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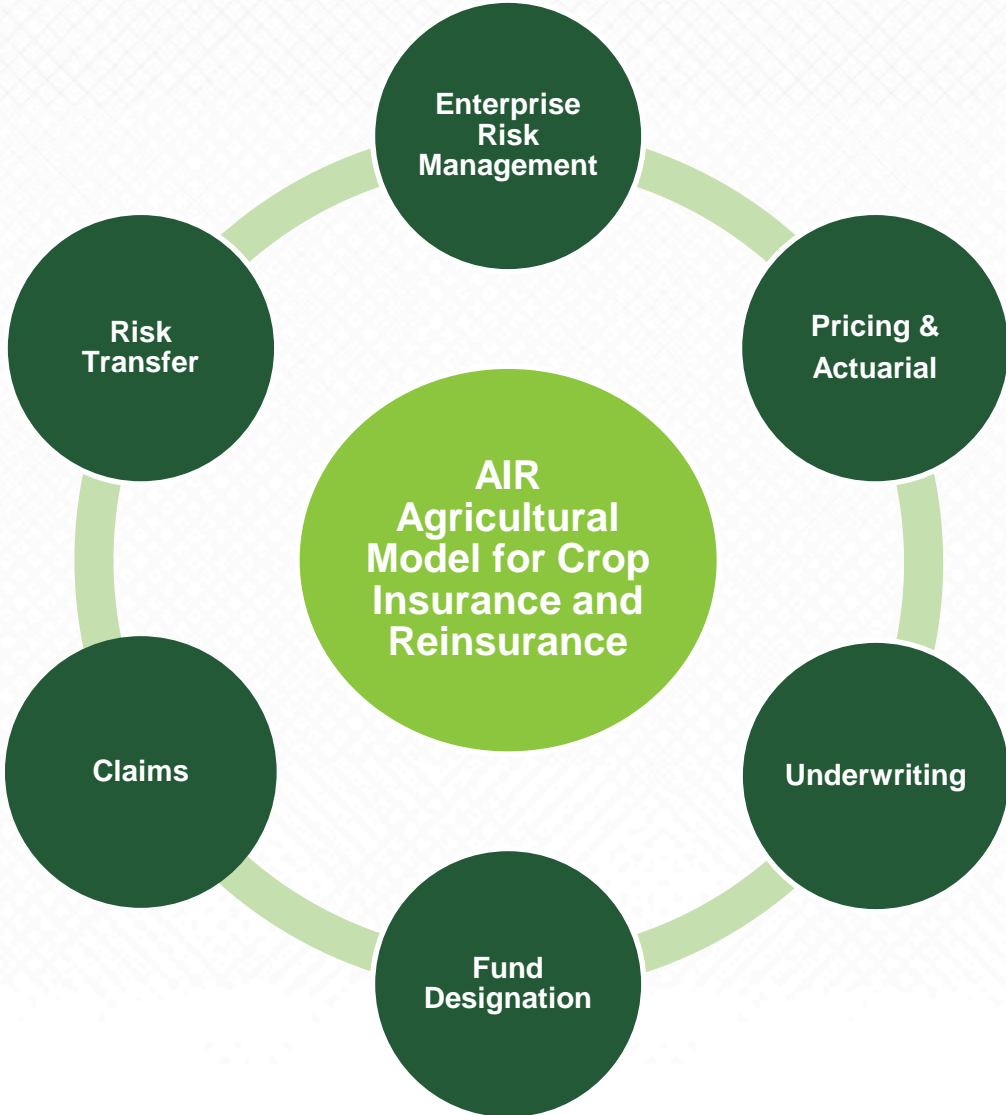
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Recap of U.S. Crop Insurance Industry Gains and Losses for the 2016 Crop Year

*Julia Borman, Ph.D. and Oscar Vergara, Ph.D.
Prepared for SCC-76 Conference, Pensacola, FL, March 31, 2017*

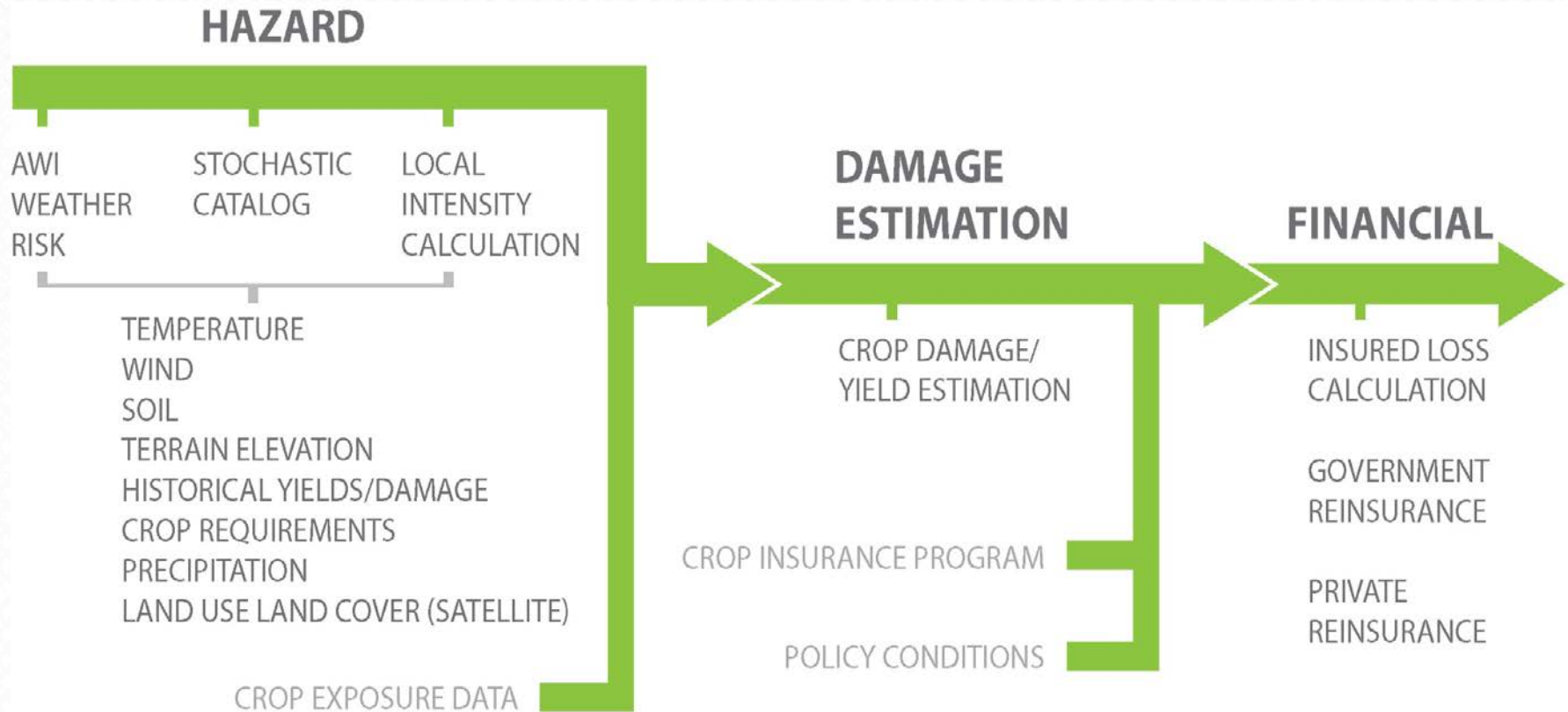
AIR Agricultural Model Applications



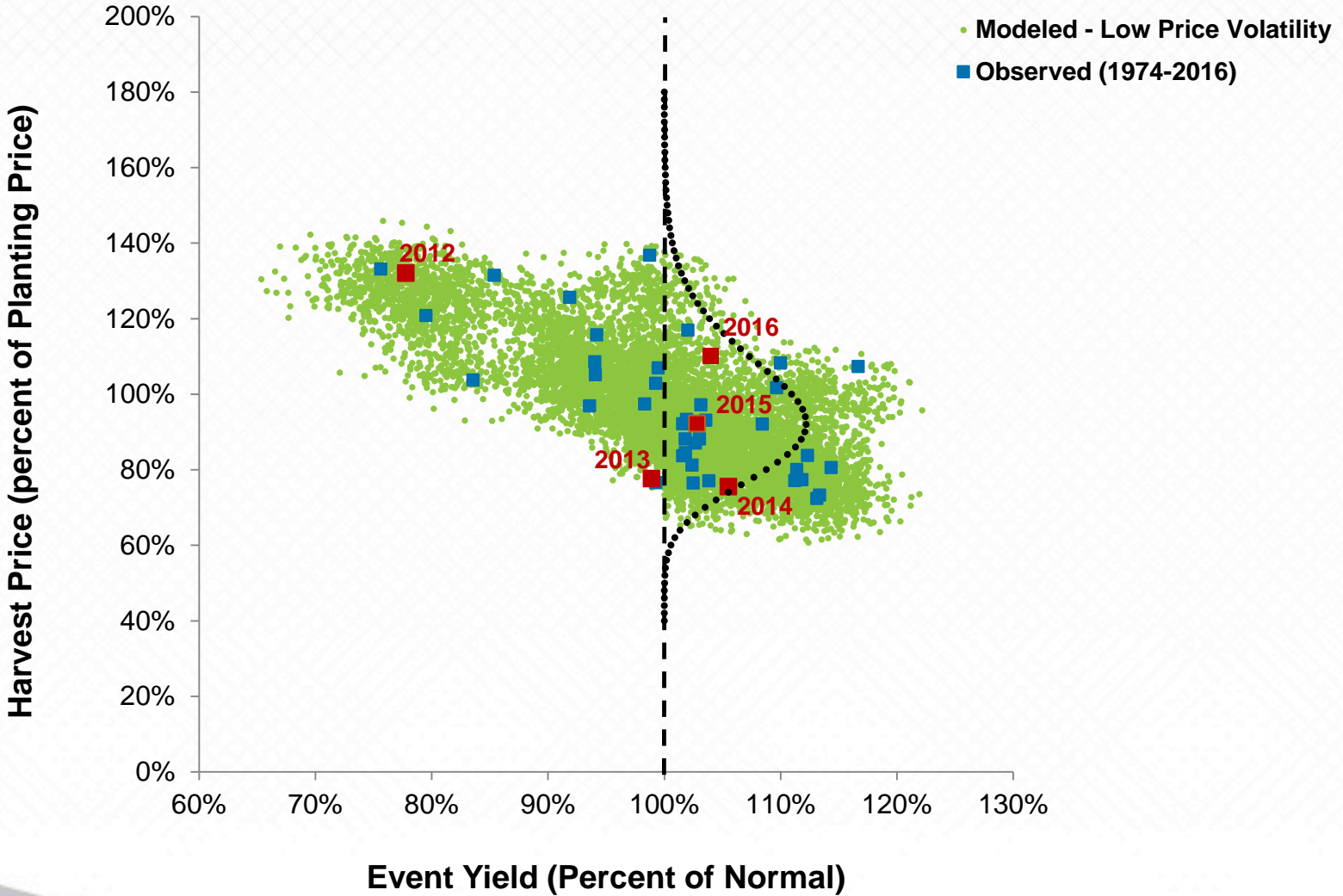
Weather Modeling is Key for Agricultural Risk Management

	% Crop Loss
Drought & Heat	37%
Excess Moisture	33%
Hail	13%
Cold, Frost & Freeze	5%
Wind & Hurricane	4%
Flood	1%
Subtotal – Directly related to weather	93%
Disease	5%
Insects & Wildlife	1%
Other	1%
Subtotal – Other perils	7%
Total	100%

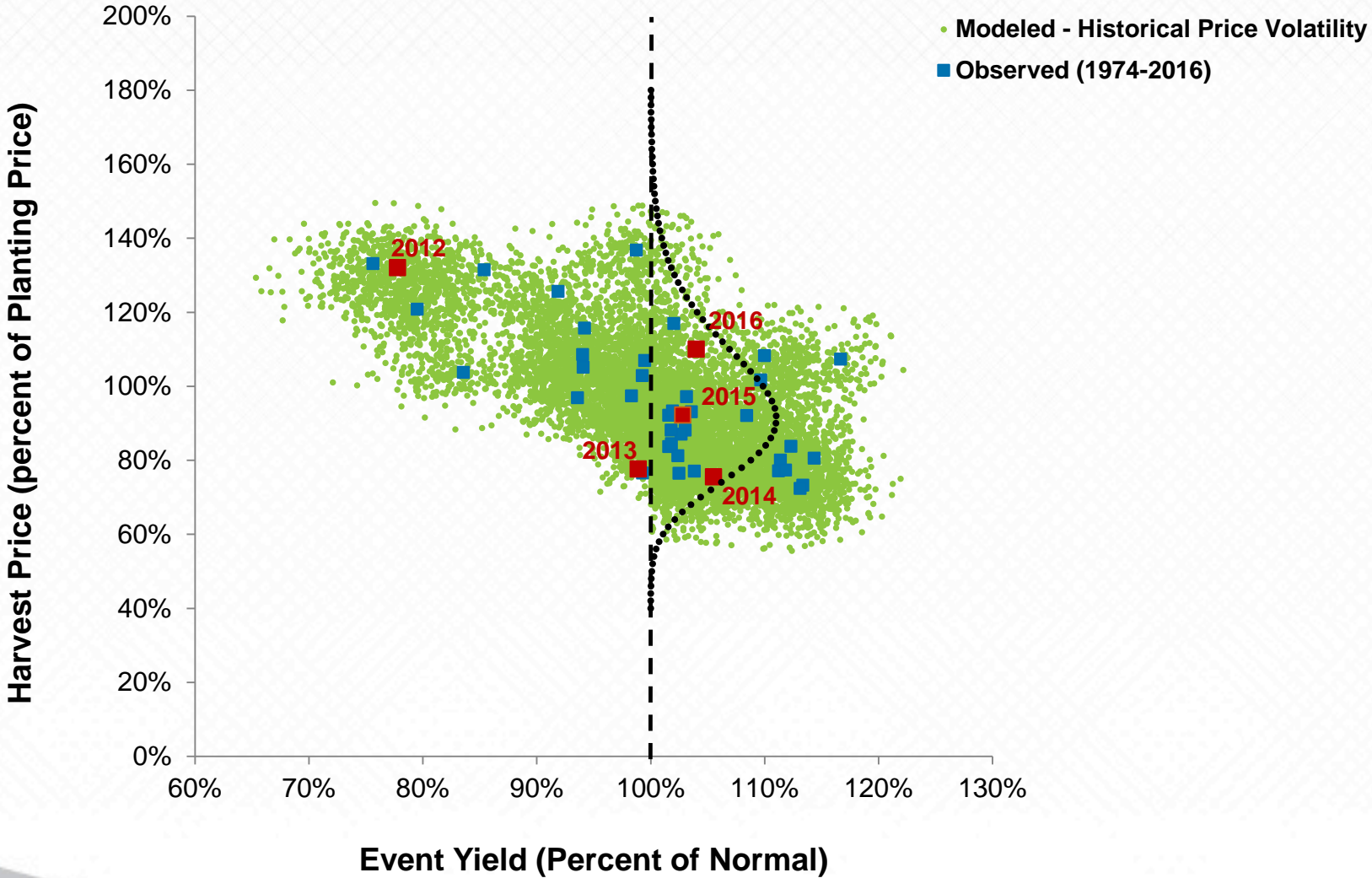
AIR's Multi Peril Crop Insurance Models are Built from the Ground Up



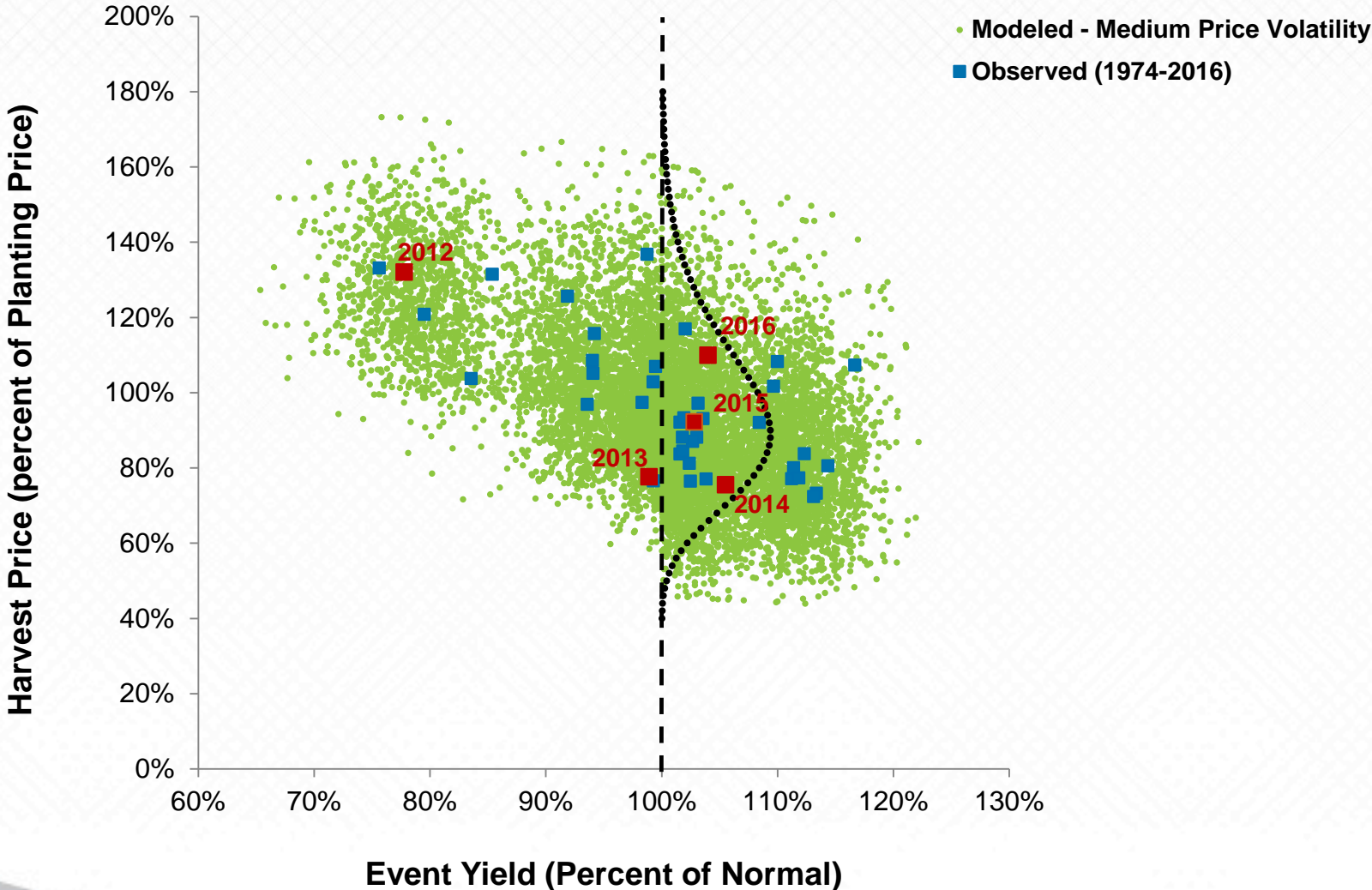
Low Volatility Catalog



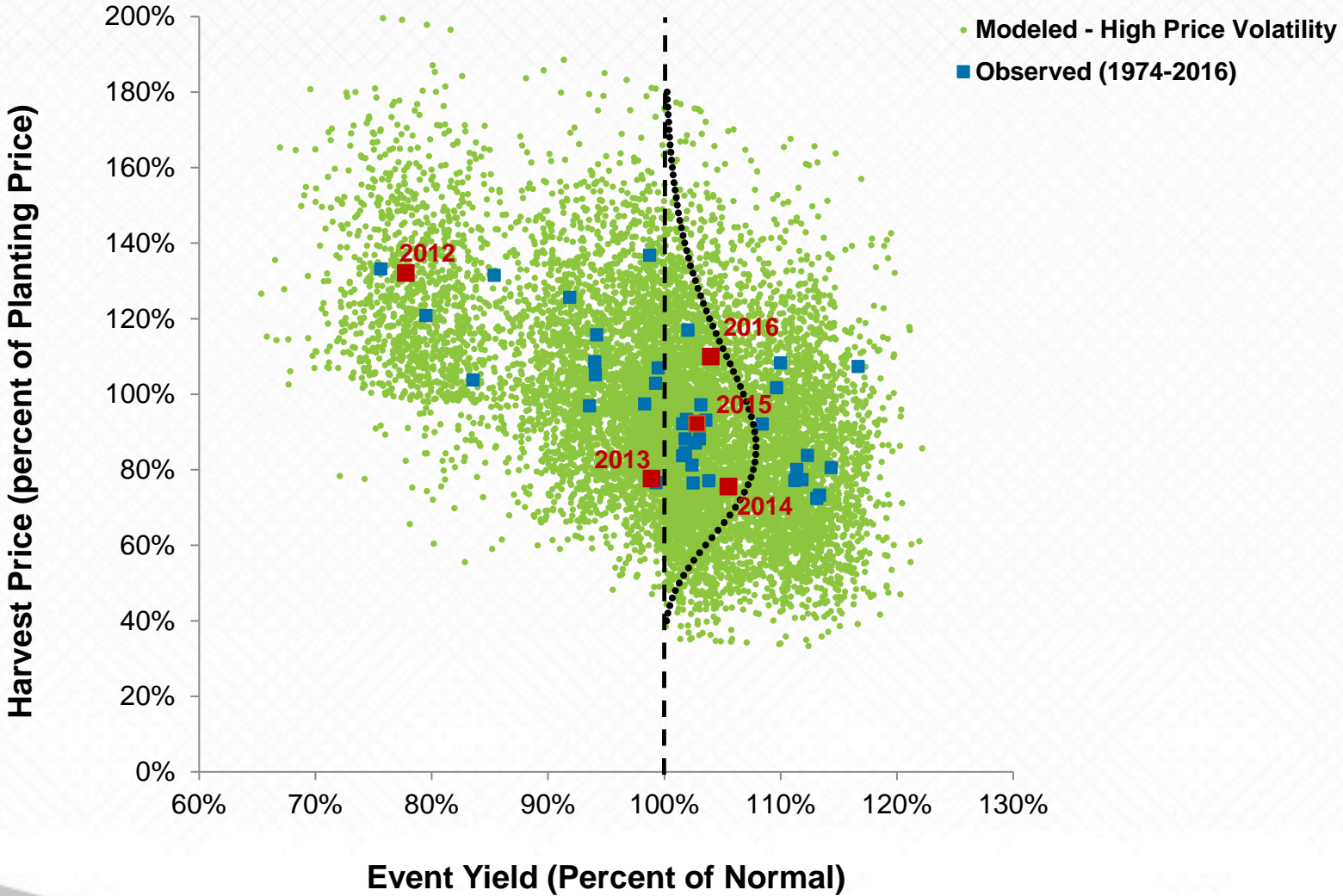
Historical Volatility Catalog



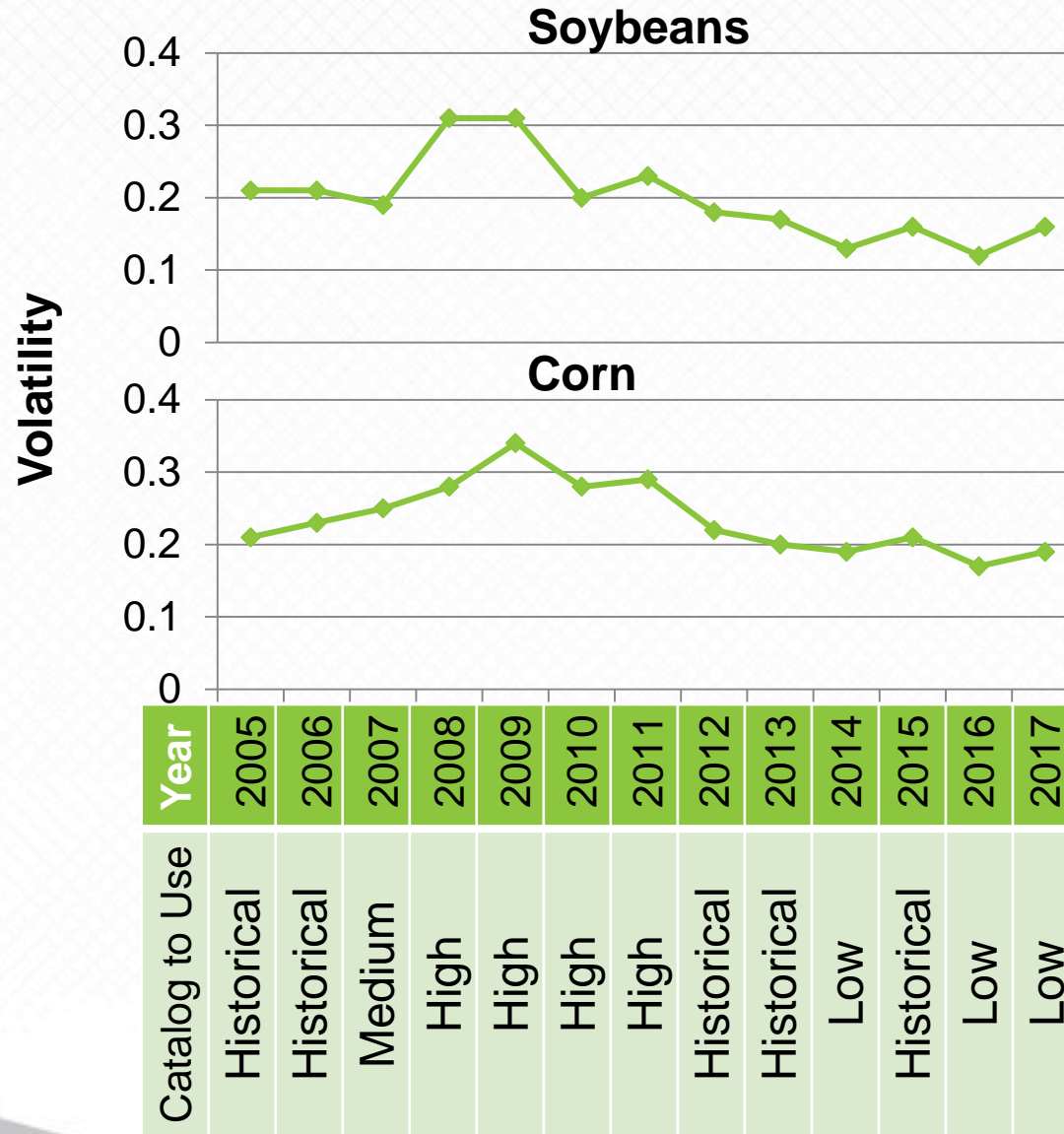
Medium Volatility Catalog



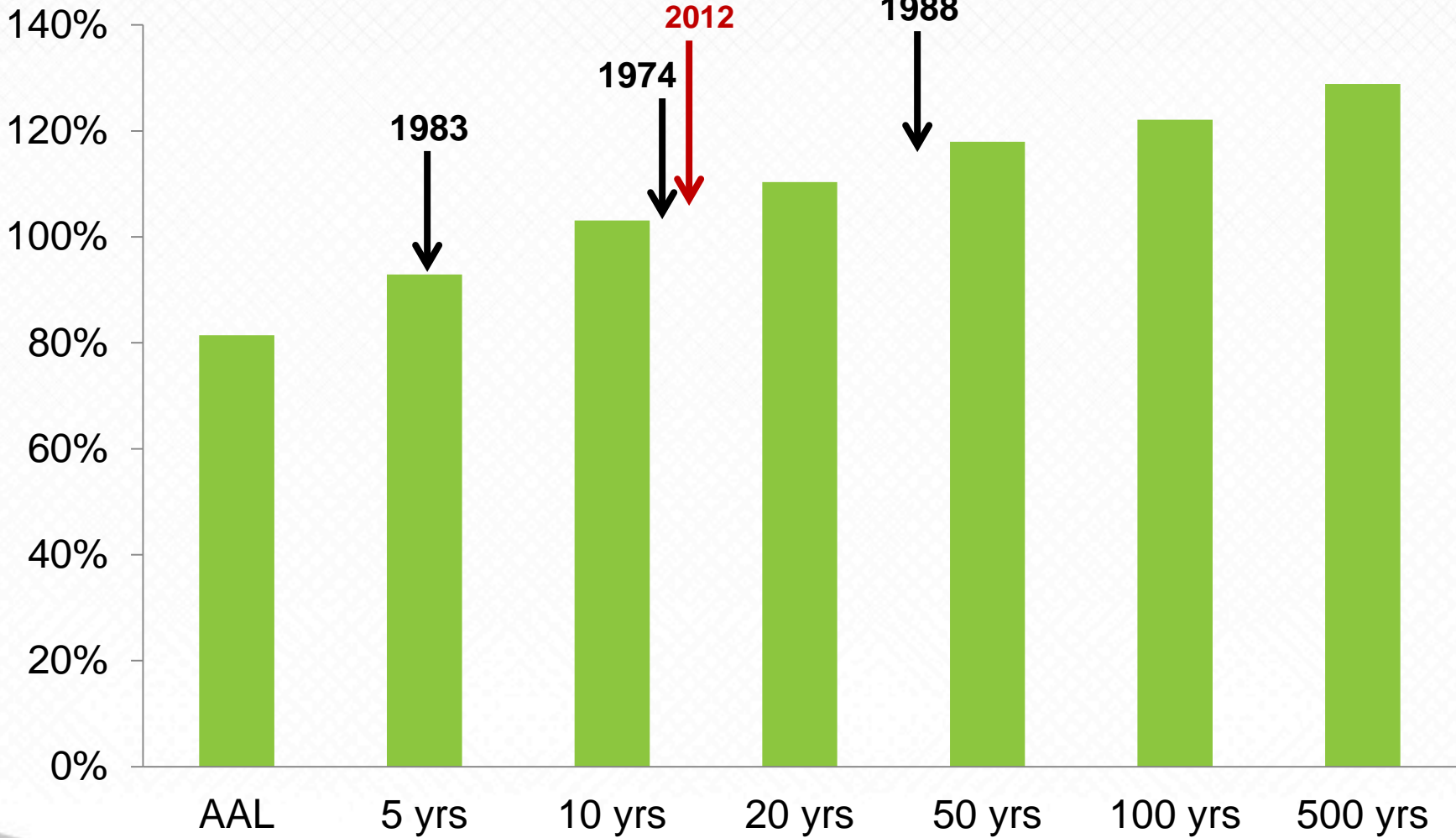
High Volatility Catalog



Which Catalog Should We Use?



Return Period of Important Historical Droughts For Industry



RMA Summary of Business Report - March 2016

Federal Crop Insurance Corp
Summary of Business Report for 2014 thru 2017
As of March 20, 2017
(Net Acre and Dollars in Thousands)

Combined Business:

Policies with Premium
Units with Premium
Net Acres Insured
Companion/Endorsed Acres
Liability
Total Premium
Subsidy
Indemnity
Loss Ratio

	2014 Crop Year To Date	2015 Crop Year To Date	2016 Crop Year To Date
	1,212,117	1,220,026	1,176,632
	2,541,360	2,549,138	2,441,336
	294,461	299,915	291,229
	0	6,526	5,176
	109,893,460	102,511,135	100,453,145
	10,072,221	9,764,410	9,313,337
	6,214,623	6,086,815	5,855,940
	9,130,532	6,301,043	3,499,462
	0.91	0.65	0.38

AIR CropAlert Growing Conditions Report



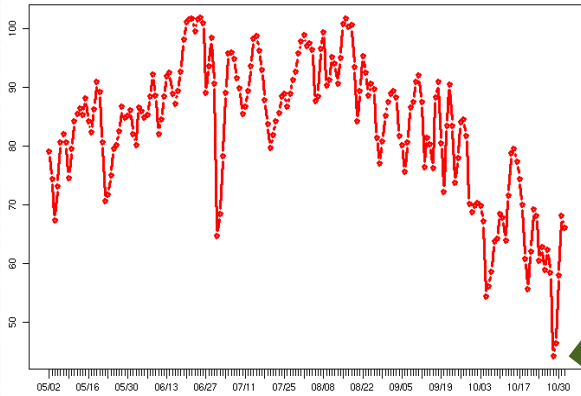
CropAlert® Growing Conditions Report



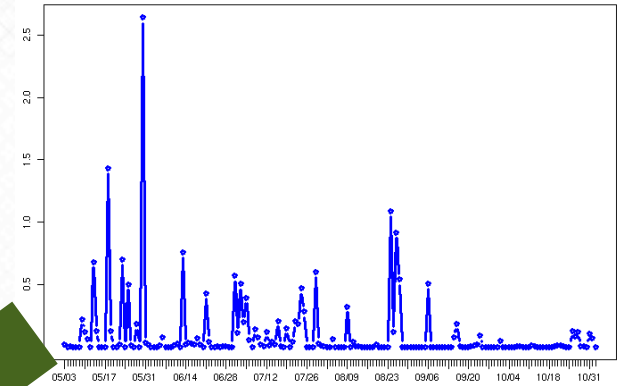
- Monthly publication from June to October
- AIR Baseline Yield Projections
- Forecasting adjustments from changing yield and price risks
- Program and Policy Analysis pieces

AWI (Agricultural Weather Index™) Is a Measure of Yield Variability Due To Weather

Daily Temperature



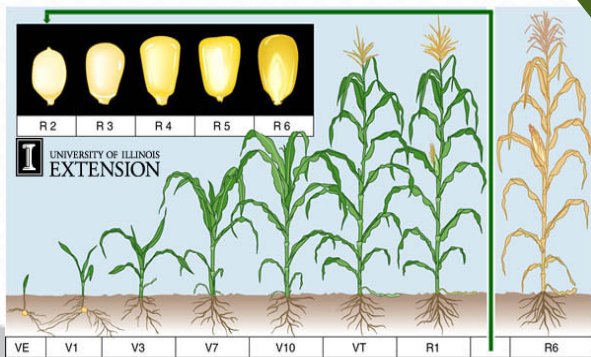
Daily Precipitation



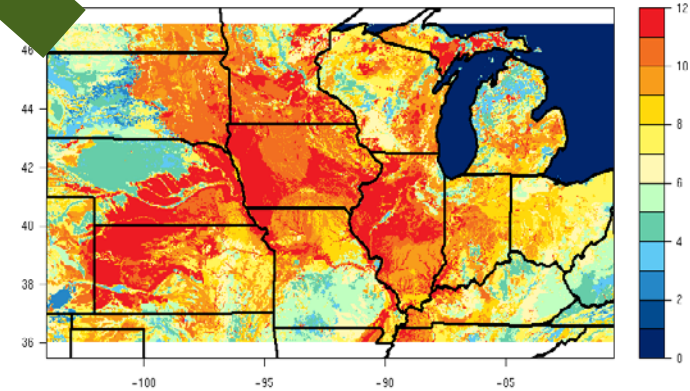
County-Specific

AWI Index

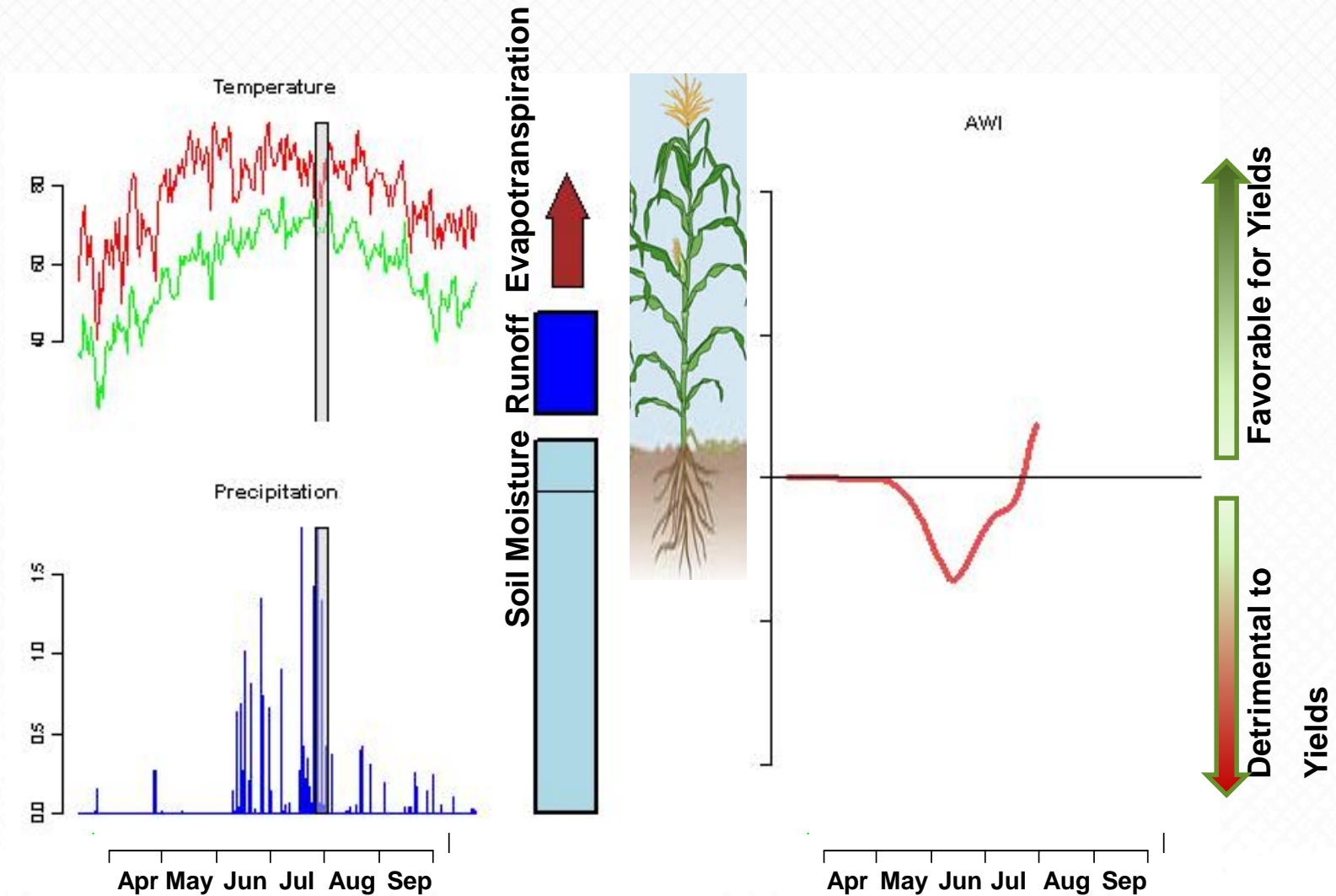
Crop Specific Data



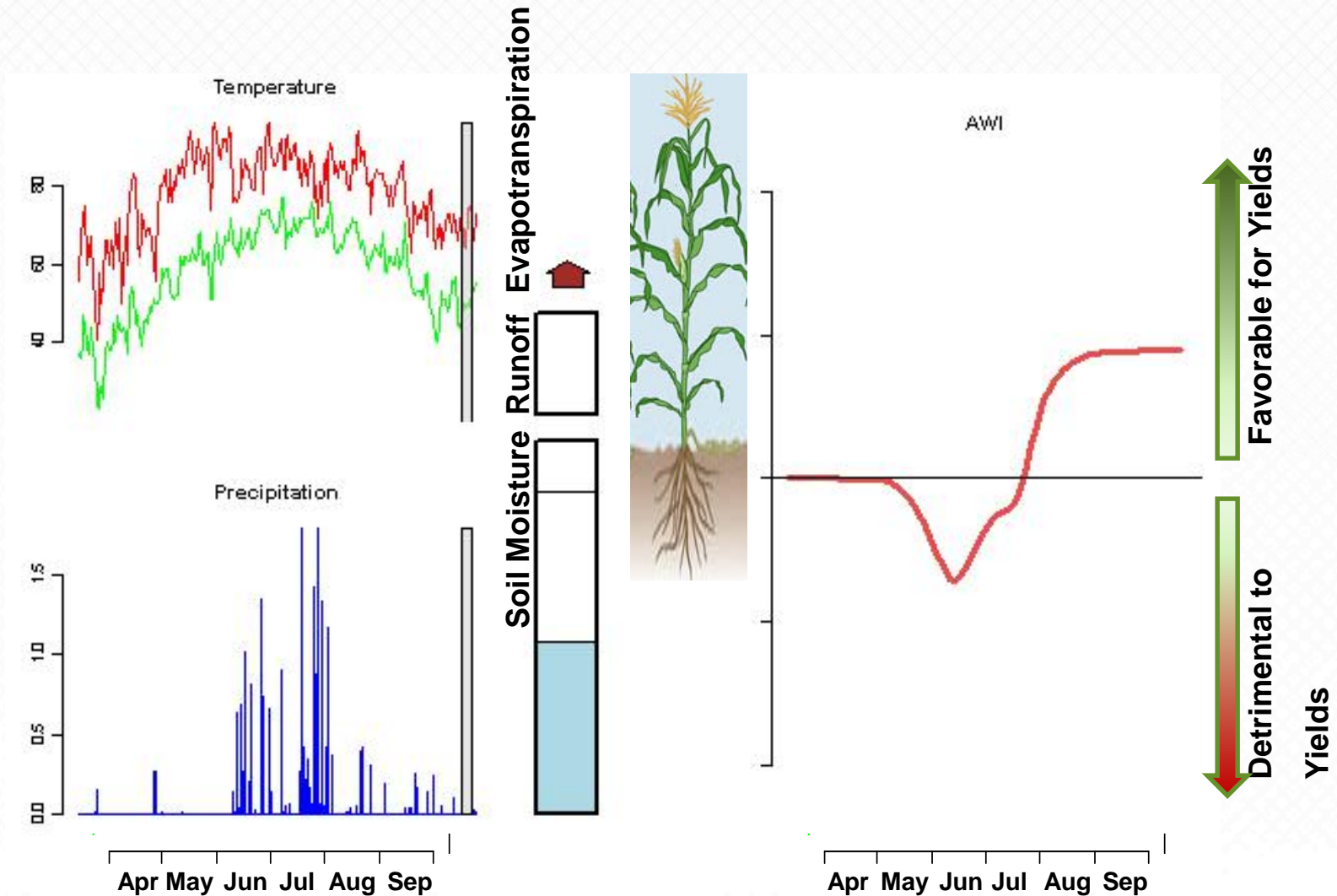
Available Water Capacity



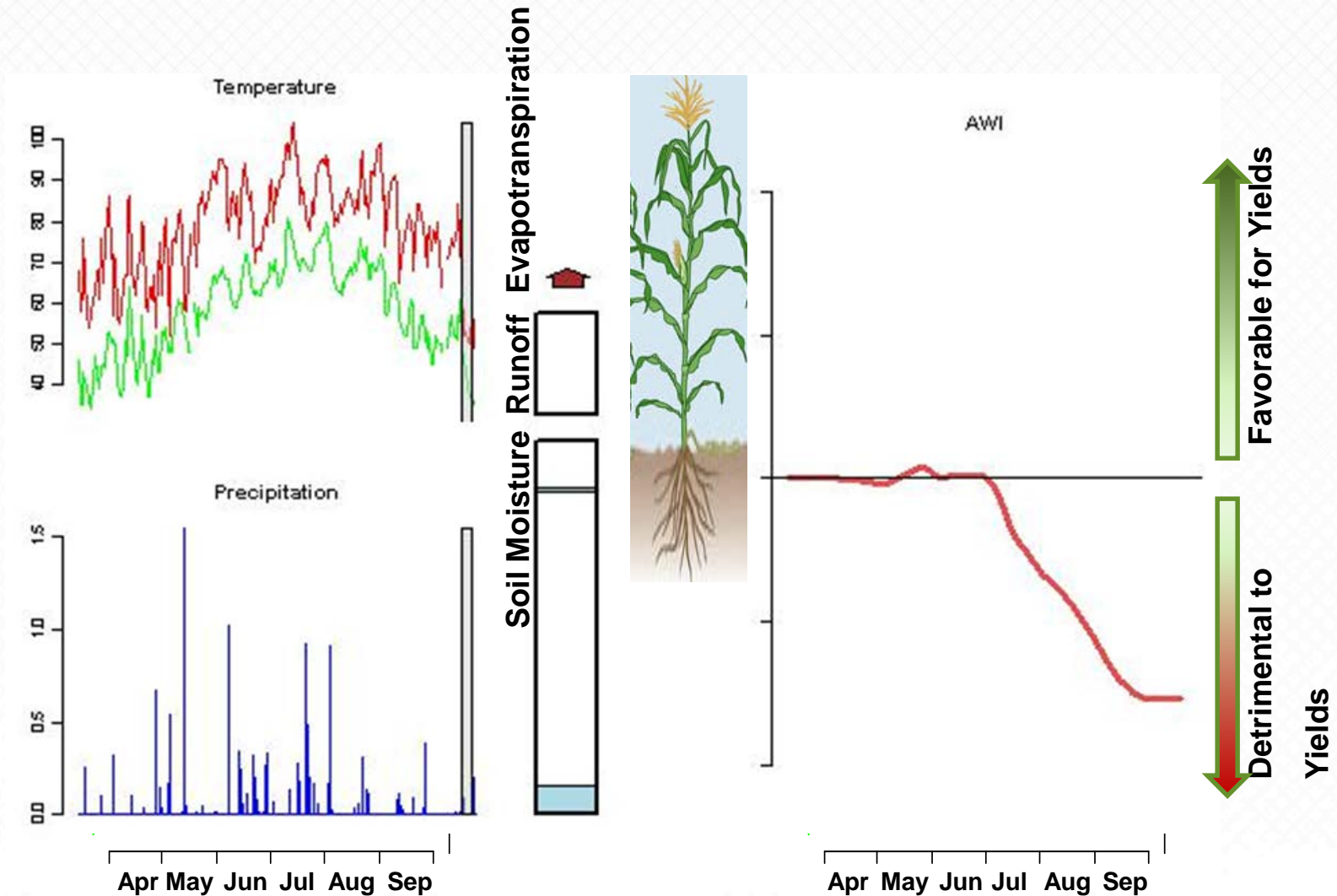
In a Normal Year, Water Supply and Water Requirements Are Balanced and AWI Indicates Positive Yield Outcome



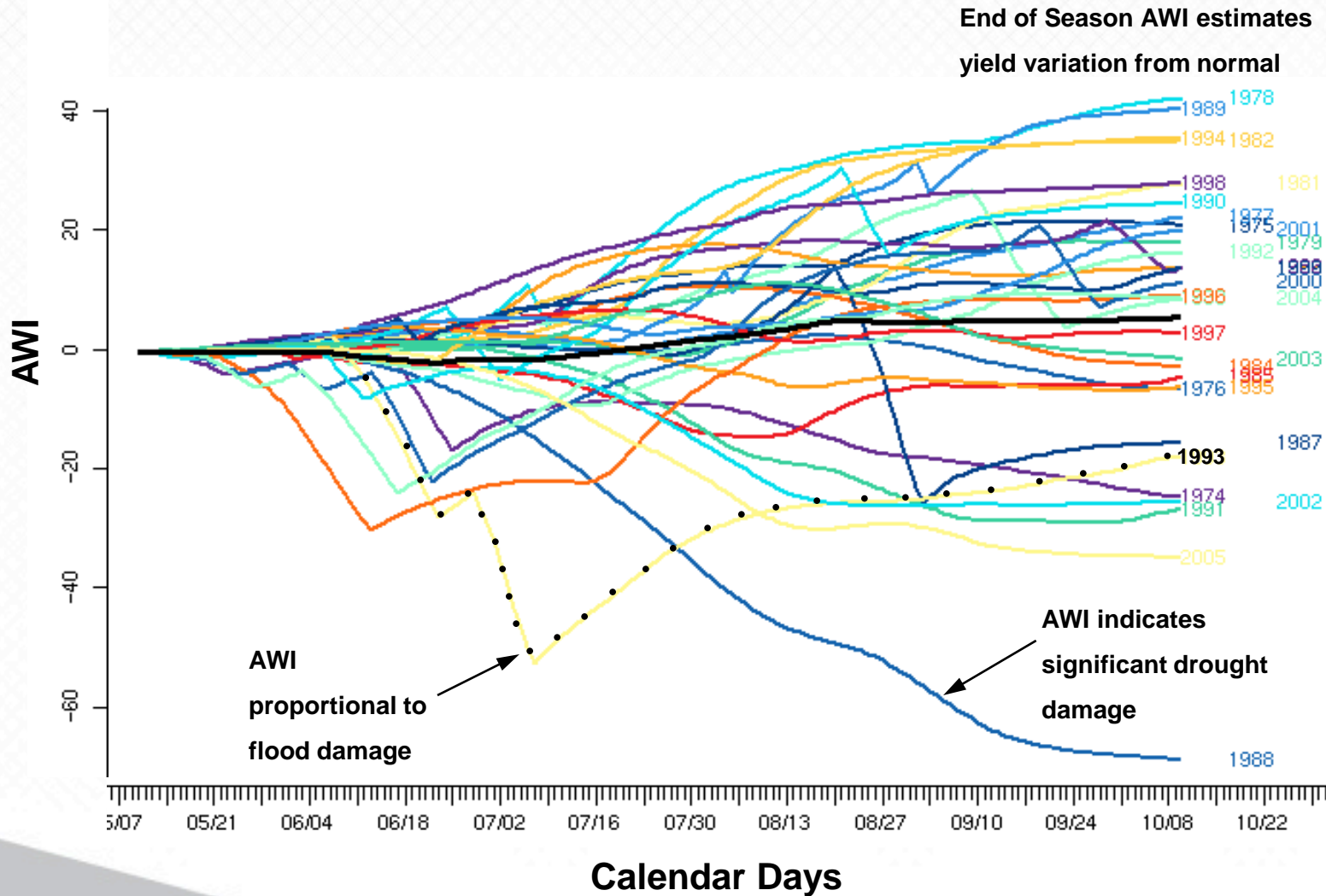
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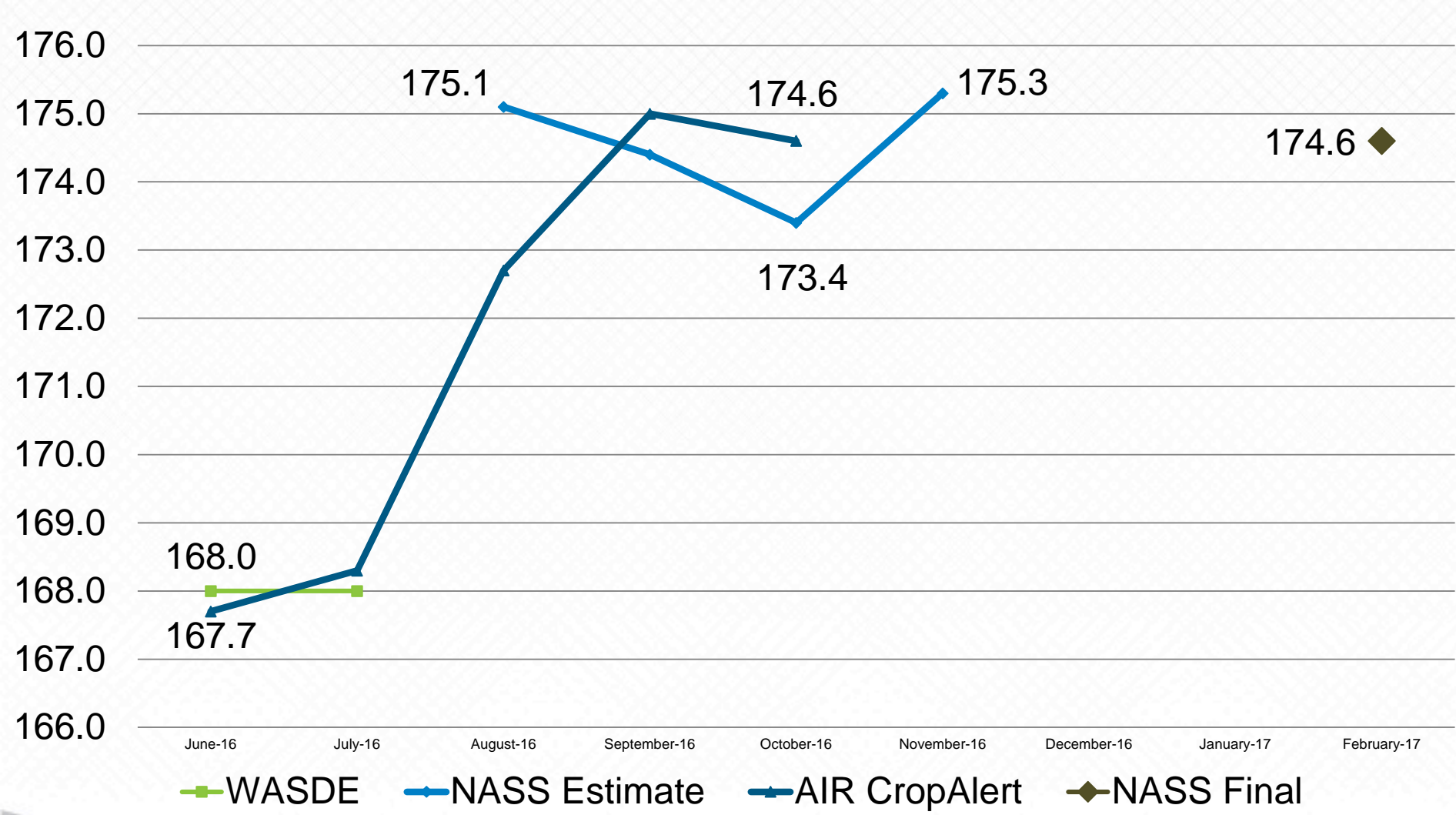
In a Drought Year, Water Requirements Exceed the Water Supply and AWI Indicates Plant Damage



AWI Indicates County-level Crop Performance During the Season



Comparison of Corn Estimates Over the 2016 Season from AIR, WASDE and NASS



In the October 2016 CropAlert Publication AIR Published Yield Estimates for the Season



Yields	Corn	Soybeans
AIR Baseline Yield (June, 2016)	167.7 bu/acre	46.5 bu/acre
AIR Final Estimate (October, 2016)	174.6 bu/acre	49.1 bu/acre
NASS Initial Yield (August, 2016)	175.1 bu/acre	48.9 bu/acre
NASS Final Yield (February, 2017)	174.6 bu/acre	52.1 bu/acre

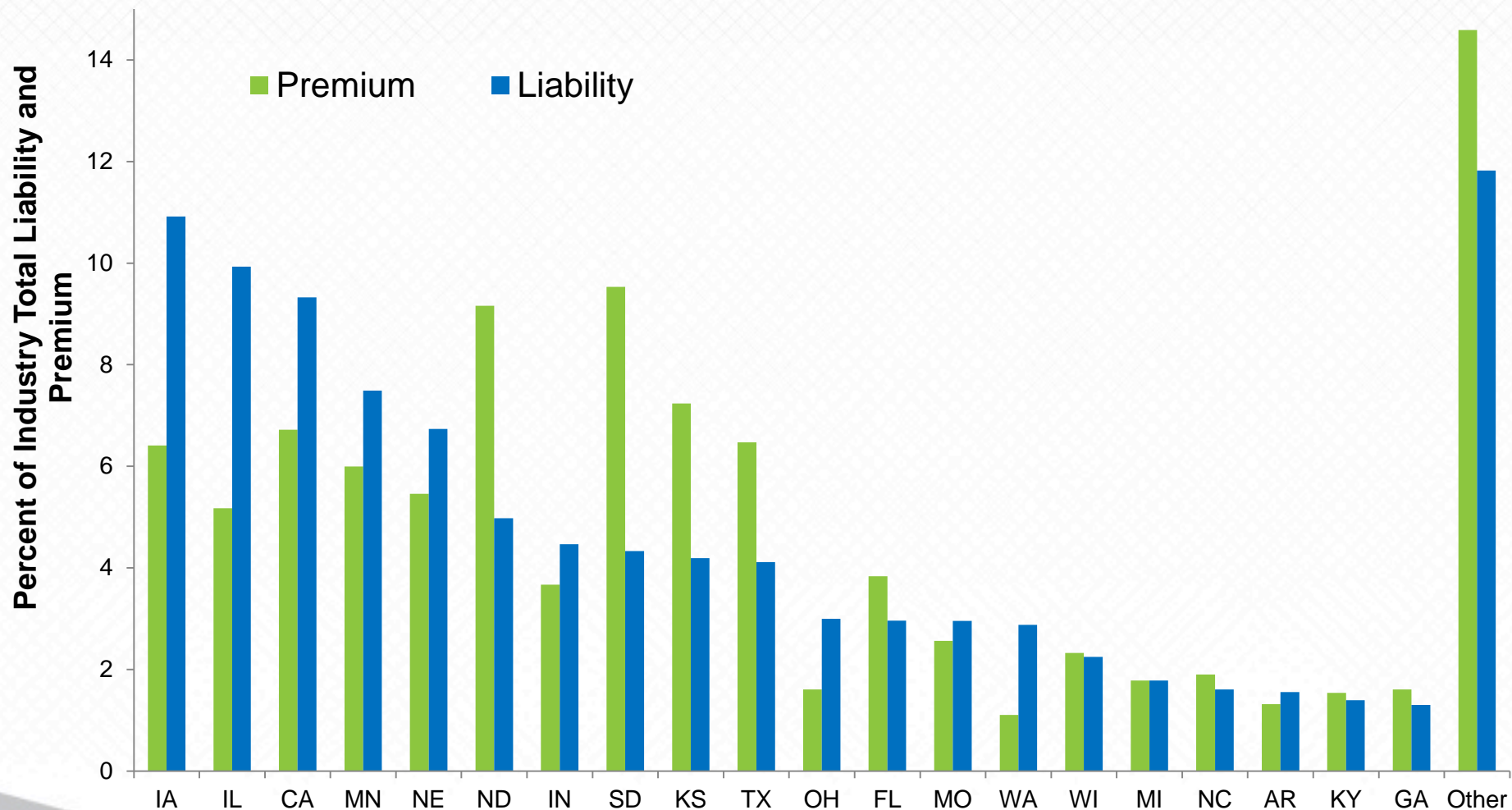
RMA Rate Changes from 2016 to 2017



2016 Breakdown of Industry Liability and Premium Reveals Overall Crop Risk by State

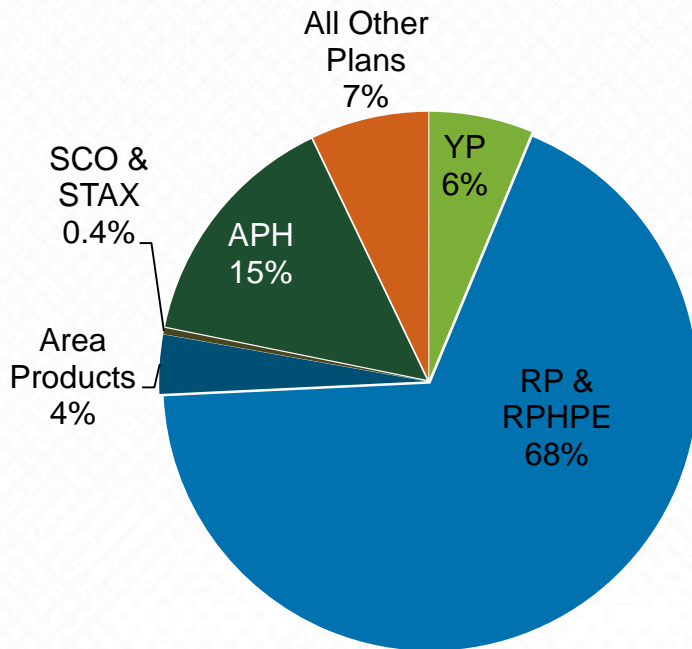
Total Industry Liability: \$100.4 B

Total Industry Premium: \$9.3 B

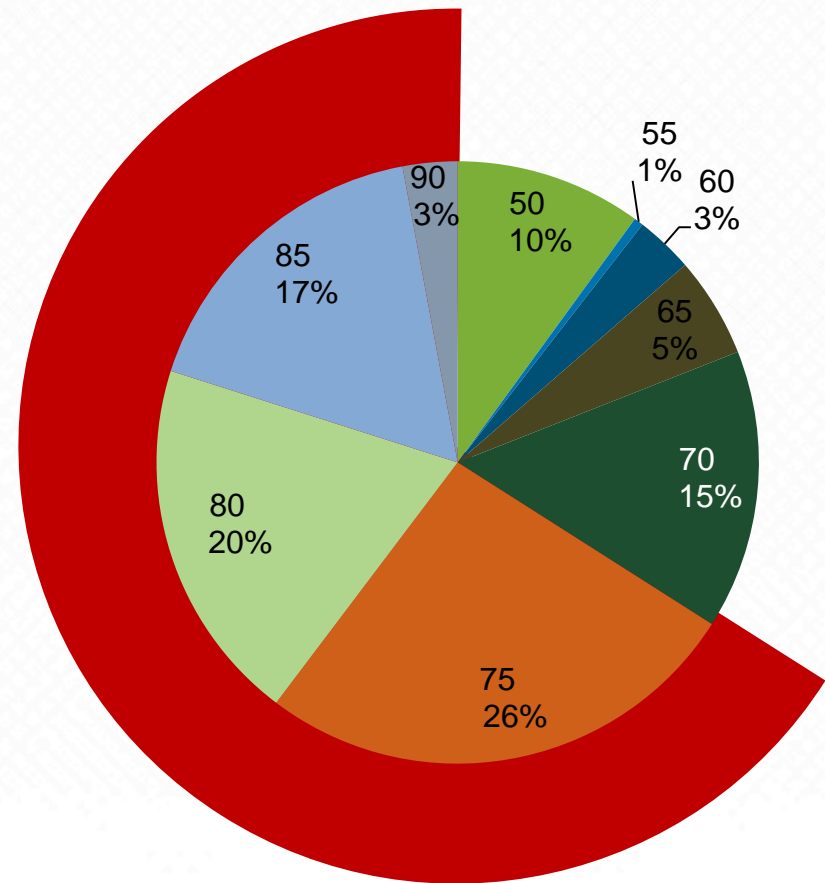


Revenue Products with Coverage Levels of 75% and Greater Are the Majority of Industry Premium in 2016

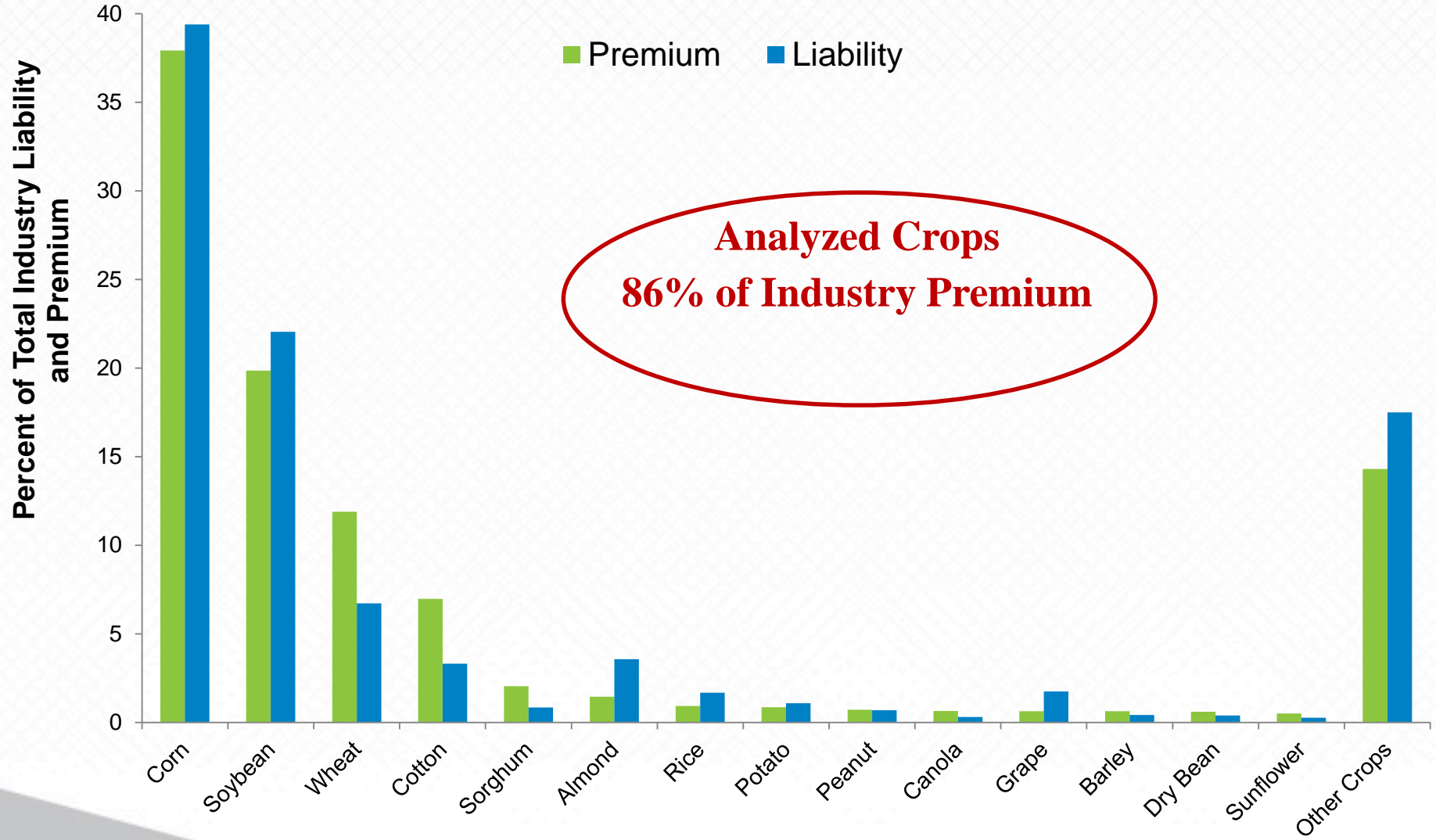
By Insurance Plan



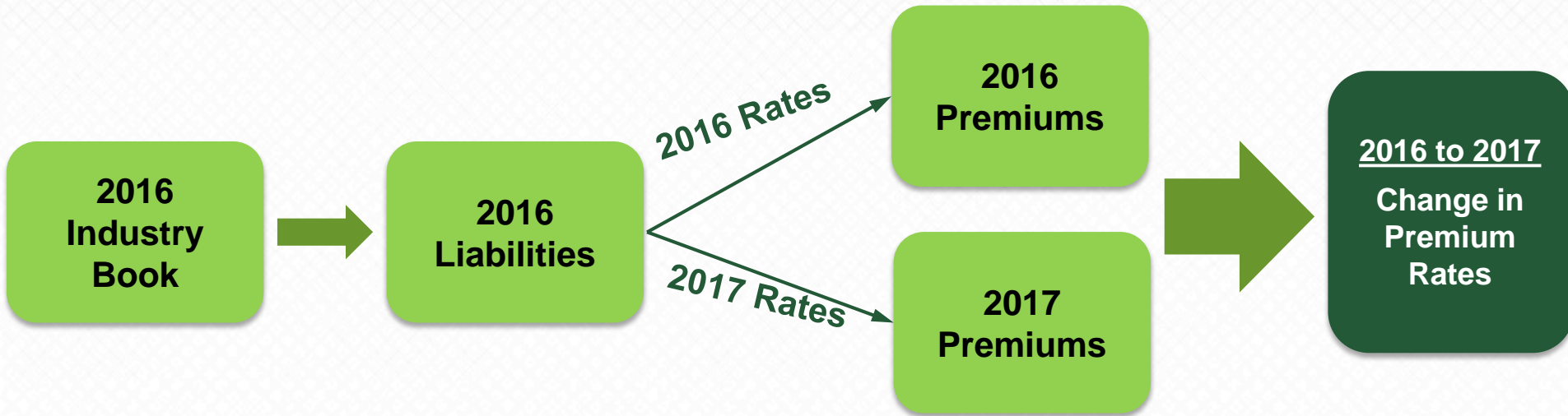
By Coverage Level



Rate Study Performed on Top 14 Crops Covers 86% of Total Industry Premium



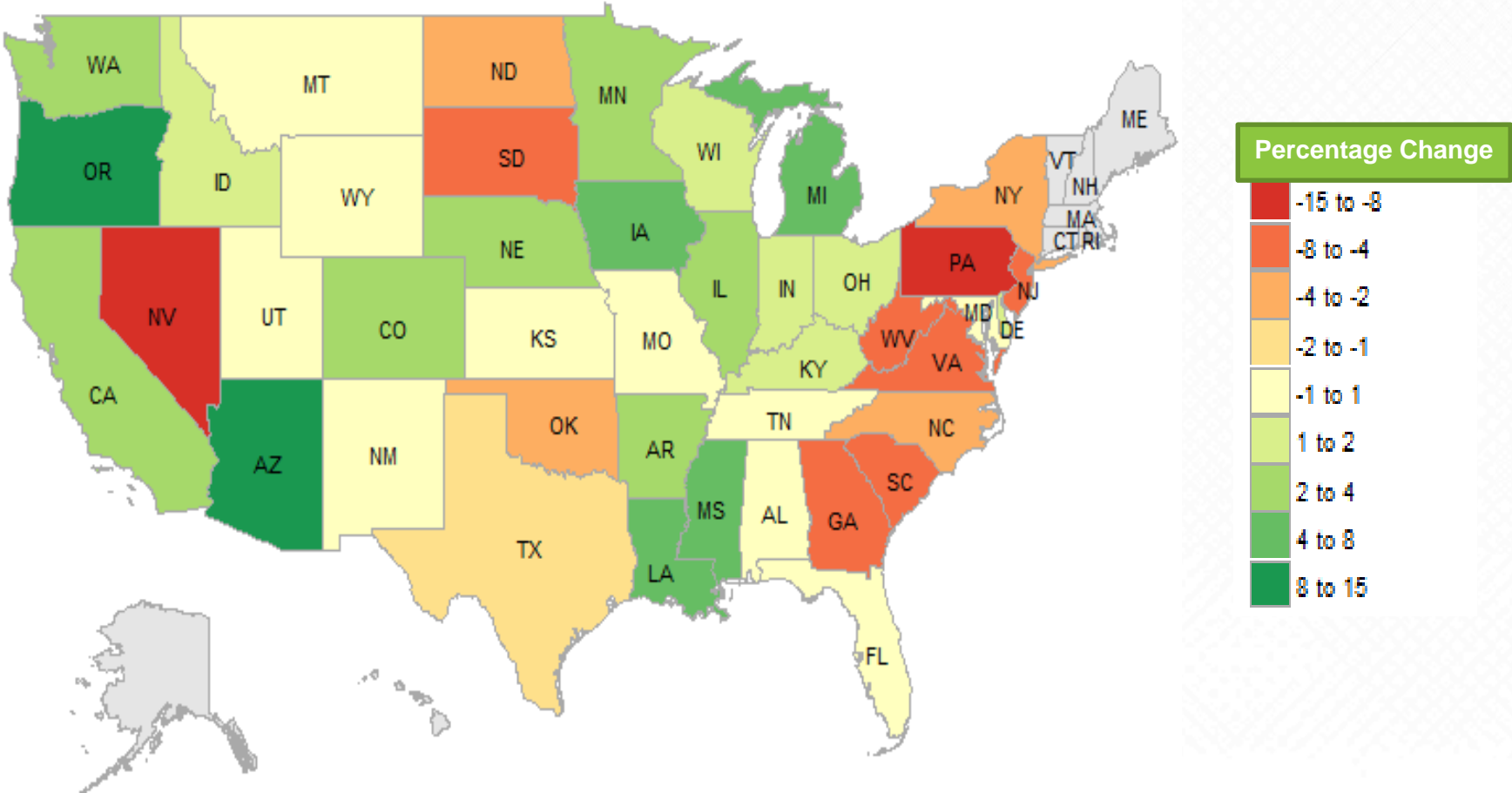
Keeping Liabilities, Prices, and Volatility Constant Allows Pure Rate Change Analysis



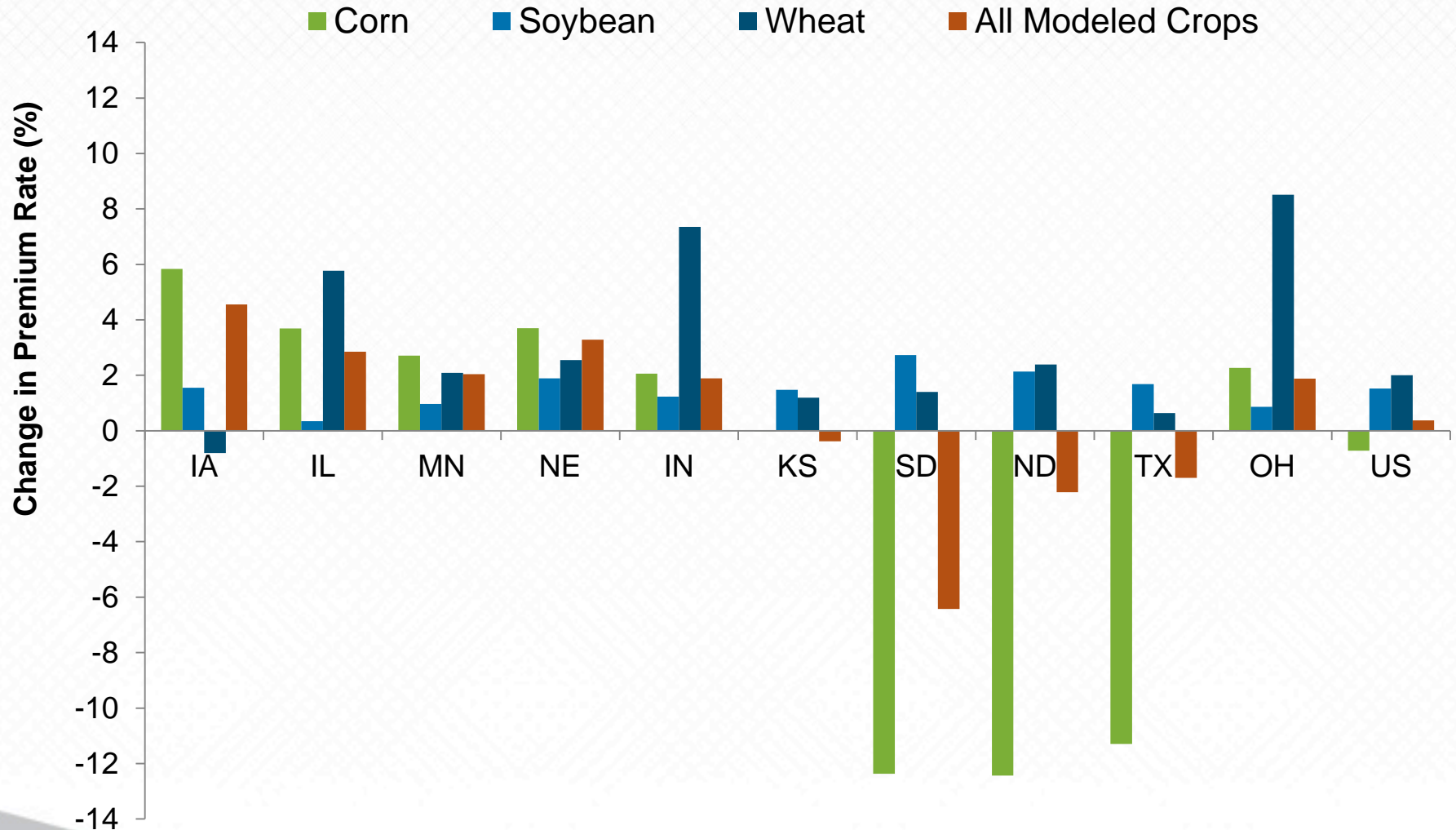
- Fourteen major crops: corn, soybean, wheat, cotton, sorghum, almonds, barley, grapes, potatoes, peanuts, rice, sunflowers, canola, dry beans
- Hypothetical industry book of business: all insurance policies that were written in 2016
- Constant “price” and “volatility”: focus on pure change in “premium rates”
- Assumptions were made about “type,” “practice,” “unit structure,” and “insurance option” to build the industry book: the actual result for a specific company could be different
- “Unit structure” and “insurance option” assumed based on available historical experience

Premium Rate Change by State from 2016 to 2017 Reveals Geographic Pattern

Premium Rate Change 2016 to 2017 (Percent Change by State)



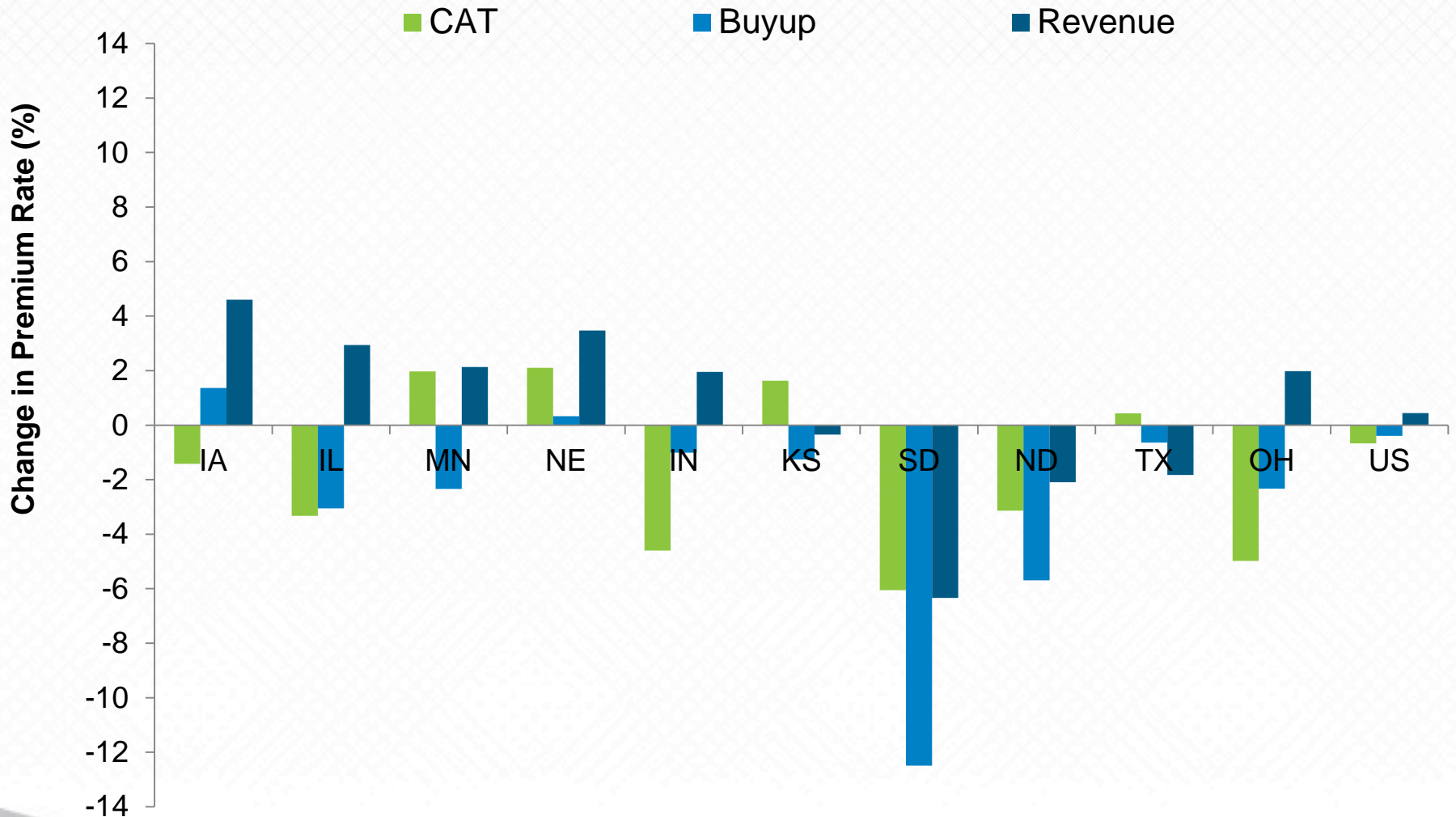
Premium Rate Change by State from 2016 to 2017 Reveals Crop-Specific Pattern



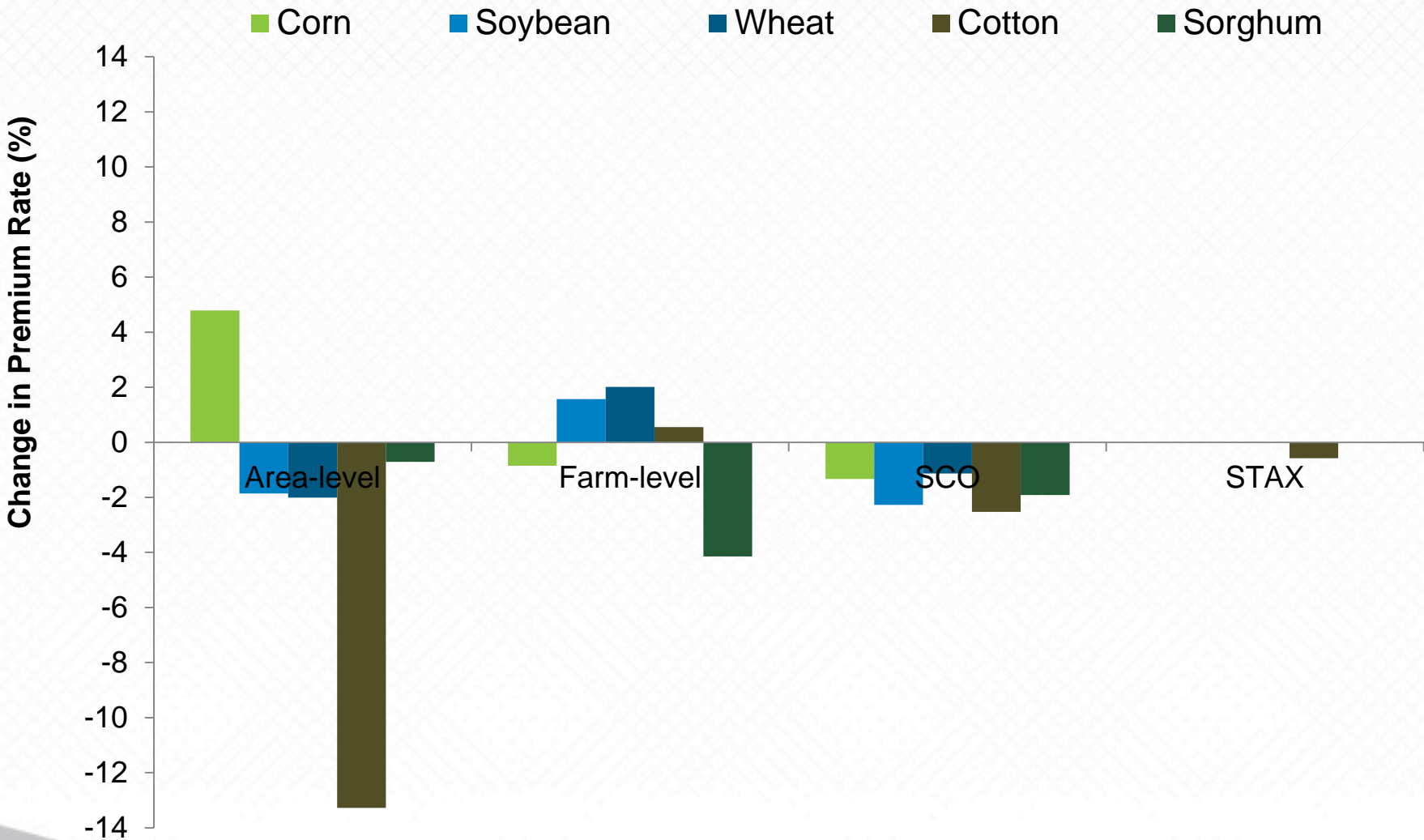
Group 2 and 3 States Have Significant Rate Reductions for Corn



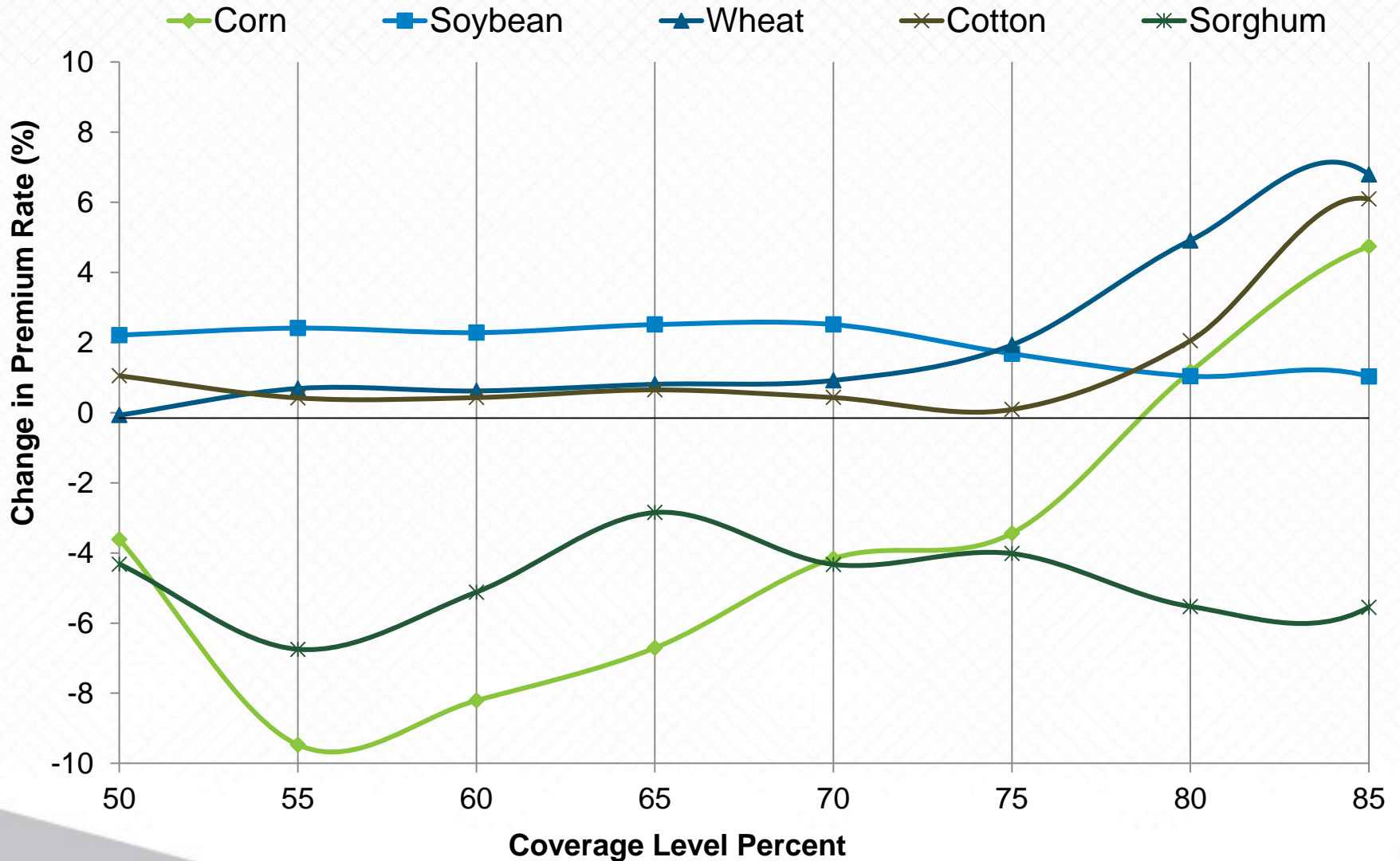
The Dakotas Experienced Major Rate Reductions for Buyup



Premium Rates Have Increased for Area-Level Corn Products, Decreased for SCO and STAX



Corn and Sorghum Premium Rate Reduction is More Significant at Low Coverage Levels

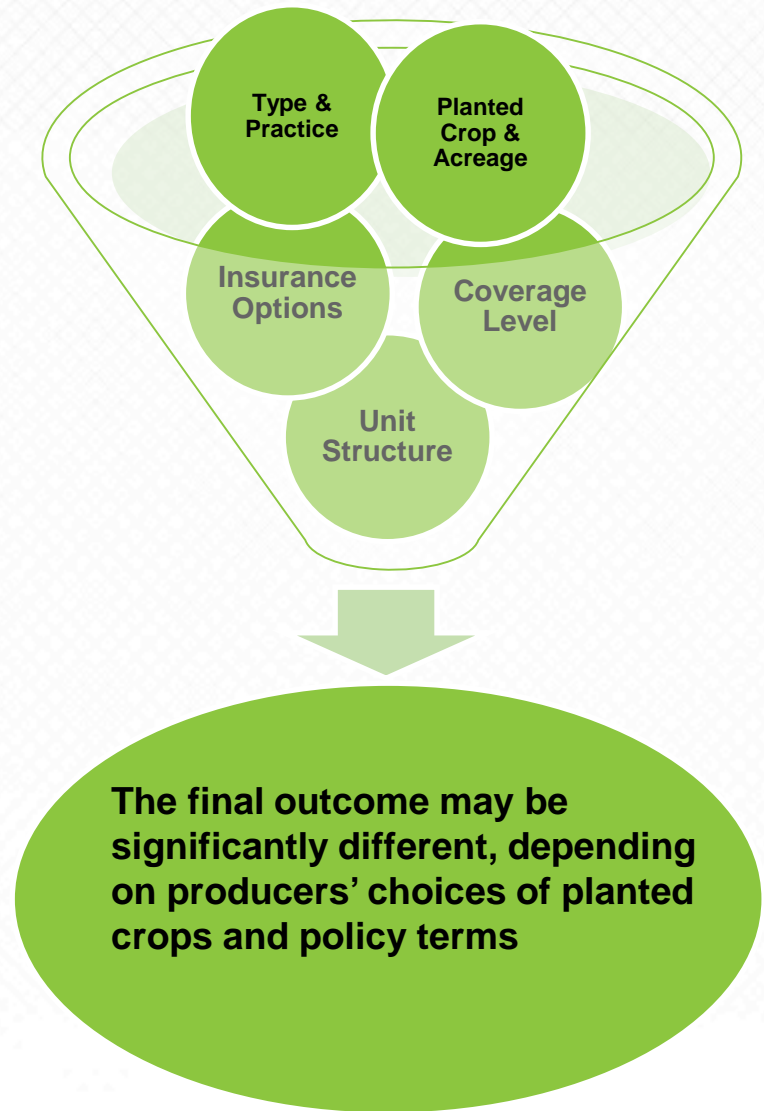


Other External Factors Affect the Change in Final Premium Rates

- Price volatility
- Change in producers' choices of coverage level
- TA and YE options → higher “effective” coverage levels
- Unit structure → EU vs. OU/BU
- Crop rotation and varying acreage over time

Rerating Summary

- The analysis assumed no change in exposure, price, and volatility from one year to another
- The results of this analysis can be used to estimate changes in profitability
- Everything else remaining the same, the rate changes are expected to slightly reduce the overall industry gross loss ratio for the selected crops by about 0.4%



Summary

- The Industry performed well in 2016
- Corn and soybean yields were record highs. Prices were still favorable, although corn saw a price decrease.
- AIR CropAlert will continue to track and estimate final yields from current growing conditions in 2017. Look for more research discussion on what is happening for both yields and prices.
- Premium rerating was favorable with an aggregate estimated impact of 0.4% on the gross loss ratio under 2016 assumptions.

Provisional Roadmap for Crop Models





Please join us for AIR's Crop Insurance Symposium, May 18 & 19, 2017, in Boston. This 1½-day event will bring together an international audience and distinguished presenters from the insurance industry, academia, and the U.S. government. AIR experts will present technical sessions on our product offerings: the U.S., Canada, and China Multi-Peril Crop Insurance (MPCI) models, the Canada Crop Hail model, and our Fund Designation Service. Our guest speakers will discuss updates from the U.S. Department of Agriculture, the application of remote sensing in determining agricultural risk, and analyses of new products.

We look forward to seeing you in Boston in May!

For more information please visit: <http://airww.co/CropSymp17>



<http://airww.co/CropSymp17>