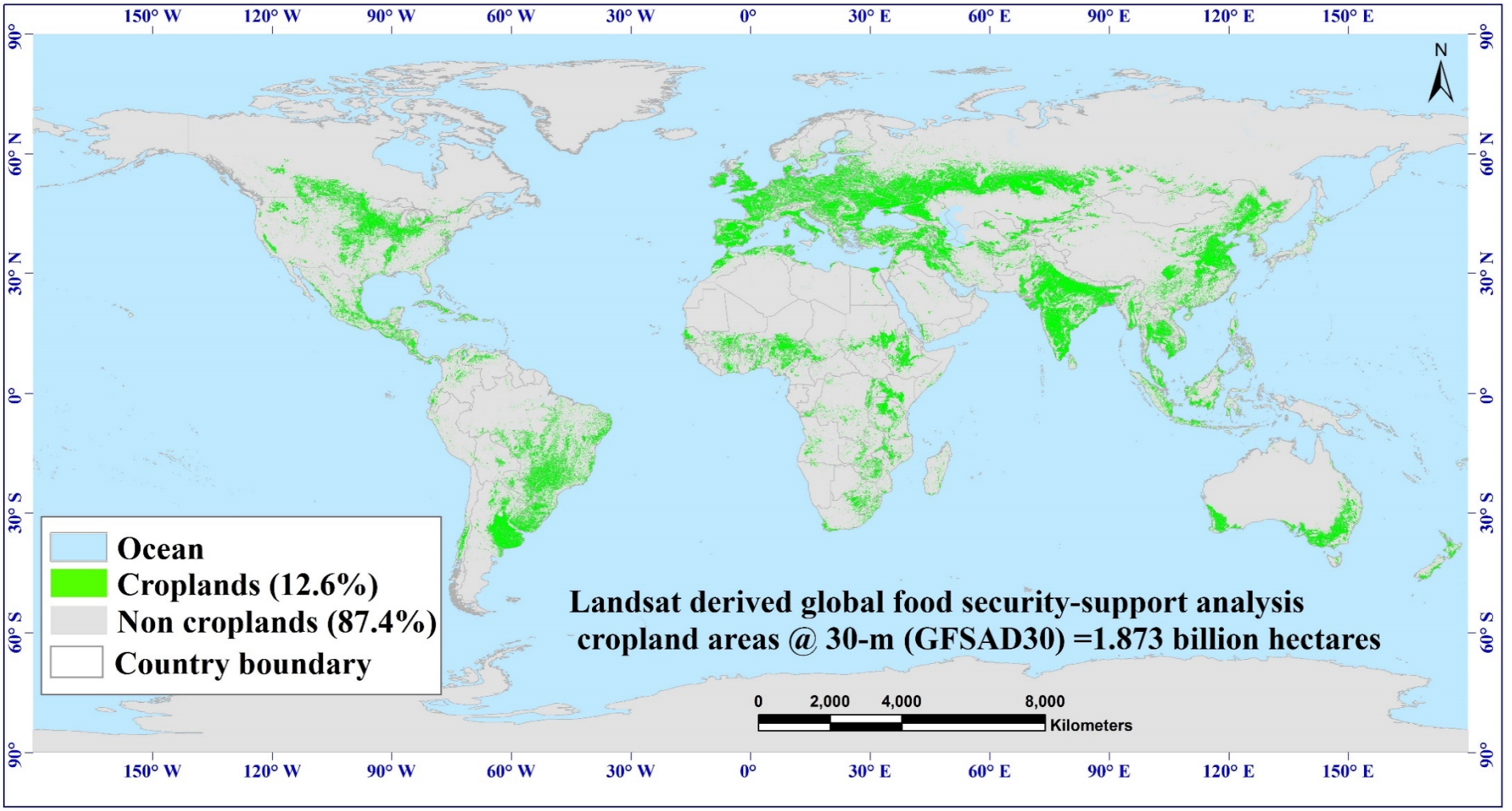


Rice crop in India: Year 2000

USGS science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

30-m Cropland Extent Product of the World



USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global Croplands @ 30-m

Definition: How Croplands are defined and mapped

https://web.croplands.org/app/map

croplands.org

https://geography.wr.usgs.gov/science/croplands/index.html

USGS
science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

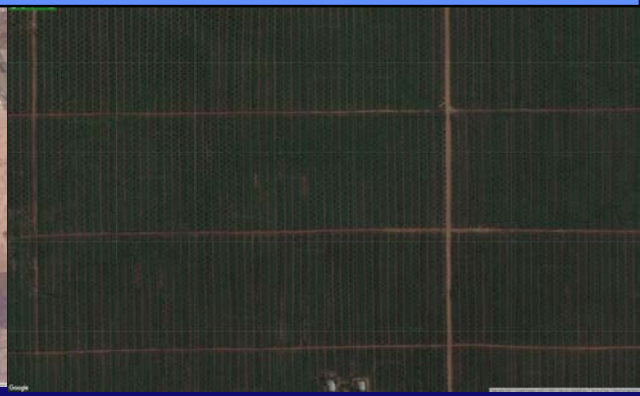
Understanding Cropland Extent

Definitions: Net Cropland Extent Includes

Croplands +

cropland fallows +

Plantations



All croplands cultivated for food, feed, and fiber, including plantations (e.g., orchards, vineyards, coffee, tea, rubber) or croplands that are left fallow

USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Understanding Cropland Extent

Definitions: Agricultural Systems, Part of the Croplands

Aquaculture, fish ponds, often adjoin rice fields

We should include aquaculture\fish ponds because they often adjoin rice fields and\or often part of heavily cultivated deltas and hence included in croplands

Three areas of difficulty:

1. Aquaculture;
2. Green houses;
3. Managed pasture

Managed Rangelands are large part of agricultural systems of many countries (e.g., Australia, New Zealand, Brazil, Argentina, and Kazakstan), we should map them, but keep them as a separate class NOT included in croplands

Rangelands, often adjoin croplands

USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global Croplands @ 30-m

Methods:

Machine Learning Algorithms (MLA's)

https://web.croplands.org/app/map
croplands.org
https://geography.wr.usgs.gov/science/croplands/index.html

USGS
science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Cropland Mapping Algorithms (CMAs)

Machine Learning Algorithms (MLAs) in Global Cropland Mapping

Pixel-based supervised machine learning algorithms (MLAs) along with **Object-based** hierarchical segmentation (HSEG) have been used extensively in generating global cropland products.

In many cases we have also successfully in automated them to apply year after year with ability to: 1. hind-cast (e.g., past years), 2. now-cast (present year), and 3. future-cast (e.g., future years):

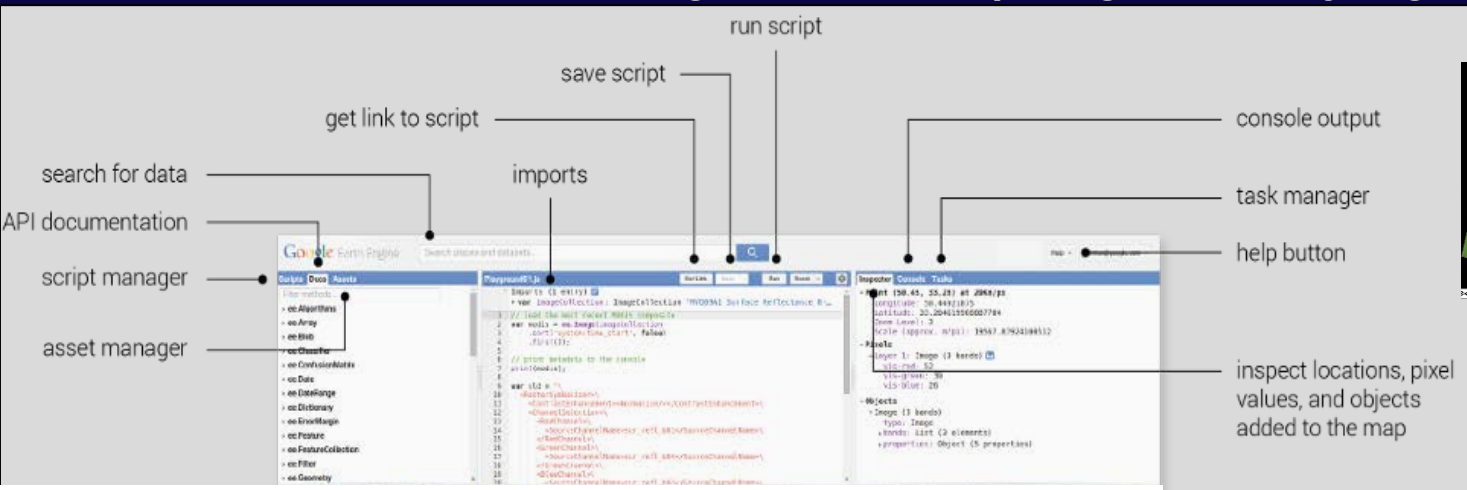
A. Random forest algorithms (Tatsumi et al., 2015, Gislason et al., 2006);
B. Support vector machines (Mountrakis et al., 2011);
C. Automated cropland classification algorithms (Thenkabail et al., 2010, Teluguntla et al., 2017);
D. Spectral matching techniques (Thenkabail et al., 2007, Teluguntla et al., 2017)
E. Decision Tree algorithms (Friedl and Brodley, 1997, Defries et al., 1998, Waldner et al., 2015);
F. Linear discriminant analysis (Imani and Ghassemian, 2015);
G. Principal component analysis, change detection analysis (Jensen, 2000);
H. kMeans, Isoclass clustering (Duveiller et al., 2015, Jensen et al., 2000);
I. Classification and Regression Tree (CART) (Egotov et al., 2015, Deng and Wu, 2013);
J. Tree-based regression algorithm (Ozdogan and Gutman, 2008);
K. Phenology based methods (Dong et al., 2015);
L. Fourier harmonic analysis (Zhang, 2015, Geerken et al., 2005);
M. Hierarchical segmentation (HSEG; Tilton et al., 2011, 2015).

USGS science for a changing world
U.S. Geological Survey
U.S. Department of Interior

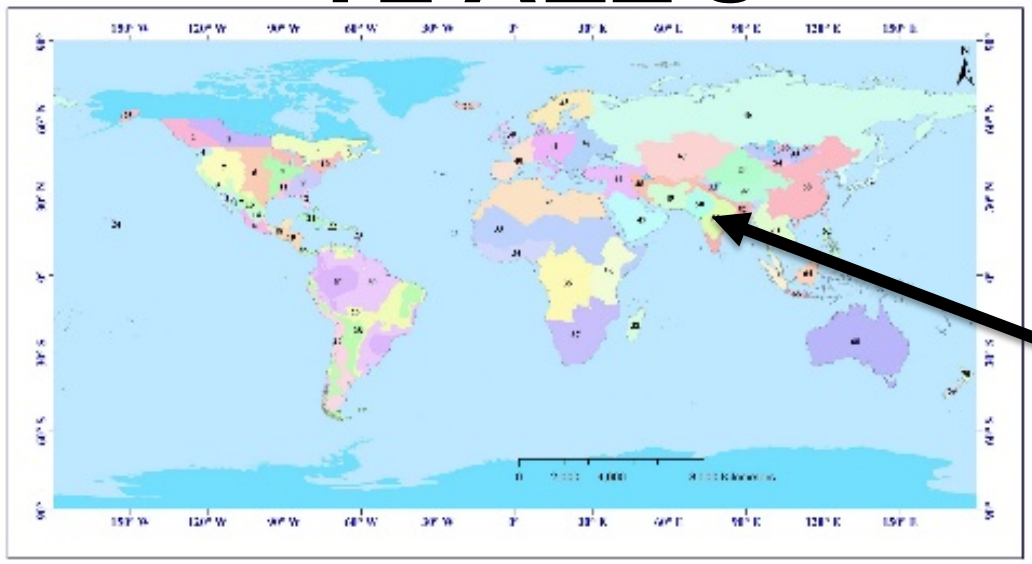
Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Accessing and Computing Massively Large Big Data (e.g., on GEE Cloud Computing)

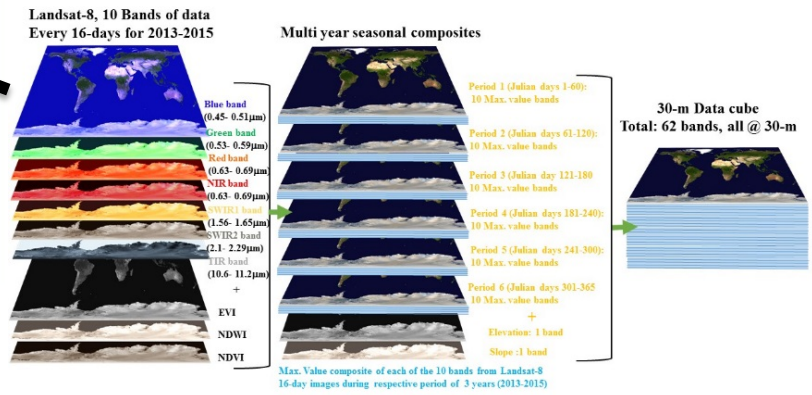
Normalized data, Code Sharing, Parallel Computing, Massively Big Data, Rapid Results



72 AEZ's



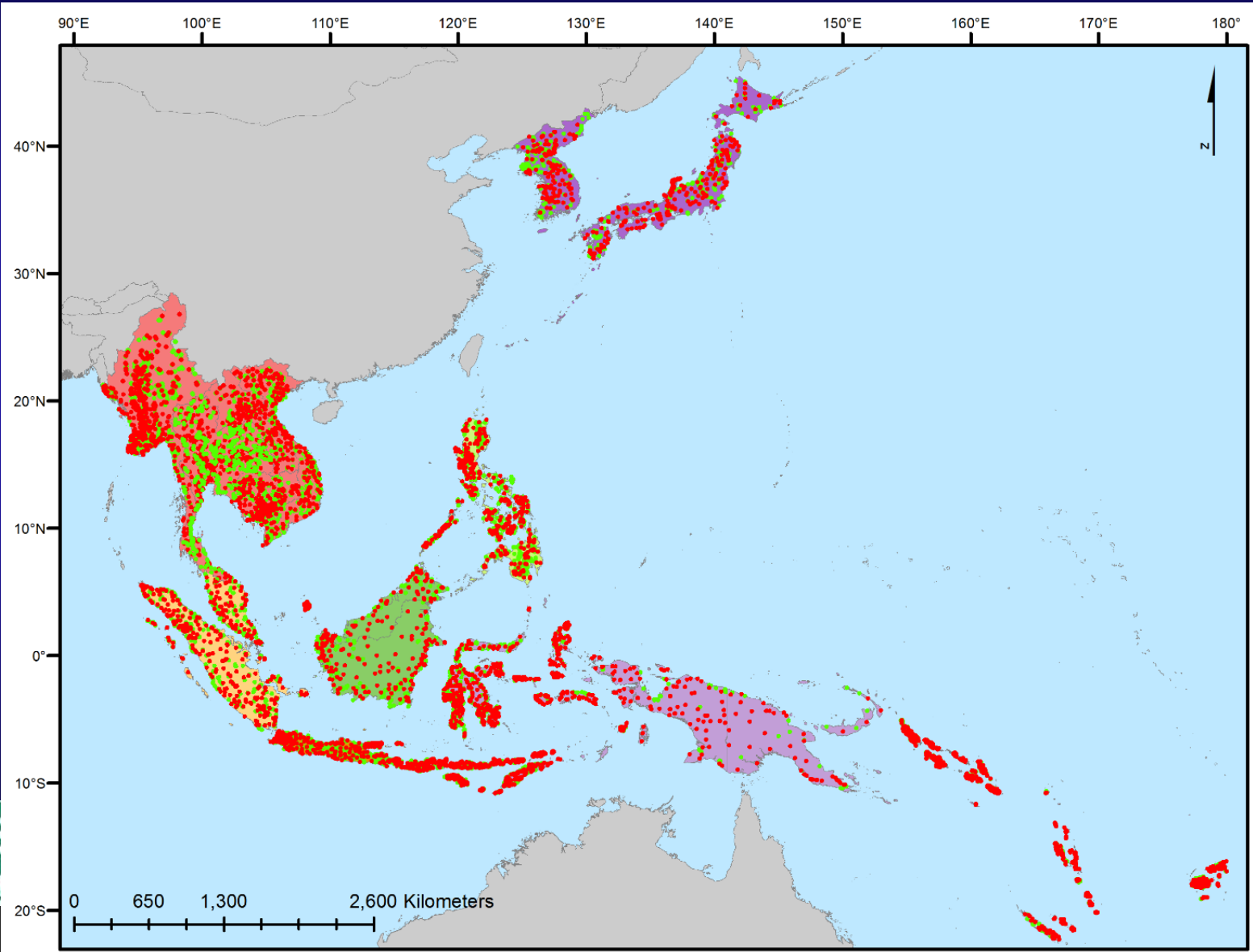
Landsat 2013-2016



Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

South East and North East Asia

AEZs, Training Samples for Machine Learning Algorithms



Zone 1
Cambodia
Laos
Myanmar
Thailand
Vietnam

Zone 2
Philippines

Zone 3
Malaysia
Singapore
Sumatra

Zone 4
Java
Bali

Zone 5
Brunei
East Malaysia
Kalimantan

Zone 6
Japan
North Korea
South Korea

Not Included
in study

Zone 7
Micronesia
Sulawesi
Lesser Sunda Is.
Papua , Indonesia
Papua New Guinea
Solomon Islands
Vandeleu
New Caledonia
Samoan Islands
Polynesia

Cropland Training

NonCropland Training

South East and North East Asia

AEZs, Training Samples for Machine Learning Algorithms

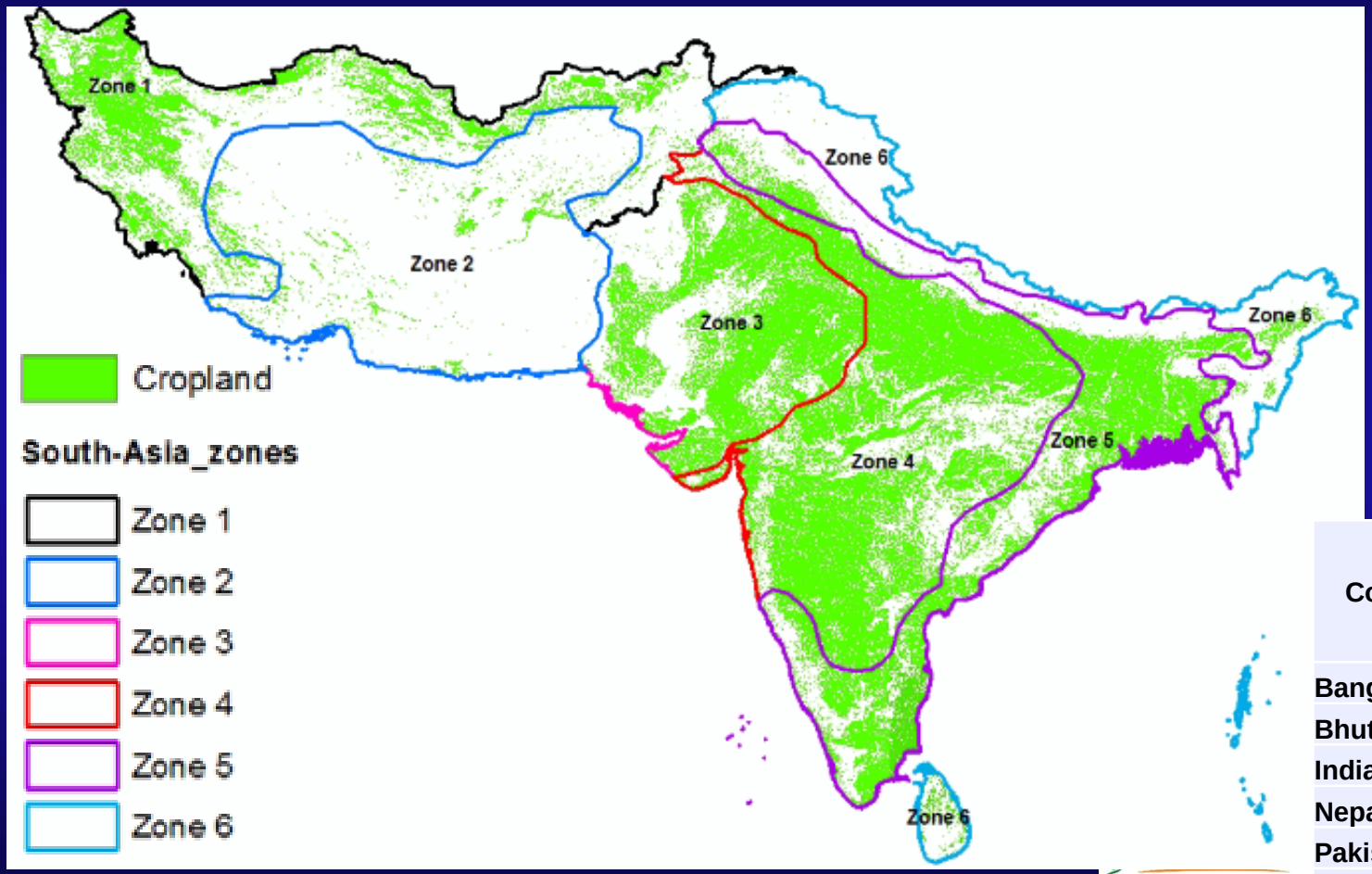
Zone	Region	Cropland Training Samples #	Non Cropland Training Samples #	Total Training Samples #	Land Area km^2	Area per Sample km^2 / #
1	Mainland SE Asia	1,326	1,267	2,593	1,939,908	748
2	Philippines	350	330	680	300,000	441
3	Sumatra & Malaysia	305	317	622	604,071	971
4	Java & Bali	298	272	570	134,078	235
5	Kalimantan	257	349	606	743,329	1227
6	Japan & Korea	460	481	941	598,711	636
7	Pacific Island Nations	614	1,223	1,837	1,253,786	683
	Total	3,610	4,239	7,849	5,573,883	710

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

South Asia

AEZs, Training Samples for Machine Learning Algorithms



Country	Total geographical area ('000 ha)
Bangladesh	14,804
Bhutan	4,365
India	345,623
Nepal	16,210
Pakistan	89,167
Sri Lanka	6,453
Iran	164,820
Afghanistan	64,750
Total	706,192

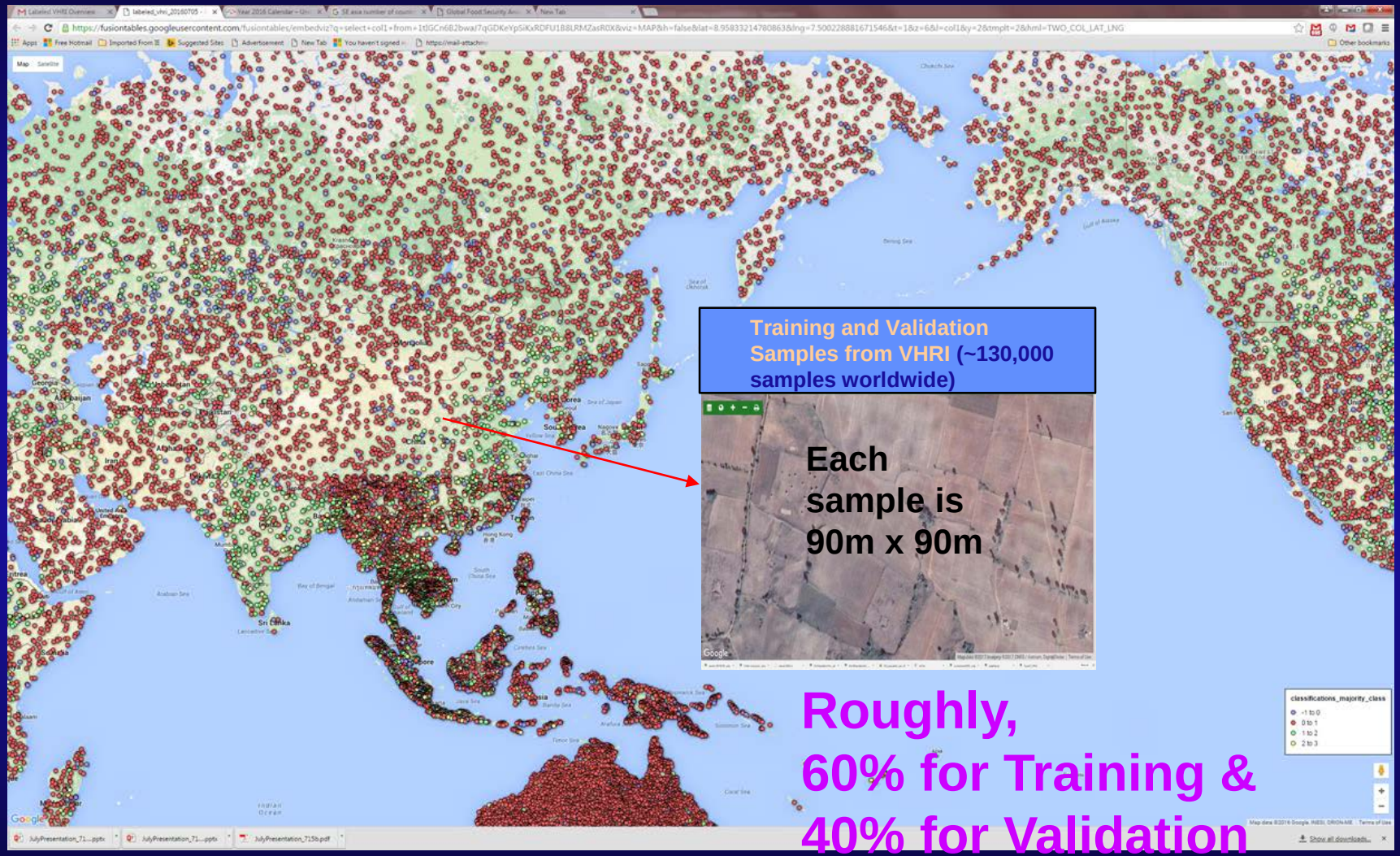
USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Reference Data used for Training and Validation

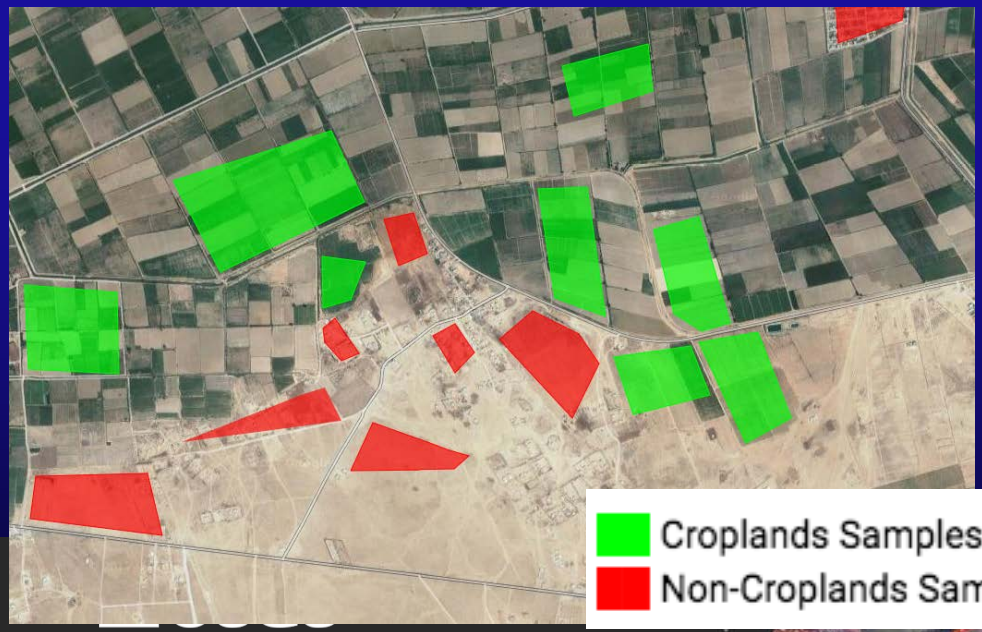
~120,000 sub-meter to 5-m Very High Resolution Data (VHRI) Locations

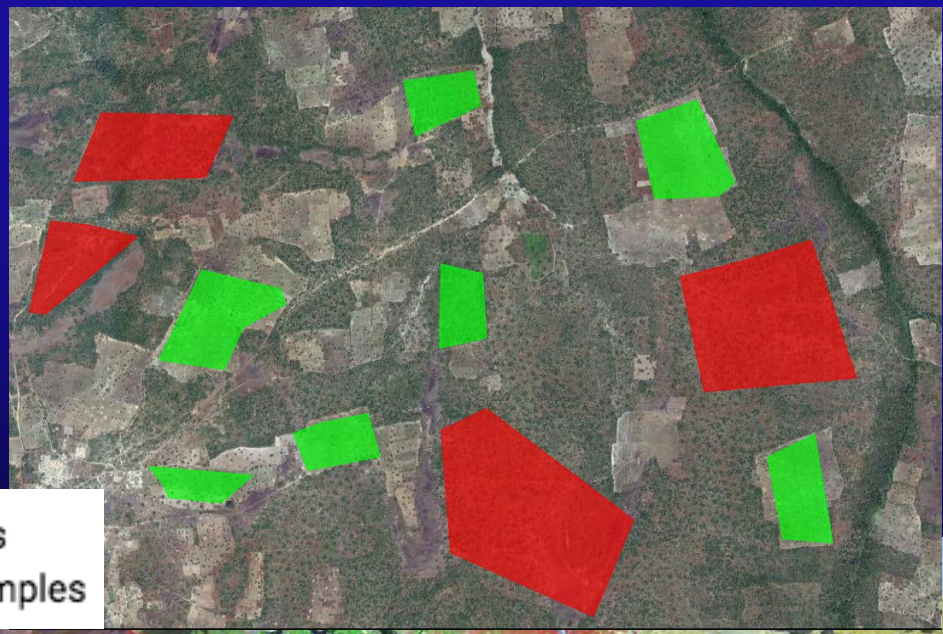


USGS science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Reference Data for Training and Validation

Croplands versus Non-croplands





Croplands Samples

Non-Croplands Samples

Ground Data for Training, Class Identification, and Validation

Recent (August, 2016) Field Data in Indonesia (Adam Oliphant & Prasad Thenkabail)

Java

Double crop irrigated rice

Bali

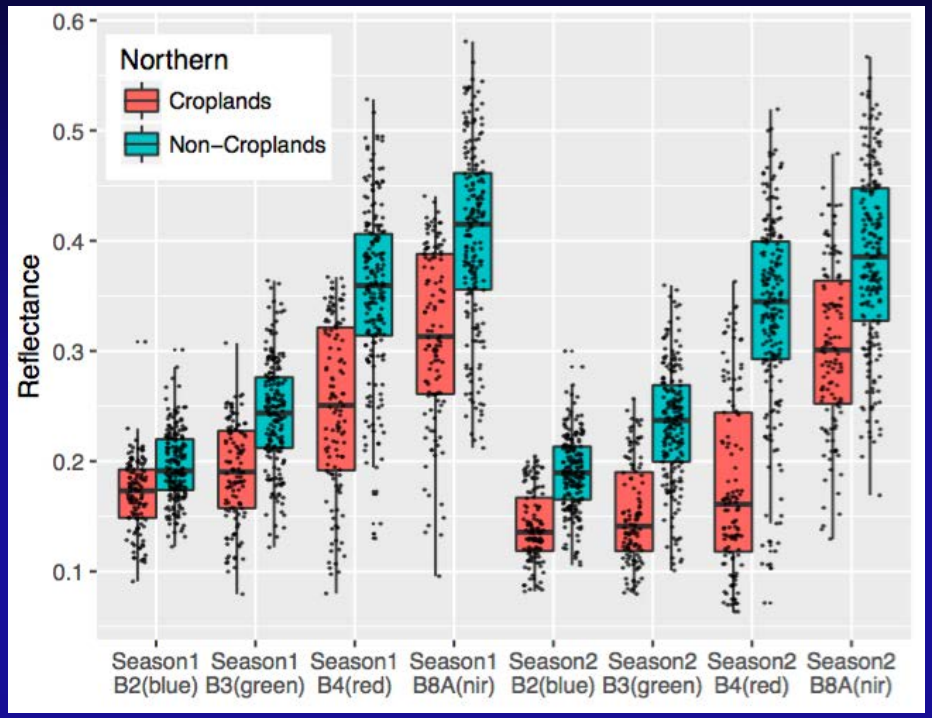
Double crop irrigated rice followed by short season crop

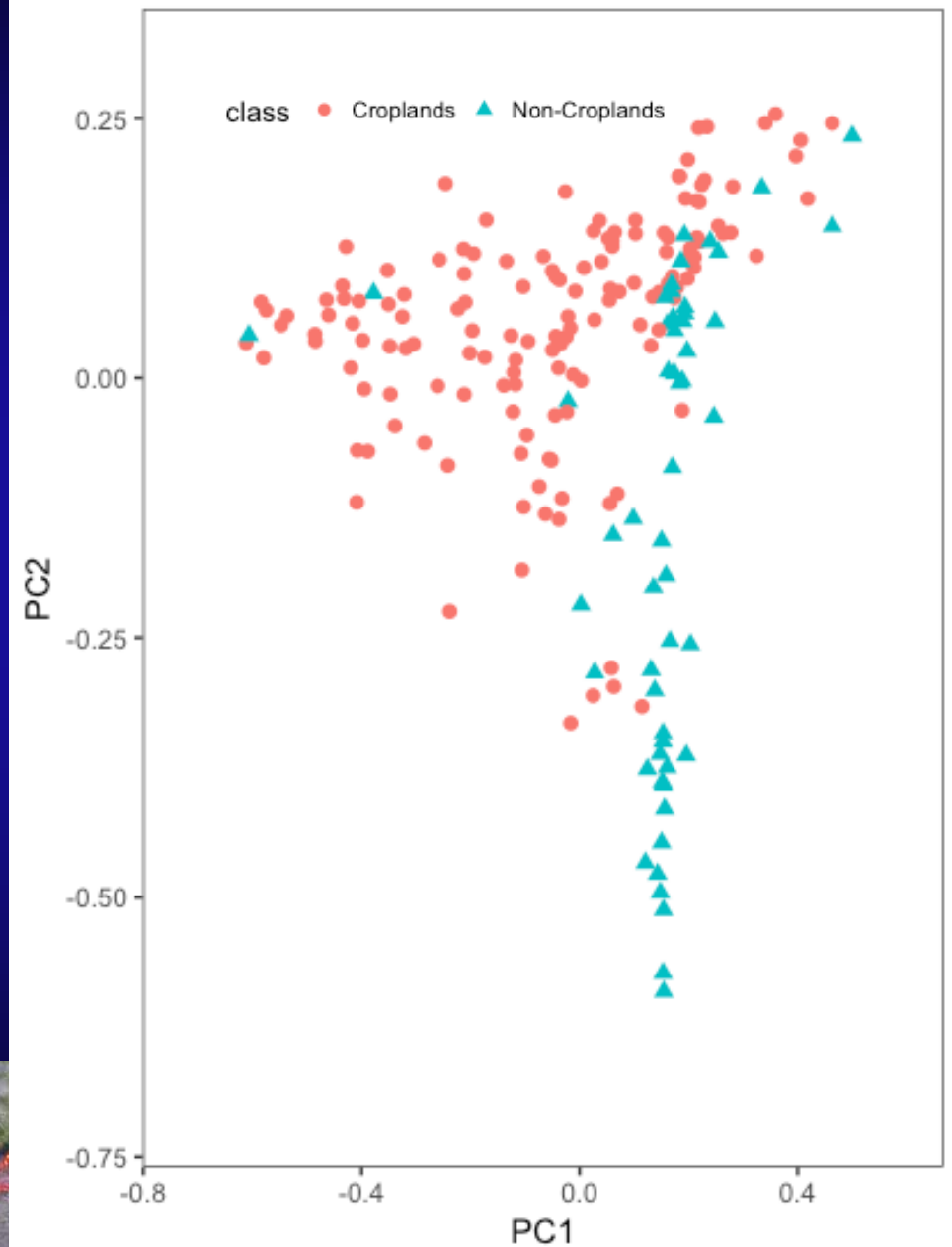
USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Knowledge Generation for Machine Learning Algorithms: Some Examples





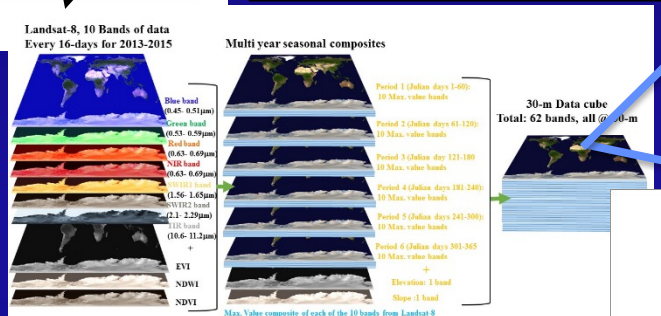
USGS
science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

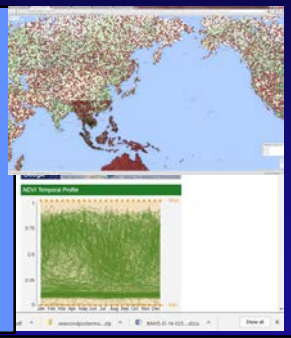
Knowledge Generation for Random Forest Algorithm to Derive Croplands *versus* Non-croplands @ 30-m

1. Take zone

2. Create a 30-m Landsat data cube

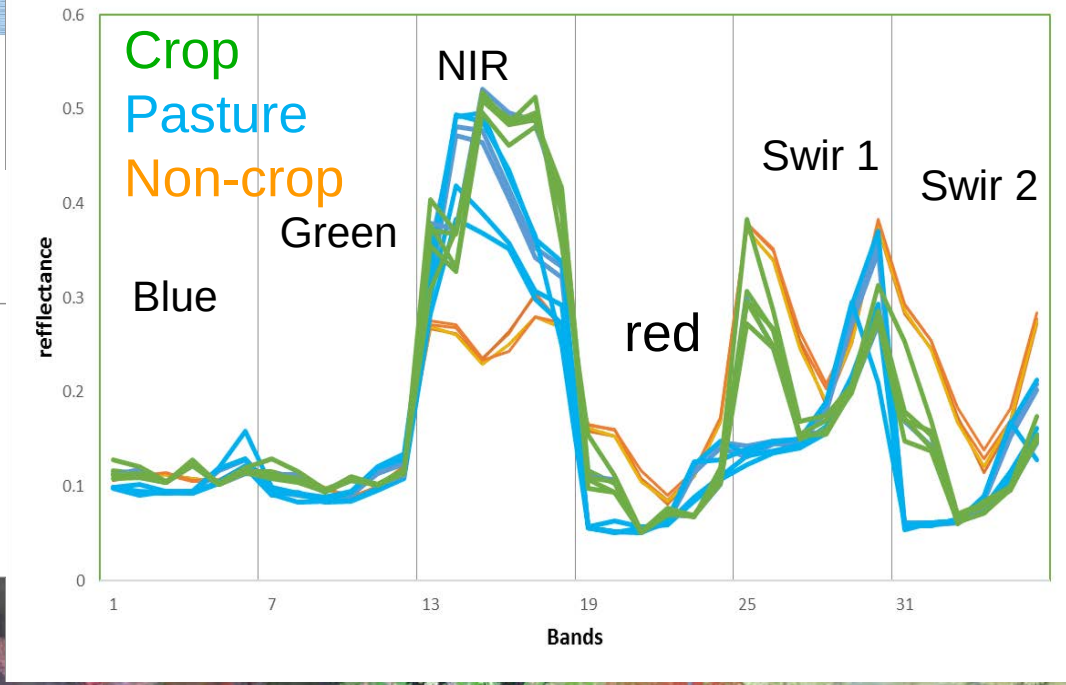


3. Create Training samples



4. Generate Distinct Knowledge

Zone	Region	Cropland Training Samples	Non Cropland Training Samples	Total Training Samples	Land Area	Area per Sample
		#	#	#	km²	km² / #
1	Mainland SE Asia	1,326	1,267	2,593	1,939,908	748
2	Philippines	350	330	680	300,000	441
3	Sumatra & Malaysia	305	317	622	604,071	971
4	Java & Bali	298	272	570	134,078	235
5	Kalimantan	257	349	606	743,329	1227
6	Japan & Korea	460	481	941	598,711	636
7	Pacific Island Nations	614	1,223	1,837	1,253,786	683
	Total	3,610	4,239	7,849	5,573,883	710

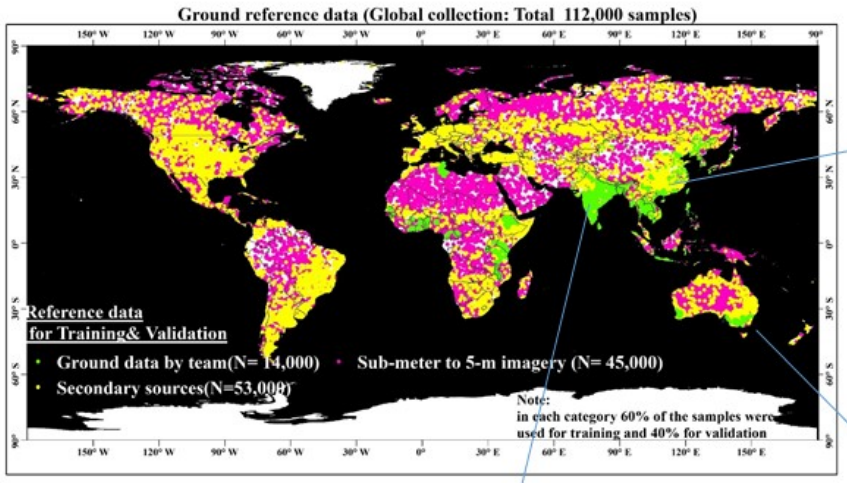


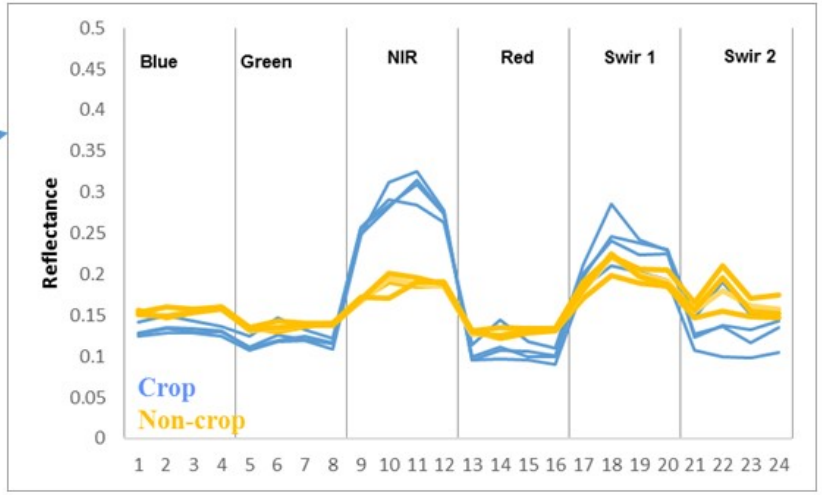
USGS science for a changing world

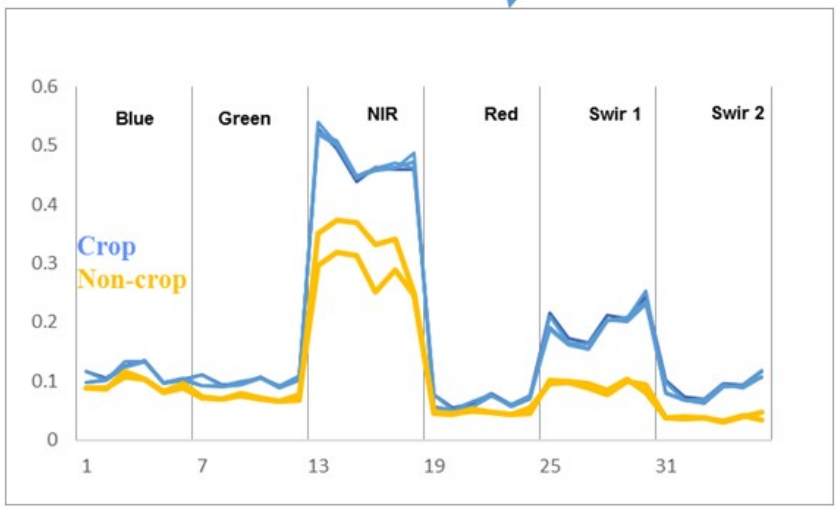
U.S. Geological Survey
U.S. Department of Interior

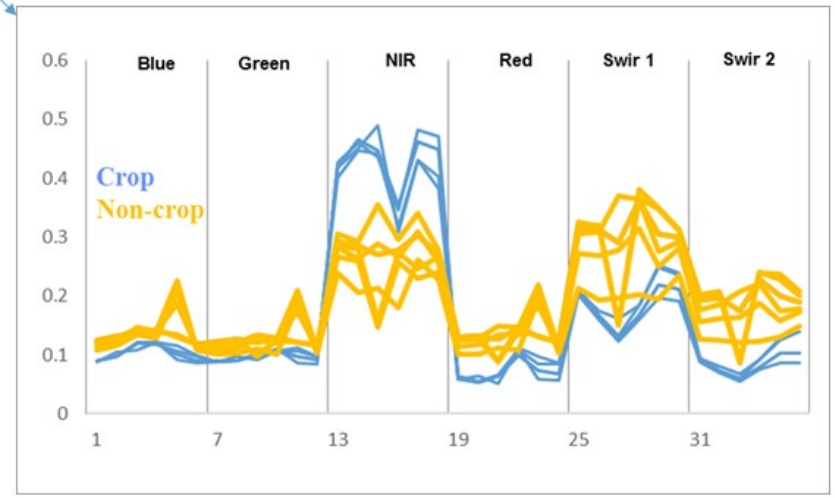
Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Knowledge Generation for Machine Learning Algorithms: Some Examples









Global Croplands @ 30-m

Results:

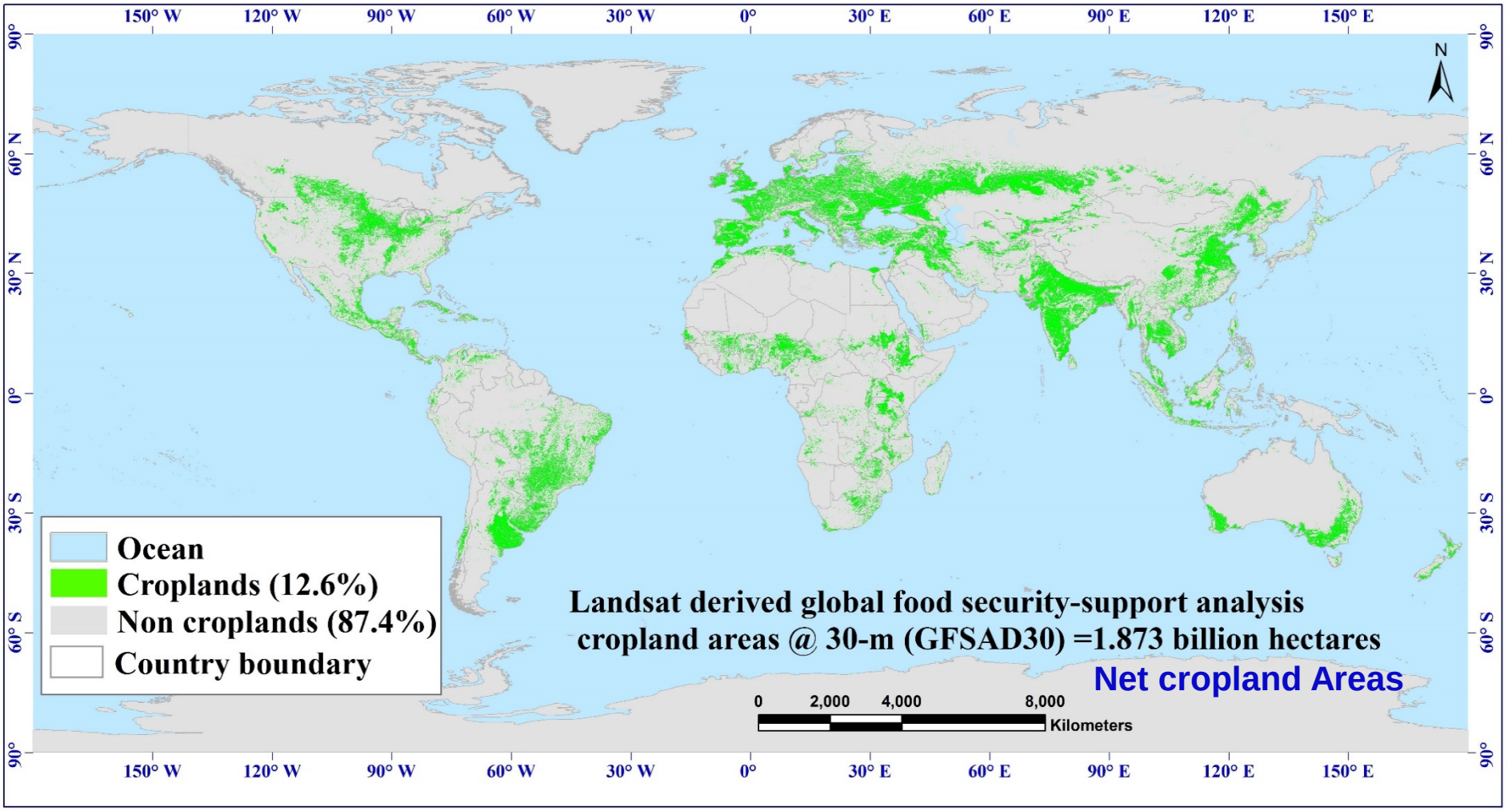
30-m Global Cropland Extent

https://web.croplands.org/app/map
croplands.org
https://geography.wr.usgs.gov/science/croplands/index.html

U.S. Geological Survey
U.S. Department of Interior

Landsat Satellite 16-day Time-Series Data for Deriving Global Croplands

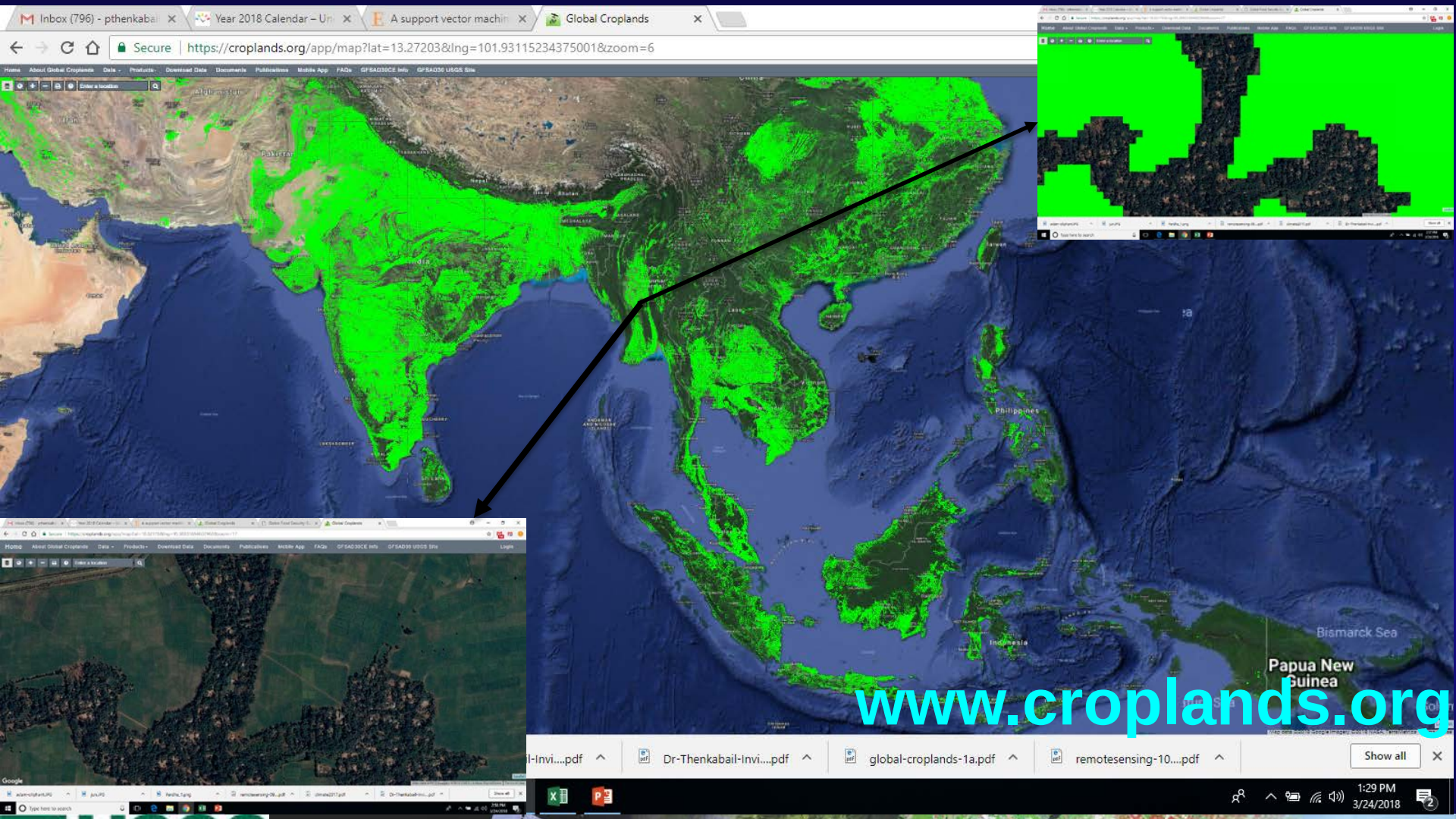
Global Cropland Extent (GCE30) Product, nominal 2015



USGS
science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Landsat Satellite 16-day Time-Series Data for Deriving Global Croplands

GCE30 Product for South and South East Asia, nominal 2015

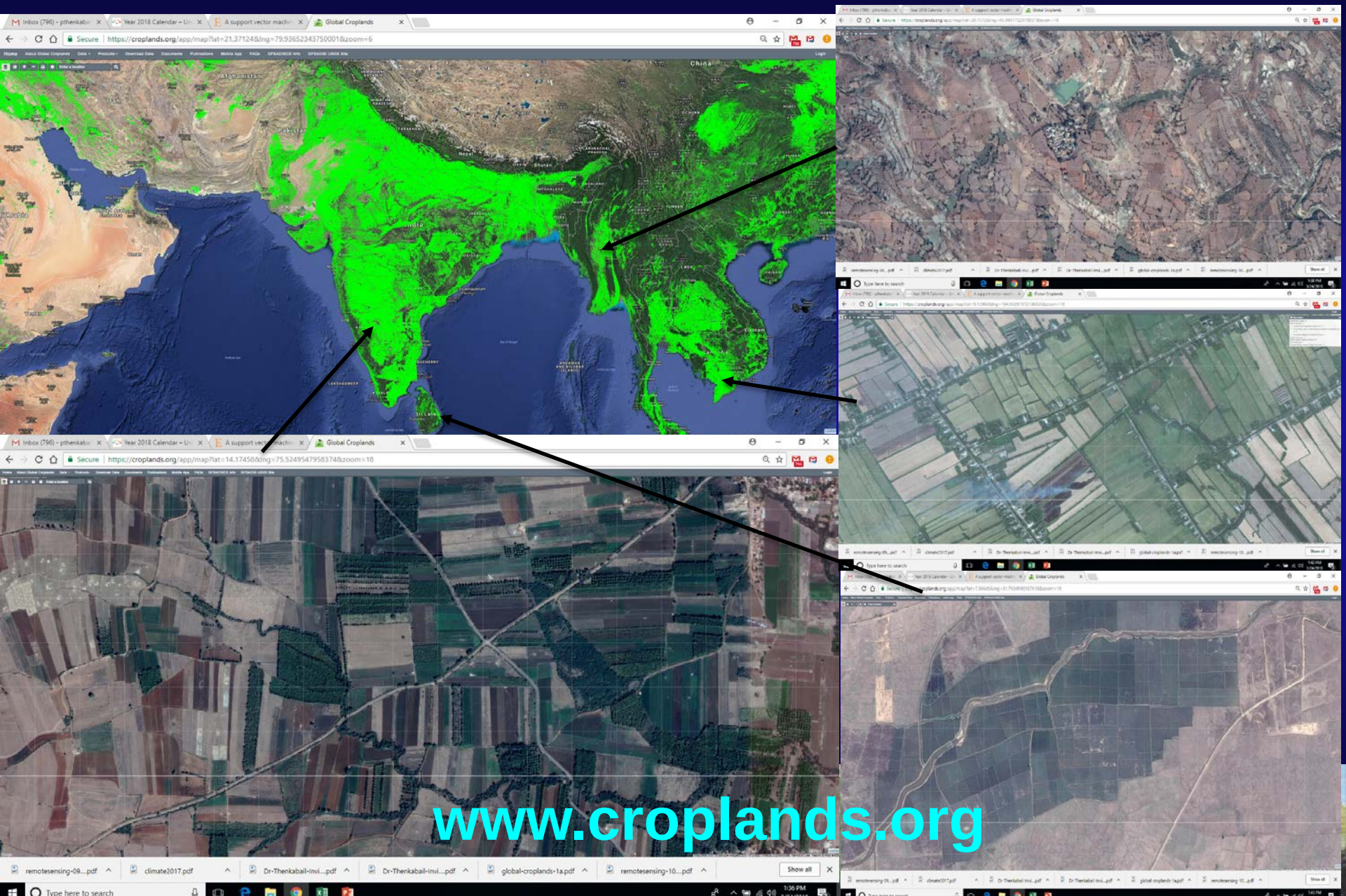


USGS
science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Landsat Satellite 16-day Time-Series Data for Deriving Global Croplands

GCE30 Product for South and South East Asia, nominal 2015



Global Croplands @ 30-m

Results:

30-m Global Cropland Extent Accuracies

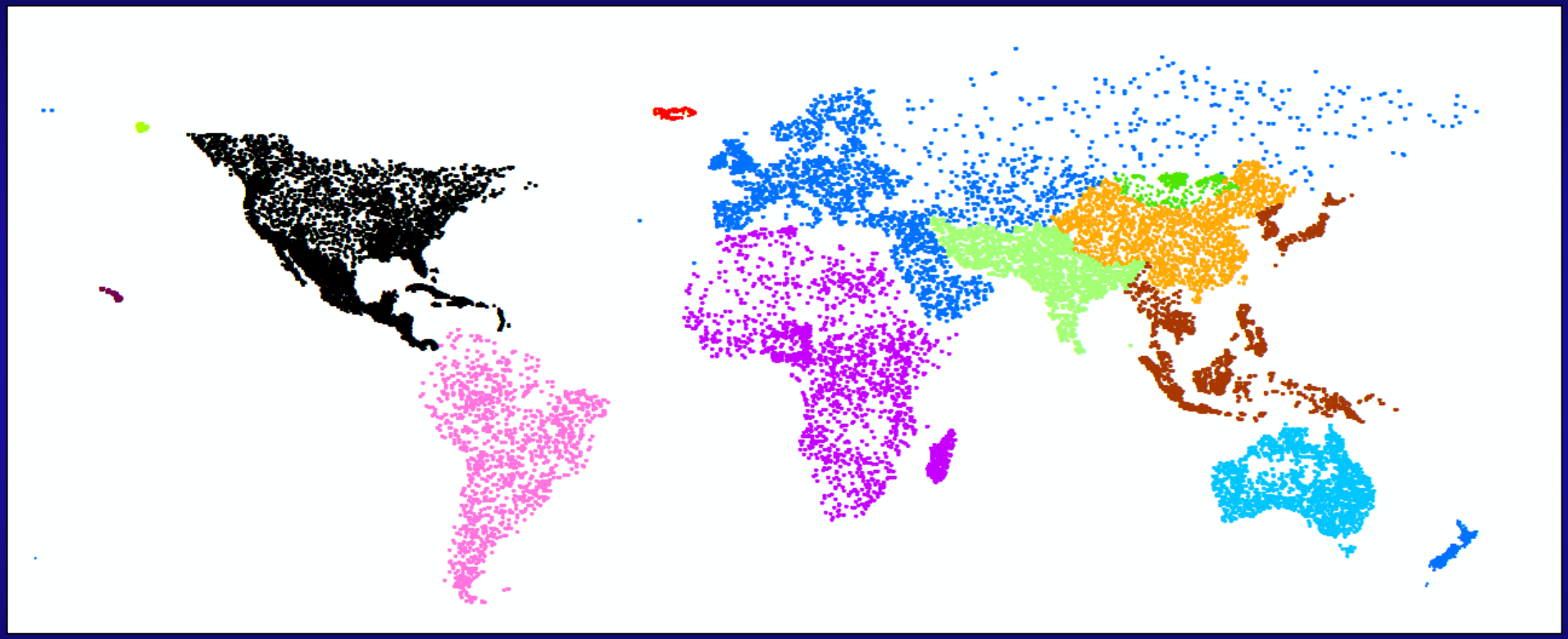
https://web.croplands.org/app/map
croplands.org
https://geography.wr.usgs.gov/science/croplands/index.html

U.S. Geological Survey
U.S. Department of Interior

Global Cropland Extent @ 30-m (GCE30) Product Derived using Lndsat Data

Validation of GCE30

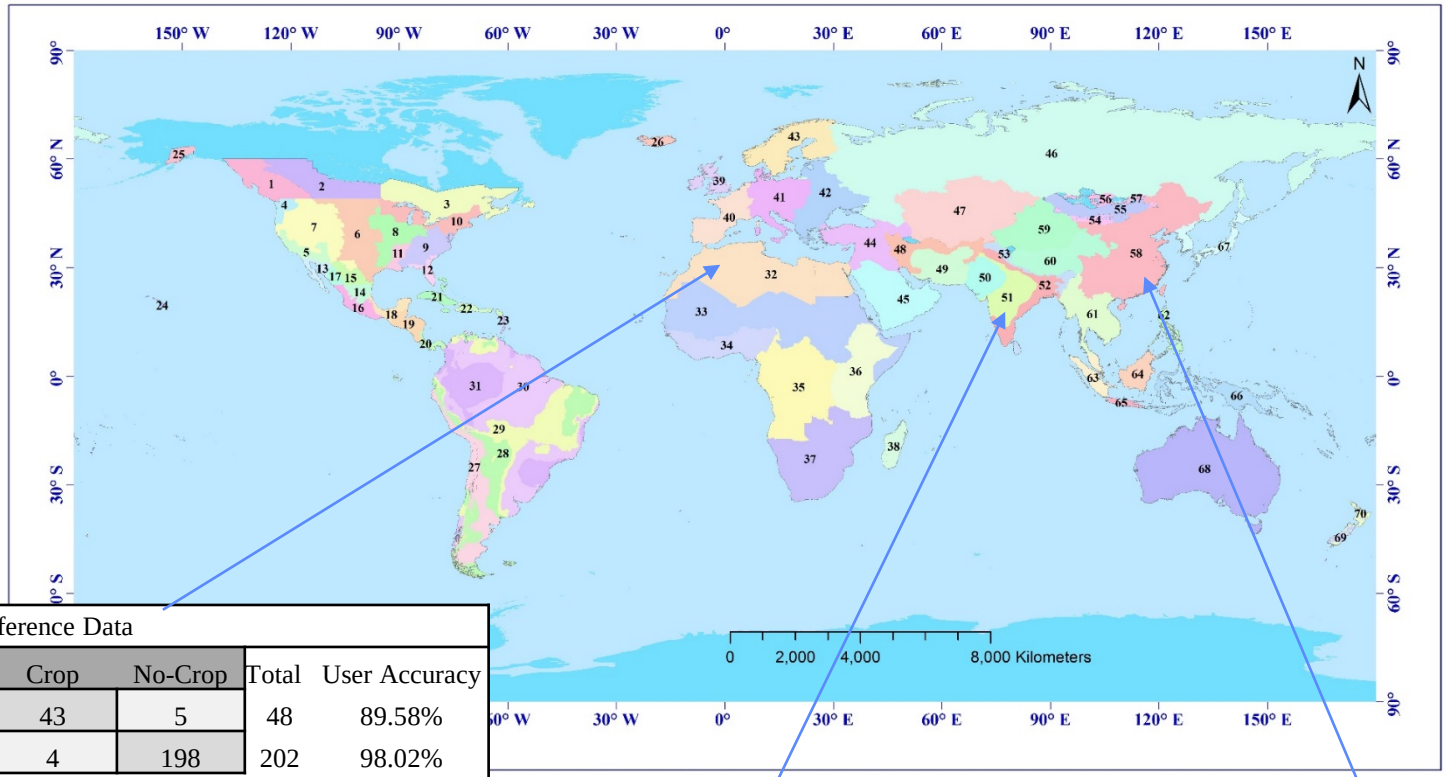
Total Number of Samples: 19,171



Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Accuracy Error matrices: Zone-by-Zone Error Matrices

For the entire world, the global cropland extent product had an overall accuracy of 91.7%. For the cropland class, the producer's accuracy was 83.4% (errors of omission of 16.6%) and user's accuracies of 78.3% (errors of commissions of 21.7%).



		Reference Data			
		Crop	No-Crop	Total	User Accuracy
Map Data	Crop	43	5	48	89.58%
	No-Crop	4	198	202	98.02%
Total		47	203	250	
Producer Accuracy		91.49%	97.54%		**96.40%**

		Reference Data			
		Crop	No-Crop	Total	User Accuracy
Map Data	Crop	140	18	158	88.61%
	No-Crop	24	67	91	73.63%
Total		164	85	249	
Producer Accuracy		85.37%	78.82%		**83.13%**

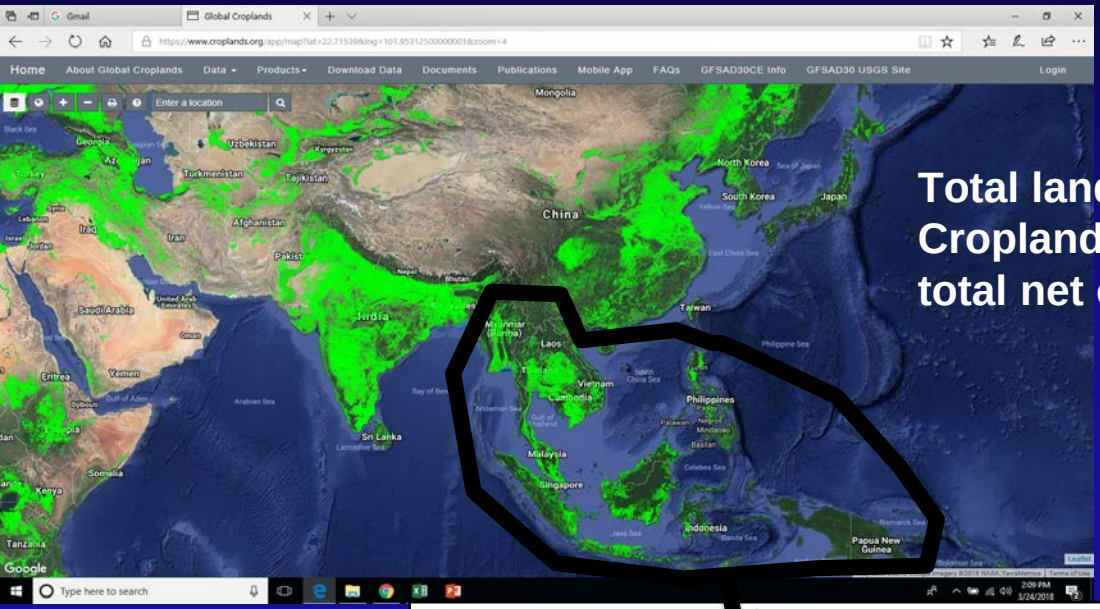
		Reference Data			
		Crop	No-Crop	Total	User Accuracy
Map Data	Crop	255	48	303	84.16%
	No-Crop	51	830	881	94.21%
Total		306	878	1,184	
Producer Accuracy		83.33%	94.53%		**91.64%**

USGS science for a changing world
U.S. Geological Survey
U.S. Department of Interior

GlobalCropland Extent @ 30-m Derived from Landsat Time-series Data

Accuracies: SE Asia

Whole SE Asia



Total land area of all zones (TLAall): 546.83 Mha
Cropland as % of TLAall: 23.4%
total net cropland area of SE Asia = 128 Mha

Reference Data

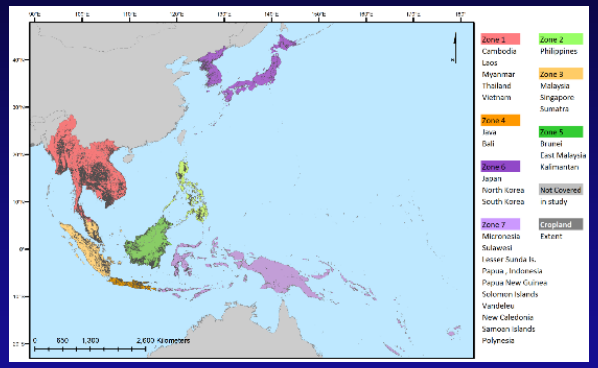
Map Data	Crop	No-Crop	Total	User Accuracy
Crop	376	114	490	76.73%
No-Crop	85	1175	1260	93.25%
Total	461	1289	1750	
Producer Accuracy	81.56%	91.16%		88.63%

USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

GlobalCropland Extent @ 30-m Derived from Landsat Time-series Data

Accuracies for Zone 1 & 2 in SE Asia



Myanmar, Thailand, Laos, Cambodia, & Vietnam

		Reference Data			
		Crop	No-Crop	Total	User Accuracy
Map Data	Crop	80	20	100	80.00%
	No-Crop	16	134	150	89.33%
Total		96	154	250	
Producer Accuracy		83.33%	87.01%		**85.60%**

Total land area of Zone 1 (TLAZ1): : 192.3 Mha
Cropland as % of TLAZ1 : 31.7%
total net cropland area of SE Asia (TCASEA) = 128 Mha
Cropland as % of TCASEA: 47.6%

Philippines

		Reference Data			
		Crop	No-Crop	Total	User Accuracy
Map Data	Crop	41	7	48	85.42%
	No-Crop	15	187	202	92.57%
Total		56	194	250	
Producer Accuracy		73.21%	96.39%		**91.20%**

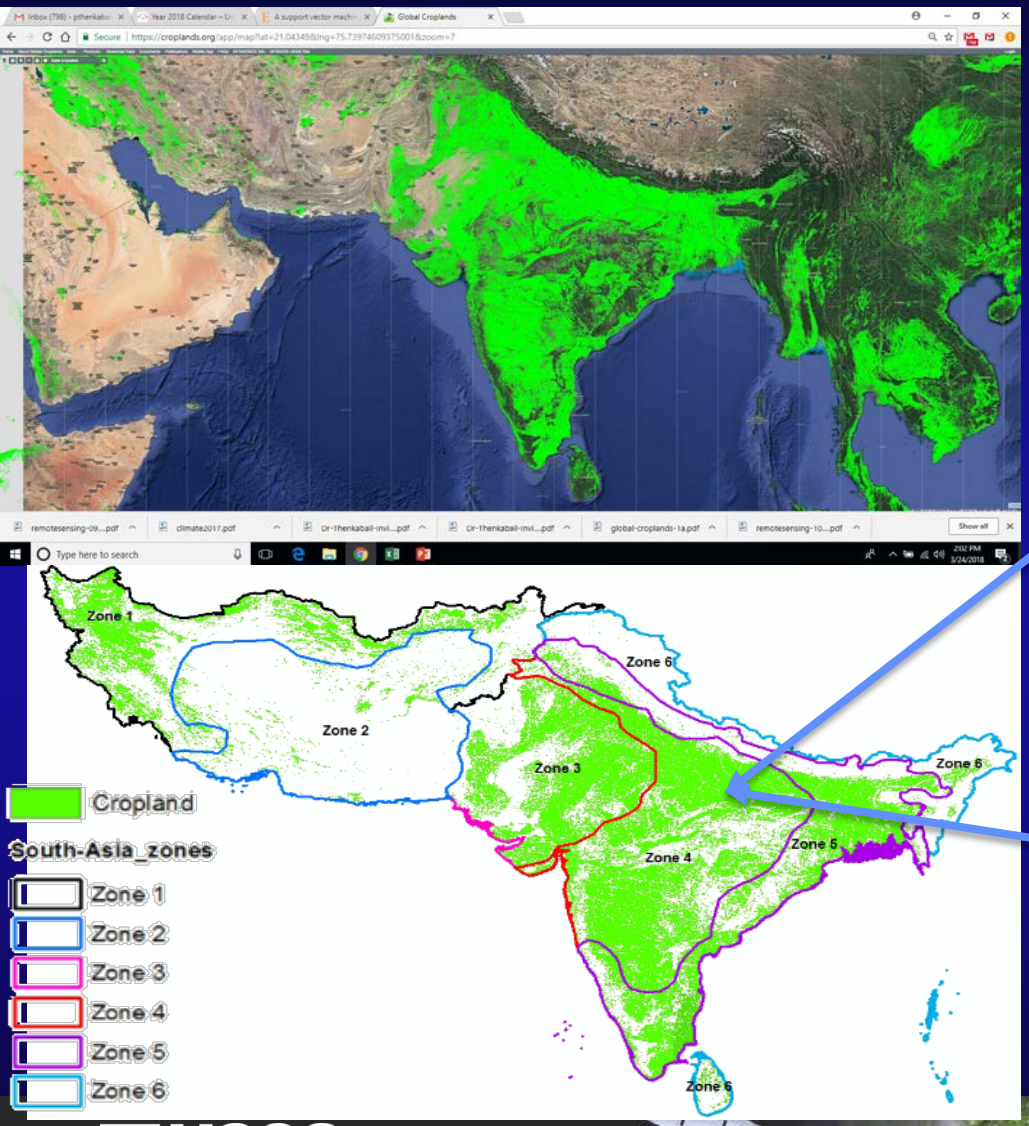
Zone	Region	Cropland Training Samples #	Non Cropland Training Samples #
1	Mainland SE Asia	1,326	1,267
2	Philippines	350	330

Total land area of Zone 2 (TLAZ2): 29.6 Mha
Cropland as % of TLAZ2: 31.1%
total net cropland area of SE Asia (TCASEA) = 128 Mha
Cropland as % of TCASEA : 7.2%

USGS science for a changing world
U.S. Geological Survey
U.S. Department of Interior

GlobalCropland Extent @ 30-m Derived from Landsat Time-series Data

Accuracies for Zone 4 : South Asia



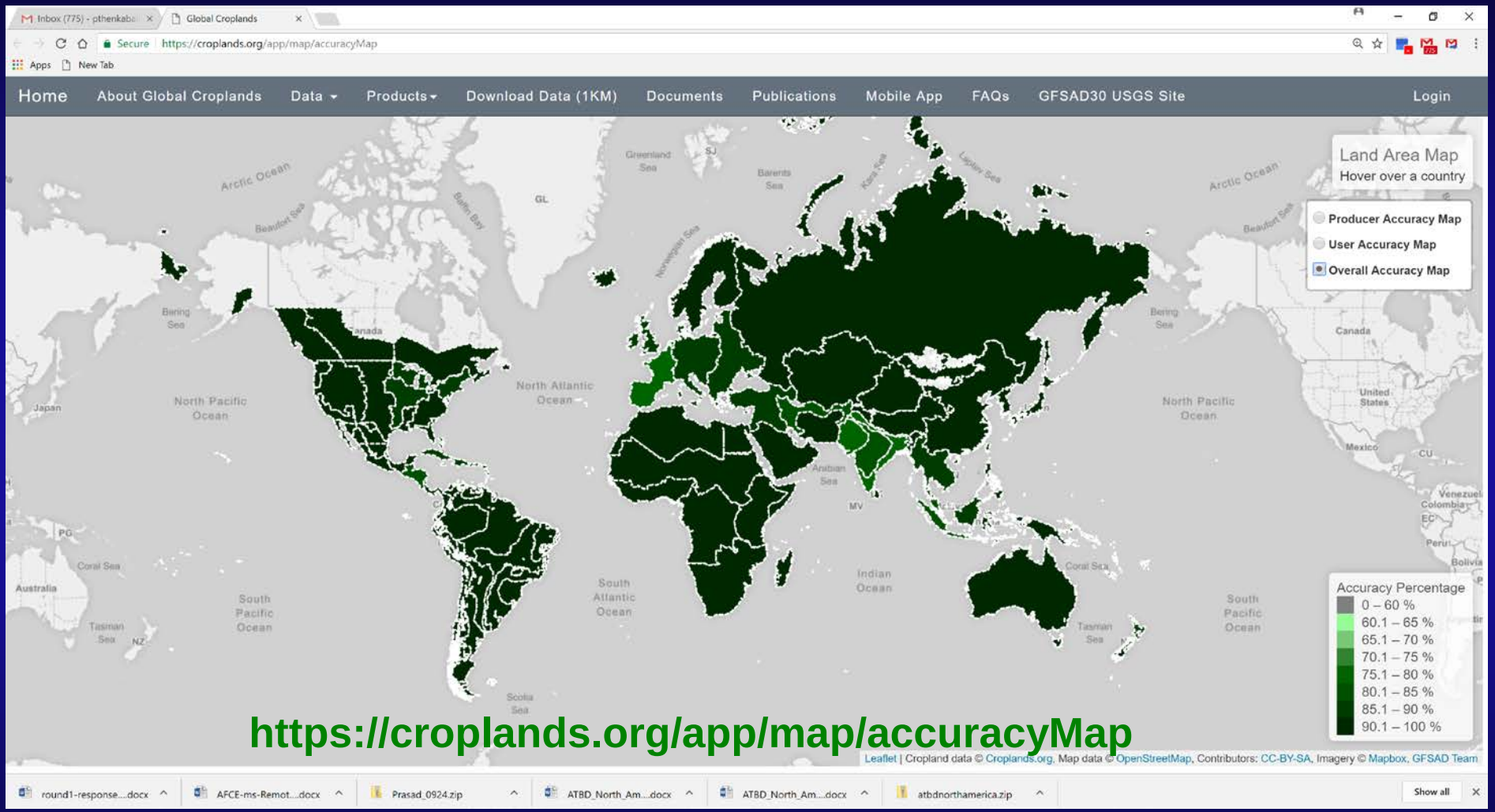
		Reference Data			
		Crop	No-Crop	Total	User Accuracy
Map Data	Crop	140	18	158	88.61%
	No-Crop	24	67	91	73.63%
Total		164	85	249	
Producer Accuracy		85.37%	78.82%		83.13%

Total land area of Zone 4 (TLAZ4): 174.87 Mha
Cropland as % of TLAZ4: 57.49 %
Total net cropland area of SAsia (TCASA) = 262.47 Mha
Cropland as % of TCASA : 38.30 %

USGS

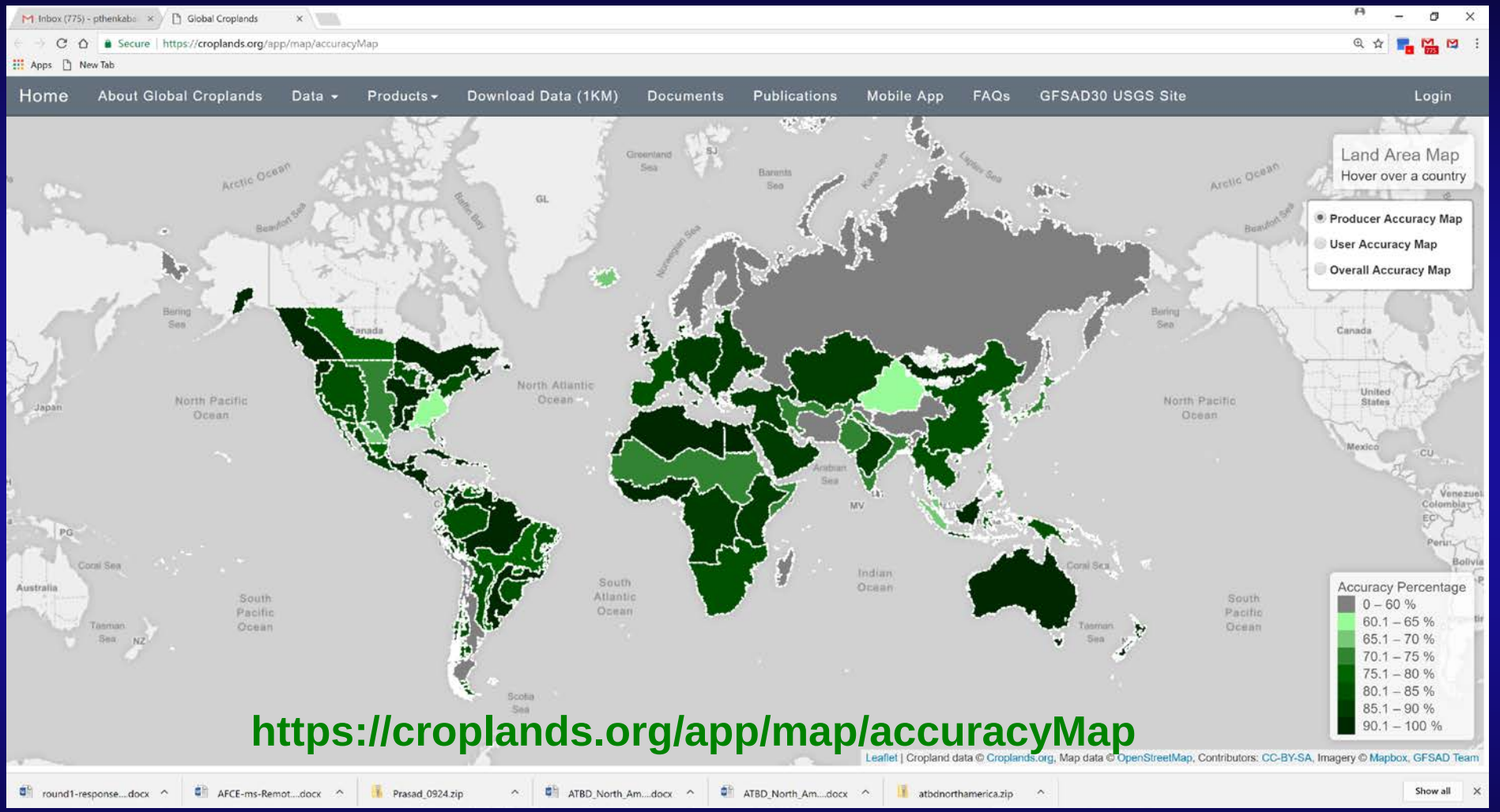
Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Overall Accuracies of the Cropland Class



Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Producer's Accuracies of Cropland Class (measures errors of omissions)

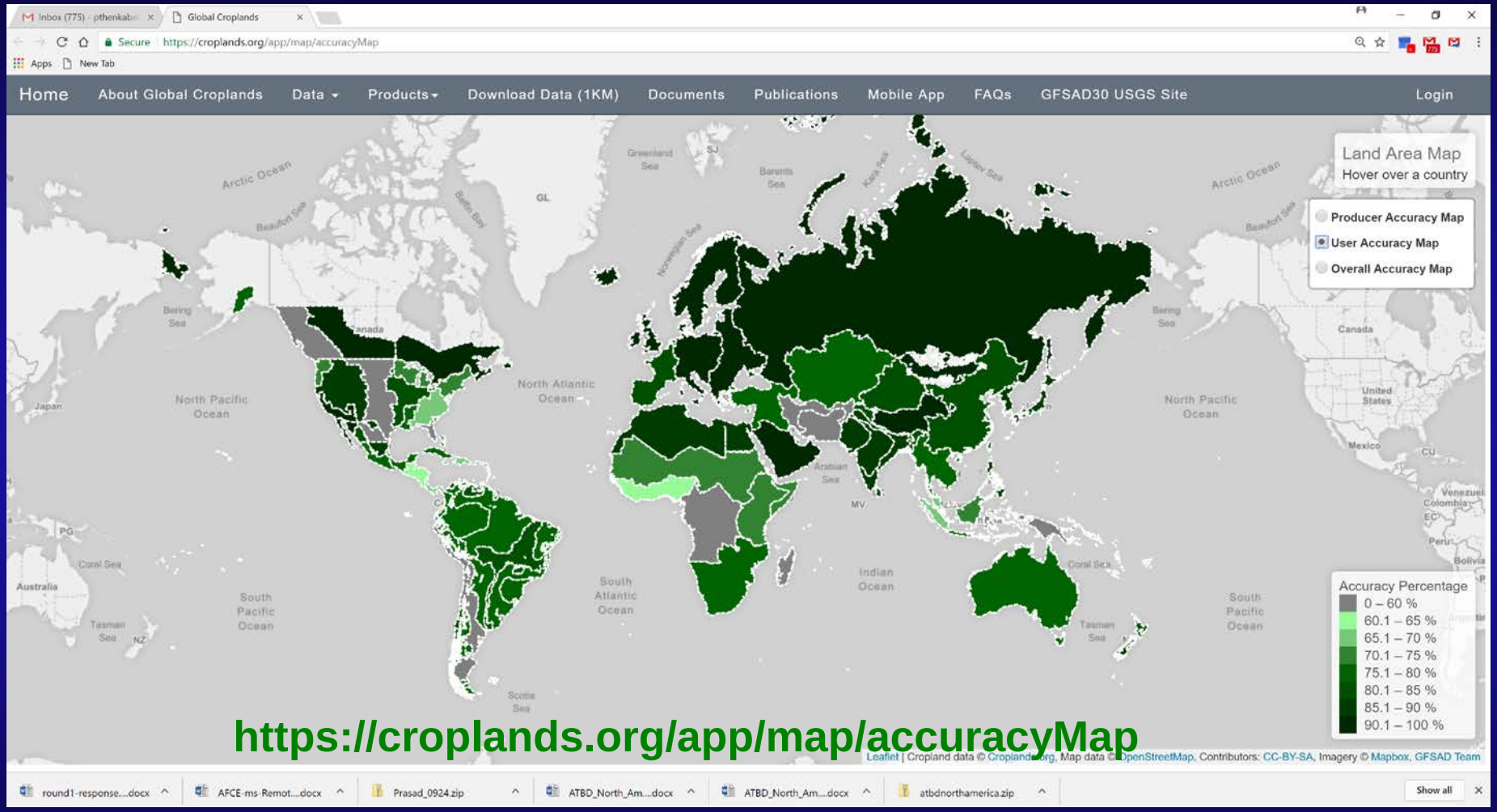


https://croplands.org/app/map/accuracyMap

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

User's Accuracies of Cropland Class (measures errors of comissions)



https://croplands.org/app/map/accuracyMap

U.S. Geological Survey
U.S. Department of Interior

Global Croplands @ 30-m

Results:

30-m Global Cropland Extent Areas

https://web.croplands.org/app/map
croplands.org
https://geography.wr.usgs.gov/science/croplands/index.html

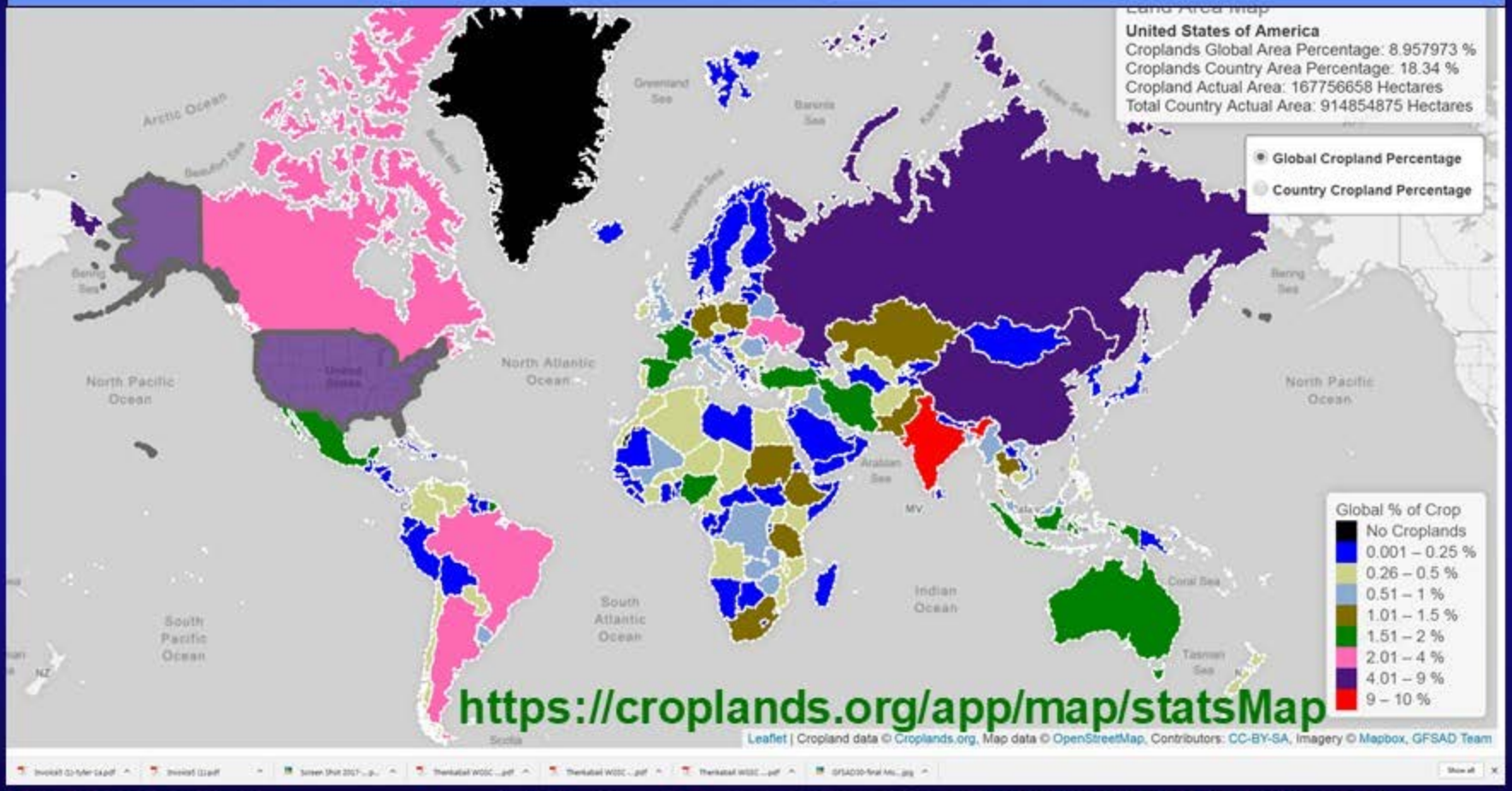
USGS
science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

30-m Net Cropland Area as % of Global Net Cropland Area

Interactive area Map @:

https://web.croplands.org/app/map/statsMap

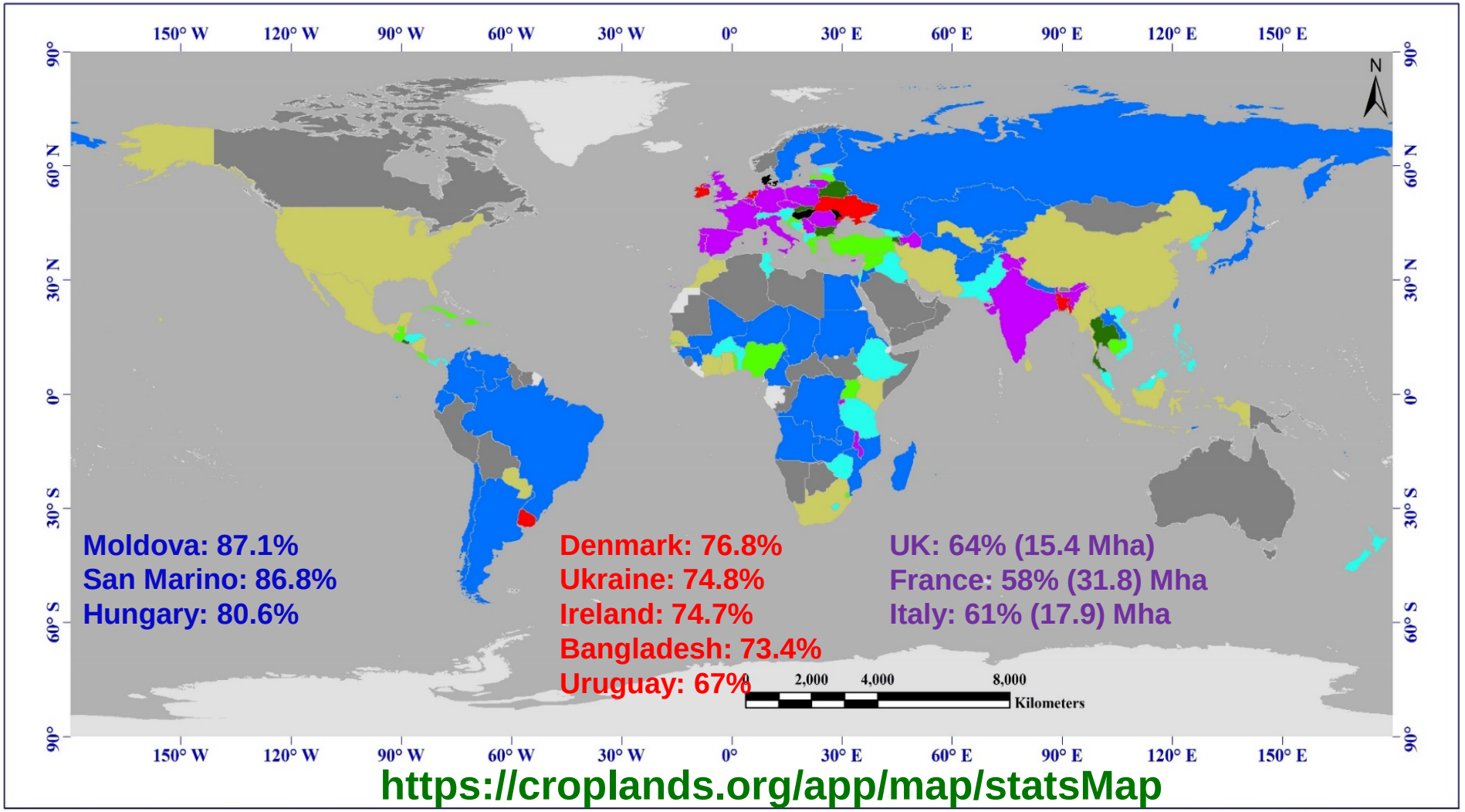


USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

30-m Net Cropland Area as % of Geographic Area of the Country



https://croplands.org/app/map/statsMap

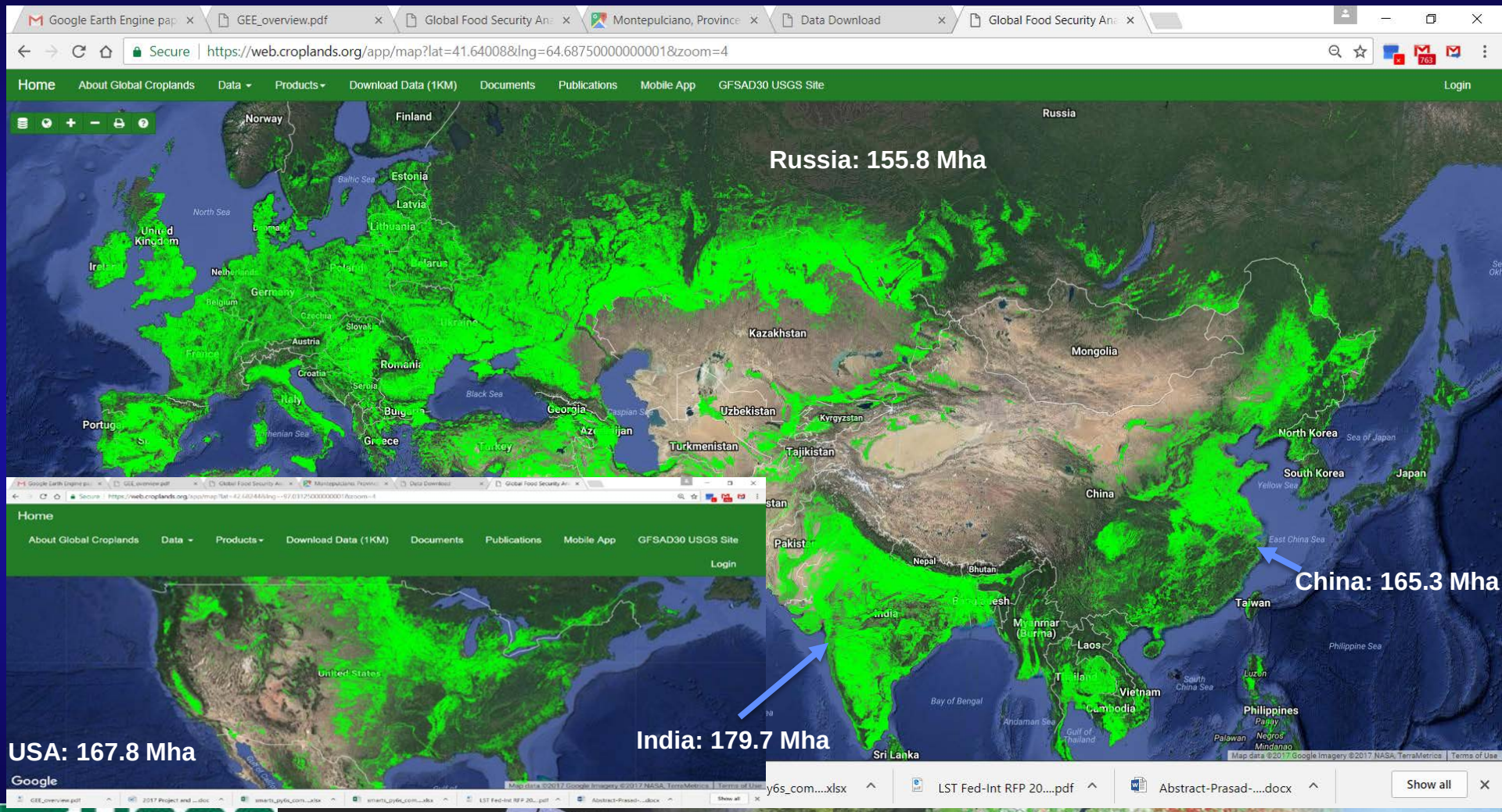
Cropland Areas as % of County Geographic Area

0.0 - 0.1	5.1 - 15.0	35.1 - 45.0	65.1 - 75.0
0.2 - 5.0	15.1 - 25.0	45.1 - 55.0	75.1 - 87.1
	25.1 - 35.0	55.1 - 65.0	

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Leading 4 Countries with 155-180 Mha of Net Cropland Areas

https://croplands.org/app/map; https://croplands.org/



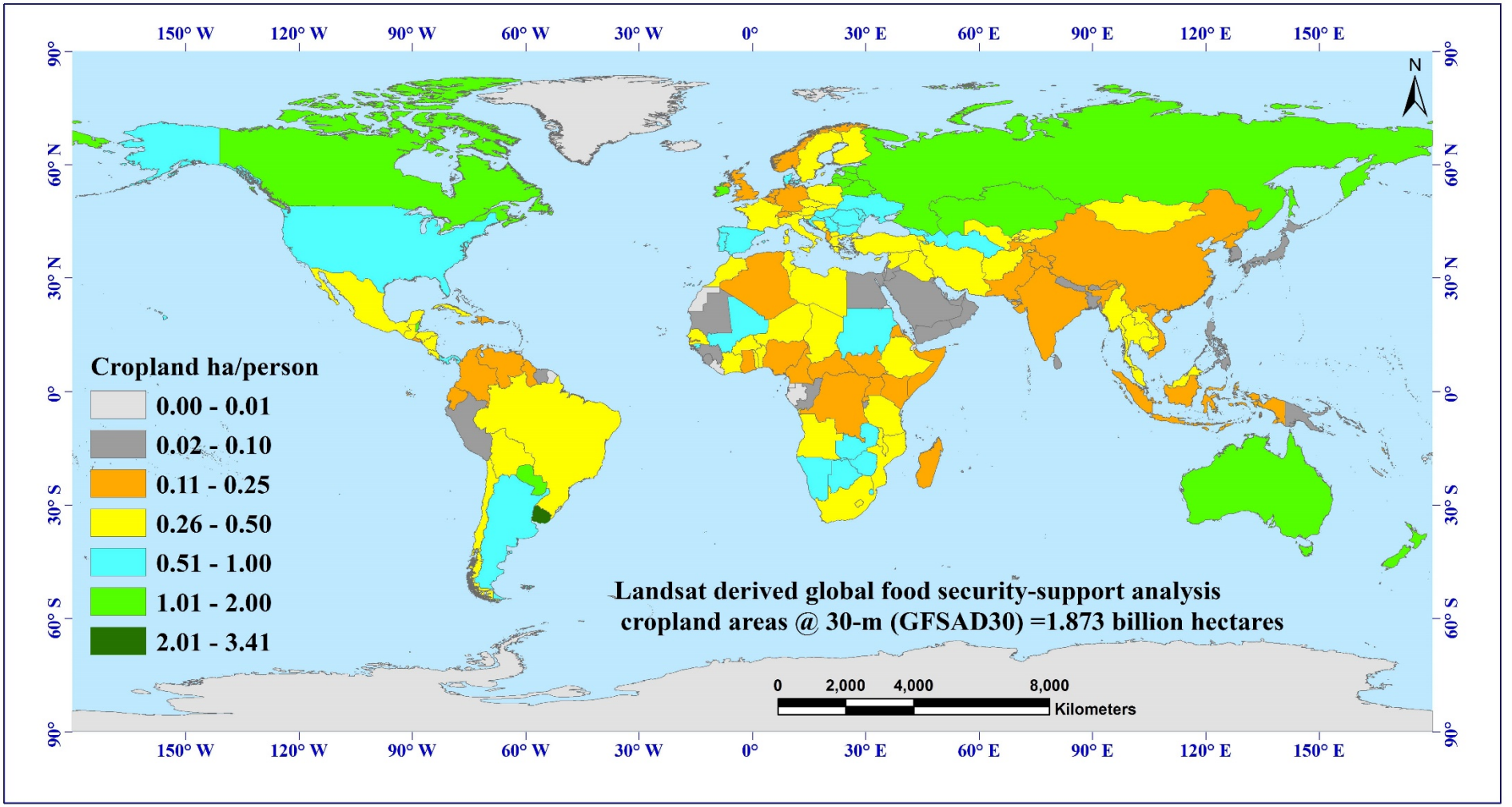
USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

www.croplands.org

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

30-m Cropland Area as ha\per person per Country



USGS
science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

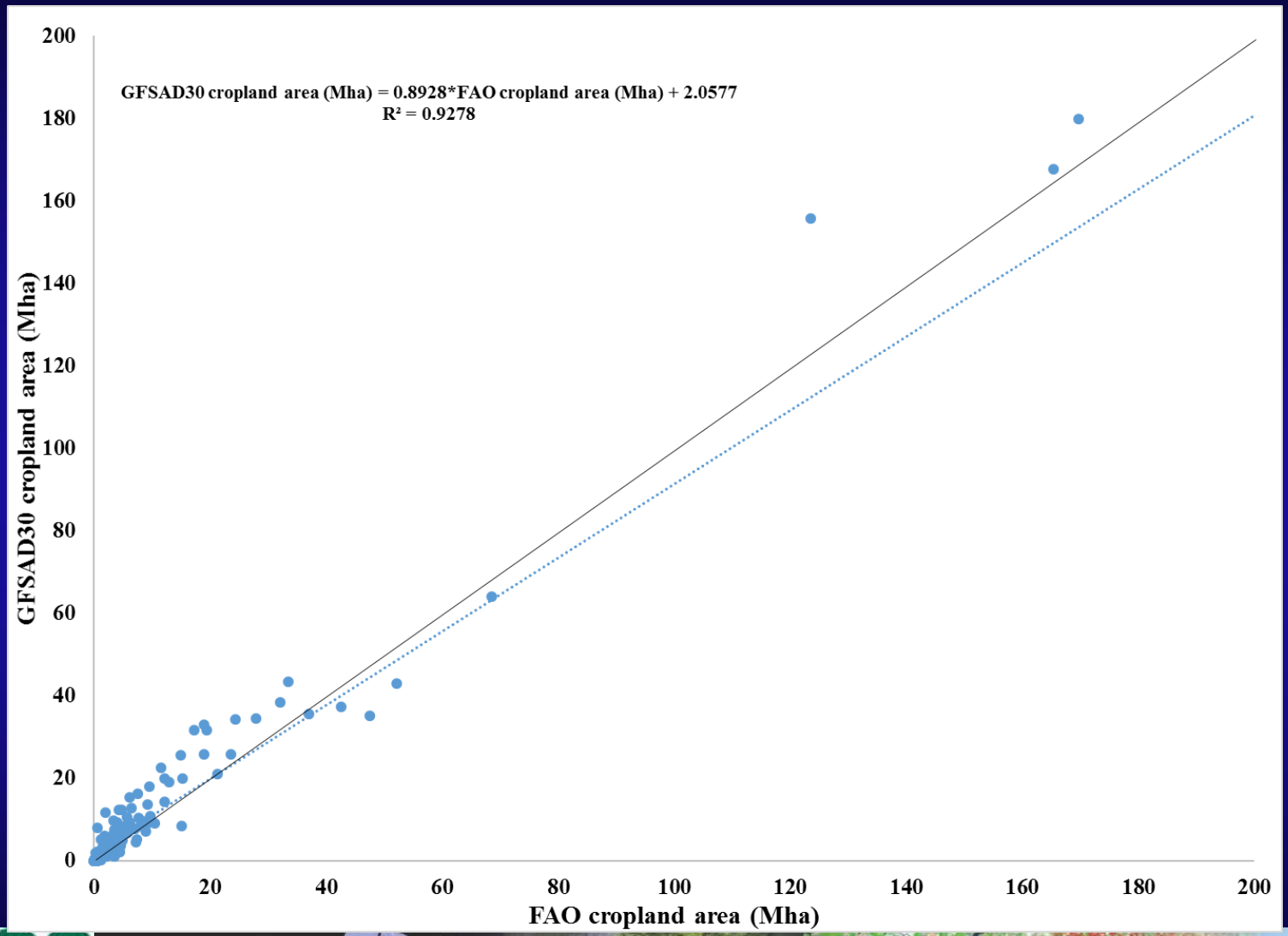
30-m Net Cropland Area as % of Geographic Area of the Country

Table 3. Cropland areas derived from Landsat 30-m global cropland product compared with numerous other measure's

Rank #	Continent Name	Country Name	Gaul Admn Code[1] #	Geographical Land Area FAO[2] Ha	Crop Area GFSAD30[3] 2015 30-m Ha	MIRCA2014[4] 2014 10km Ha	FAO[5] 2010 Ha	GIAM-GMRCA[6] 2000 1000m Ha	GRIPC2005[7] 2005 500-m Ha
1	Asia	India	115	297,459,504	179,800,110	177,397,578	169,705,109	150,059,162	187,497,499
2	North America	USA	259	914,854,875	167,756,658	185,400,709	165,414,910	161,617,081	245,739,524
3	Asia	China	1E+05	932,824,512	165,228,334	158,872,013	248,526,732	203,624,473	203,607,871
4	Europe	Russia	204	1,633,037,879	155,799,806	127,482,904	123,516,453	128,675,415	235,890,486
5	South America	Brazil	37	845,047,923	63,994,709	58,705,445	68,505,500	91,603,674	102,616,446
6	Europe	Ukraine	254	57,971,910	43,375,936	34,483,060	33,392,284	31,285,731	50,085,213
7	North America	Canada	46	913,513,514	42,980,283	42,379,112	52,119,600	37,602,699	68,061,608
8	South America	Argentina	12	273,879,142	38,383,784	34,778,946	32,034,000	43,623,158	55,168,208
9	Asia	Indonesia	116	181,081,081	37,441,996	31,533,604	42,612,000	20,746,487	31,031,121
10	Africa	Nigeria	182	91,075,795	35,665,573	38,620,000	37,026,500	9,770,698	39,298,447
11	Australia & Oceanian	Australia	17	768,851,504	35,105,792	30,615,114	47,447,364	48,623,546	54,933,291
12	North America	Mexico	162	194,391,304	34,516,526	37,674,312	27,867,743	16,352,595	26,860,401
13	Europe	Turkey	249	76,899,209	34,314,153	23,230,840	24,280,464	12,356,748	20,189,904
14	Asia	Iran	117	162,802,013	33,063,882	16,644,983	18,969,365	8,133,031	7,358,862
15	Europe	France	85	54,805,243	31,795,512	19,627,780	19,403,358	20,048,339	40,252,787
16	Europe	Spain	229	49,873,874	31,786,945	18,748,612	17,216,960	18,813,770	20,624,711
17	Asia	Kazakhstan	132	270,051,813	25,885,023	23,102,226	23,558,240	38,950,704	36,389,615
18	Asia	Thailand	240	51,149,871	25,756,201	17,701,953	19,003,200	16,542,332	27,363,222
19	Africa	Ethiopia	79	99,957,143	25,702,434	11,090,000	14,973,580	10,748,582	14,225,217
20	Africa	Sudan	6	188,606,800	22,740,632	18,400,000		9,553,181	10,431,977

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

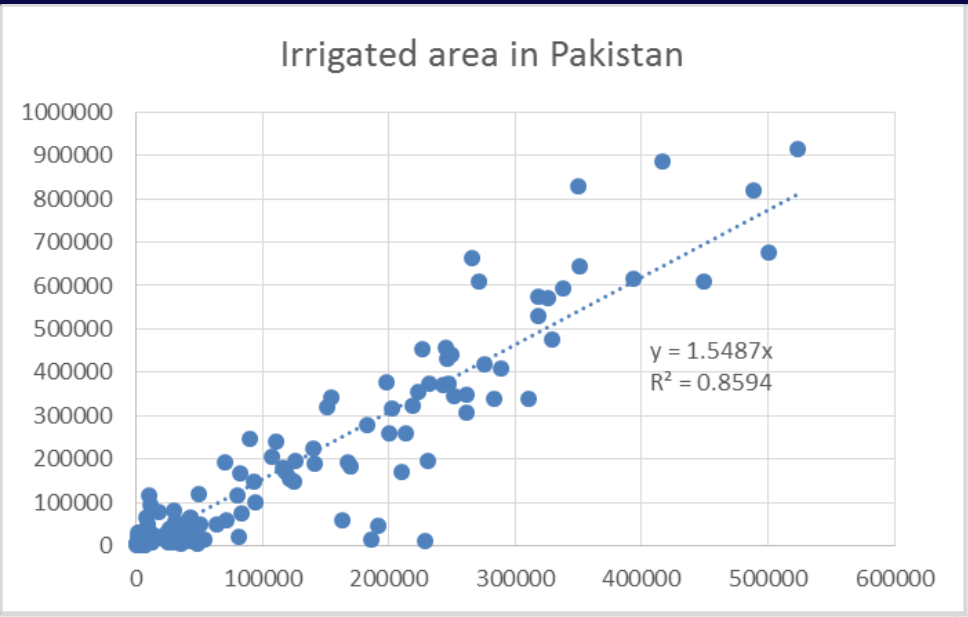
Area Comparisons of Countries: GFSAD30 Vs. FAO (2015)

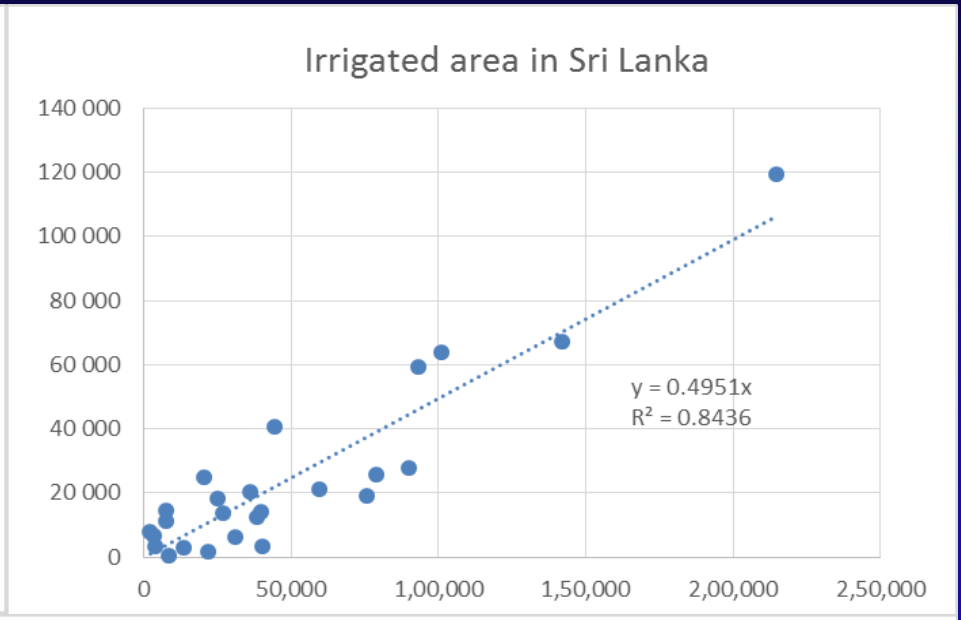


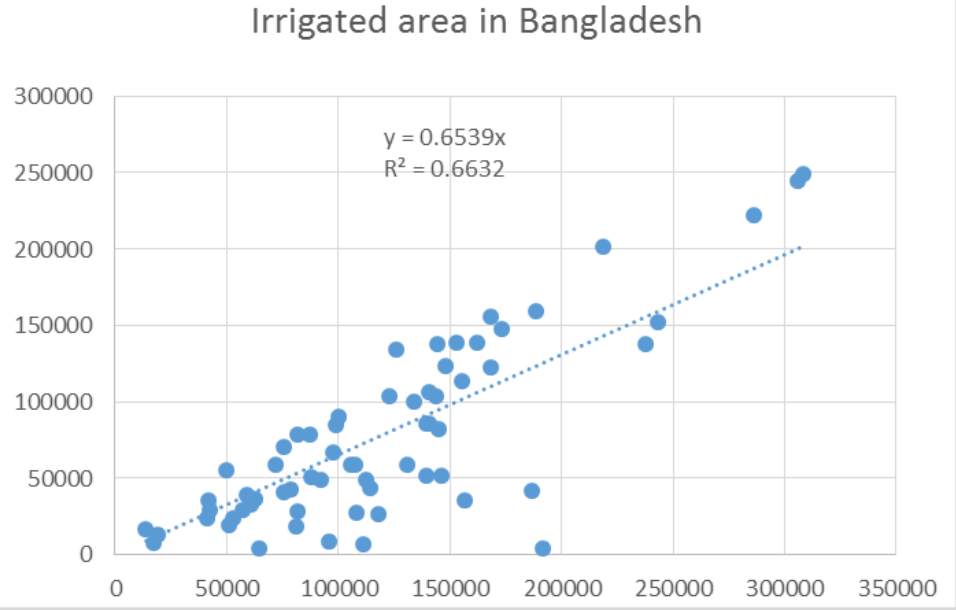
USGS
science for a changing world
U.S. Geological Survey
U.S. Department of Interior

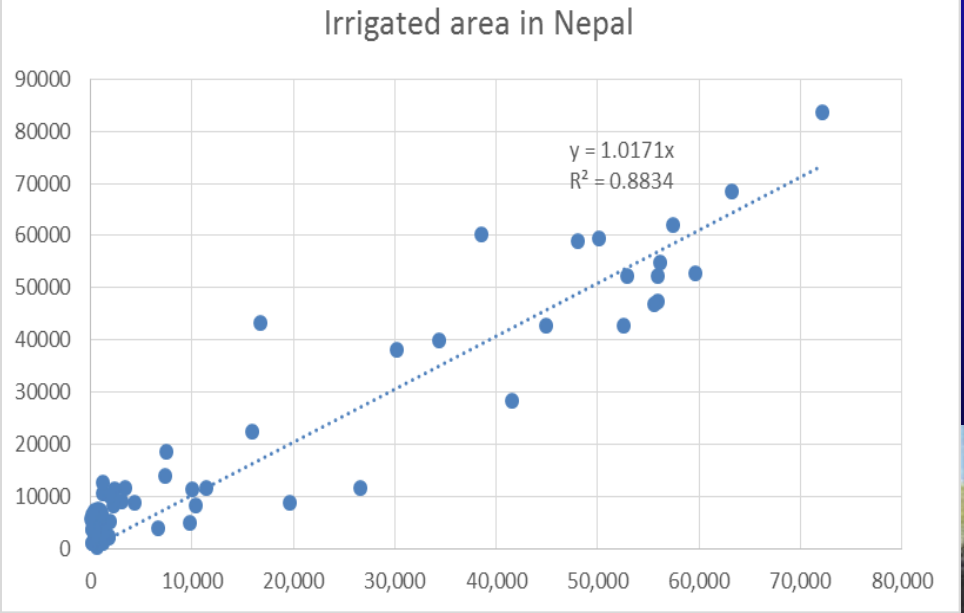
Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

Area Comparisons of Countries: GFSAD30 Vs. FAO (2015)









Global Croplands @ 30-m
Dissemination

https://web.croplands.org/app/map
croplands.org
https://geography.wr.usgs.gov/science/croplands/index.html

USGS
science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

DATA Access\Dissemination through LP DAAC

Data, Products, ATBD's, User Guide's, Manuscripts

Data Download:

https://lpdaac.usgs.gov/about/news_archive/release_gfsad_30_meter_cropland_extent_products

Data Browse:

www.croplands.org

Project Sites:

www.croplands.org

https://geography.wr.usgs.gov/science/croplands/index.html

globalcroplands.org

You can find (from these sites):

1. products,
2. algorithms, and
3. manuscripts

USGS science for a changing world

U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

DATA Access\Dissemination through LP DAAC

Data, Products, ATBD's, User Guide's, Manuscripts

https://lpdaac.usgs.gov/about/news_archive/release_gfsad_30_meter_cropland_extent_products

EARTHDATA Find a DAAC ▾ Feedback

LP DAAC
LAND PROCESSES DISTRIBUTED ACTIVE ARCHIVE CENTER

Home | About ▾ | Dataset Discovery ▾ | Citing Our Data | Tools ▾ | User Resources ▾ | User Services ▾ | Site ▾ | Search | Login with Earthdata

Home > News Archive > Release of GFSAD 30 meter Cropland Extent Products

November 9, 2017

Release of GFSAD 30 meter Cropland Extent Products

The Land Processes Distributed Active Archive Center (LP DAAC) is pleased to announce the availability of the The NASA Making Earth System Data Records for Use in Research Environments (MEaSUREs) Global Food Security-support Analysis Data 30 meter (GFSAD30) Cropland Extent data product.The monitoring of global cropland extent is critical for policymaking and provides important baseline data that are used in many agricultural cropland studies pertaining to water sustainability and food security. The GFSAD30 collection provides cropland extent data across the globe, divided and distributed into 7 separate regional datasets, for nominal year 2015 (2010 for North America) at 30 meter resolution. Additionally, the validation dataset used to conduct an independent accuracy assessment of global cropland extent is available.

The Digital Object Identifier (DOI) for each dataset is given below to provide users with a persistent link to the product information.

GFSAD30 Cropland Extent 2015 Africa 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30AFCE.001
GFSAD30 Cropland Extent 2015 30 m Australia, New Zealand, China, Mongolia 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30AUNZCNMOCE.001
GFSAD30 Cropland Extent 2015 Europe, Central Asia, Russia, Middle East 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30EUCEARUMECE.001
GFSAD30 Cropland Extent 2015 North America 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30NACE.001
GFSAD30 Cropland Extent 2015 South Asia, Afghanistan, Iran 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30SAAFGIRCE.001
GFSAD30 Cropland Extent 2015 South America 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30SACE.001
GFSAD30 Cropland Extent 2015 Southeast and Northeast Asia 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30SEACE.001

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

DATA Access\Dissemination through LP DAAC

Data, Products, ATBD's, User Guide's, Manuscripts

https://lpdaac.usgs.gov/about/news_archive/release_gfsad_30_meter_cropland_extent_products

GFSAD30 Cropland Extent 2015 Africa 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30AFCE.001
GFSAD30 Cropland Extent 2015 30 m Australia, New Zealand, China, Mongolia 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30AUNZCNMOCE.001
GFSAD30 Cropland Extent 2015 Europe, Central Asia, Russia, Middle East 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30EUCEARUMECE.001
GFSAD30 Cropland Extent 2015 North America 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30NACE.001
GFSAD30 Cropland Extent 2015 South Asia, Afghanistan, Iran 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30SAAFGIRCE.001
GFSAD30 Cropland Extent 2015 South America 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30SACE.001
GFSAD30 Cropland Extent 2015 Southeast and Northeast Asia 30 m
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30SEACE.001
GFSAD30 Cropland Extent 2015 Global Validation
DOI: https://doi.org/10.5067/MEaSUREs/GFSAD/GFSAD30VAL.001

USGS science for a changing world
U.S. Geological Survey
U.S. Department of Interior

Global 30-m Landsat-derived Cropland Extent, Areas, and Accuracies

DATA Access\Dissemination

Peer-reviewed Manuscripts

https://geography.wr.usgs.gov/science/croplands/pubs2017.html

Xiong, J., Thenkabail, P.S., Tilton, J.C., Gumma, M.K., Teluguntla, P., Oliphant, A., Congalton, R.G., Yadav, K., Gorelick. N. 2017. Nominal 30-m Cropland Extent Map of Continental Africa by Integrating Pixel-Based and Object-Based Algorithms Using Sentinel-2 and Landsat-8 Data on Google Earth Engine, Remote Sensing, 2017, 9(10), 1065; doi:10.3390/rs9101065, http://www.mdpi.com/2072-4292/9/10/1065

Teluguntla, P., Thenkabail, P.S., Xiong, J., Gumma, M.K., Congalton, R.G., Oliphant, A., Poehnelt, J., Yadav, K., Rao, M., and Massey, R. 2017. Spectral matching techniques (SMTs) and automated cropland classification algorithms (ACCAs) for mapping croplands of Australia using MODIS 250-m time-series (2000–2015) data, International Journal of Digital Earth, DOI: 10.1080/17538947.2016.1267269. IP-074181, http://dx.doi.org/10.1080/17538947.2016.1267269

Xiong, J., Thenkabail, P.S., Gumma, M.K., Teluguntla, P., Poehnelt, J., Congalton, R.G., Yadav, K. and Thau, D., 2017. Automated cropland mapping of continental Africa using Google Earth Engine cloud computing. ISPRS Journal of Photogrammetry and Remote Sensing, 126, pp.225-244, http://www.sciencedirect.com/science/article/pii/S0924271616301575

Massey, R., Sankey, T.T., Congalton, R.G., Yadav, K., Thenkabail, P.S., Ozdogan, M., Sánchez Meador, A.J. 2017. MODIS phenology-derived, multi-year distribution of conterminous U.S. crop types, Remote Sensing of Environment, Volume 198, 1 September 2017, Pages 490-503, ISSN 0034-4257, https://doi.org/10.1016/j.rse.2017.06.033