Input costs are skyrocketing.

Global markets are a mess.

Can I get a decent rainfall forecast?

Why on Earth is NASA here?

....because Earth is a major part of NASA's mission!!

I don’t need your solutions. I need help to find my own solutions.
We have been here for 50 years

We will be here for the next 50 years
Agriculture Application Area
Program Elements

NASA Harvest - International agriculture and global food security program

ACRES – Domestic agriculture program

Partnership Activities from better drought forecasts to Climate-Smart Agriculture

Launch at Commodity Classic 2023
Your Nation’s space program has an agriculture program

- Fertilizer Management example (Univ. of Illinois)
- Water Demand example
Using Satellite Data To Help Farmers Improve Field-Scale Nutrient Management

- Collaboration with Illinois Corn Grower Association farmer members through reciprocal learning & citizen science
  - Precision Conservation Management program: combining precision technology and data management with farm business to help farmers manage, adopt, and adapt conservation practices long-term and improve on-farm decision-making

- Web-based software to guide Illinois farmers’ decision-making for improved nitrogen fertilizer application
  - Based on the concept of Maximum Return to Nitrogen (MRTN) with newly-collected nitrogen fertilizer trial data in Illinois

- Focused on advancing tools by explicitly incorporating granular environmental conditions (i.e. soil and climate) and satellite data

https://www.precisionconservation.org/pcm-booklet-2021/

Guan et al
Western Water Applications Office (WWAO)

Examples of other projects/activities:
- Snow Data for USDA NRCS Snow Monitoring and Runoff Forecasting
- Monitoring Remote Stock Ponds in the Southwestern U.S. for Ranchers and USFS
- Improving predictions of water yield and sediment loads in the Columbia River Basin through the incorporation of Landsat-derived vegetation parameters into an existing online process-based hydrology and erosion model (WEPPcloud) - USFS
- NASS-Crop CASMA (Crop Condition and Soil Moisture Analytics)

The Crop-CASMA data viewer shows soil moisture anomalies for CONUS on April 01, 2022 with many western areas showing over 50% less moisture than average.
Land surface models with predictions of upcoming weather can provide forecasts of soil moisture changes in a 14-day period.

14-day outlook of soil moisture issued on August 4 (for August 19)

Actual soil moisture on August 19
OPENET
Filling the Biggest Data Gap in Water Management
Linking Satellite Data with Irrigation Mgmt Software

UCANR CropManage

https://cropmanage.ucanr.edu/

Dr. Michael Cahn
On August 10, 2020 a severe derecho (strong wind storm) swept across Iowa, the largest corn/soy growing state, causing widespread damage, bending and flattened crops over approximately one-third of the state.

Total loss was estimated at $31 Million

Loss adjustment took 4 months to manually assess the damage caused and over 100,000 ‘man-hours’ at a cost of $2.5 Million (source: PlanetWatchers)

Rapid assessment of derecho impact on key crops

- Sentinel-1 Threshold based on baseline of change between prior years

Need in-season crop type map to quantify area impact on corn vs. soybean fields
NASA Earth Observing Fleet
28 Earth observing satellites

~1,000 Earth observing satellites today...growing exponentially

December 2021

NASA Scientific Visualization Studio
svs.gsfc.nasa.gov/4928
Moving Forward

NASA EARTH
Your Home. Our Mission.

Moving Forward
Integrating Earth Data to Impact Agriculture

Surface Biology Satellite and Landsat Next

Radar Satellite (NISAR) and Ground Water (MC)

Atmosphere Observing System (AOS)

Precipitation

Vegetation

Soil Moisture

Producer

Crop Model

Agriculture Program

NASA’s Earth System Observatory (ESO)

Next NASA Earth observation surge focused on key agriculture indicators
SBG Architecture

SBG Constellation
Pathfinder

SBG Light
Wide-swath VSWIR spectrometer
Sun-sync orbit (late AM)
185 km swath
16 day revisit
10 nm, 200+ bands
30 meter GSD
High SNR and radiometric performance
~5 deg off-nadir tilt

SBG Heat
Wide-swath TIR imager and ASI VNIR camera
Sun-sync orbit (early PM)
5+ bands TIR, 2+ bands VNIR
935 km swath, 3 day revisit
60 meter GSD
0.2K NeDT
Space For Ag Tour
ESD Director Karen St Germain
August 2022

NASA ESD Leadership’s Objective
Involve agricultural producers in the development of useful and practical guidance for Earth science applications. Engage producers and their allied industries through a strategic plan that incorporates direct outreach, communication and media

- Visit Kansas and Nebraska land grant universities and agricultural research institutes
- Visit with Nebraska and Kansas farmers and Extension Educators
- Meet with crop association members
- Commodity Classic 2023
NASA Activities – Broadening our Community

- NASA Acres Program (Domestic)
- NASA Harvest Program (Global)
- Western Water Applications Office
  - Basin Needs Assessments
- 14 Water Resource Projects – aligned with agriculture
- Meetings with NACD
- “Space for Ag” Tour
- USDA Outlook Forum
- Commodity Classic
Your Nation’s Space Program has an agriculture program.