# Overview of the Wheat CAP 22-26 – UAS Component

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# The UAS Objectives

- Implement a centralized BrAPI-compliant pipeline for UAS-HTP data processing, analysis and management to accelerate adoption and deposit into the T3 database.

# Pre-proposal Survey

- Surveyed the UAS capabilities of 19 public wheat breeding programs (https://www.triticeaecap.org/the-wheatcap-uas-survey/) prior to preparation of the proposal.
- Fifteen programs have some capacity but can further benefit from a centralized WheatCAP training and support for standardized data collection protocols, streamlined data processing, advanced analytics algorithm development, and big data storage.
- A centralized online platform developed by TAMU/Purdue UAS-HTP group (https://wheatcap.uashubs.com/) for data receiving, processing, and importation.

# Unmanned Aerial System (UAS) data processing pipeline

**UAS data collection**

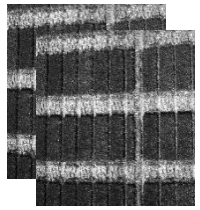
**Level 0**
Raw UAS data

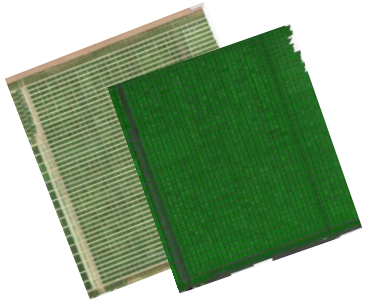
**Level 1**
Model development
Orthomosaic
Digital Surface Model
Surface temperature model

**Level 2**
Data extraction
Excess Green Index
Normalized Difference RedEdge Index
Normalized Difference Vegetation Index
Canopy cover, canopy height, canopy volume

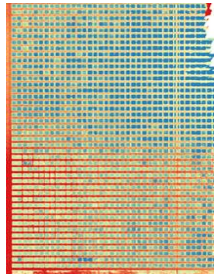
**RGB**

**Multi-spectral**





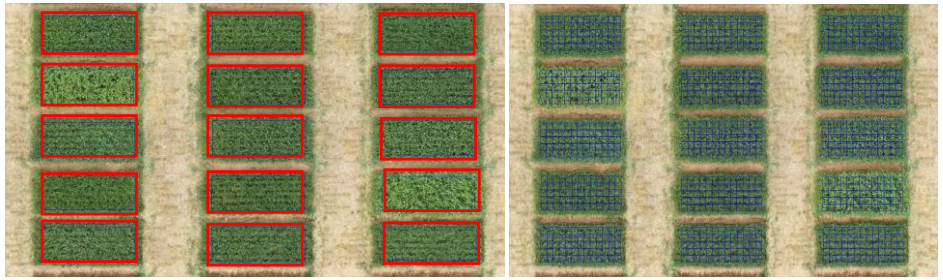
**Orthomosaics**



**Digital surface model**

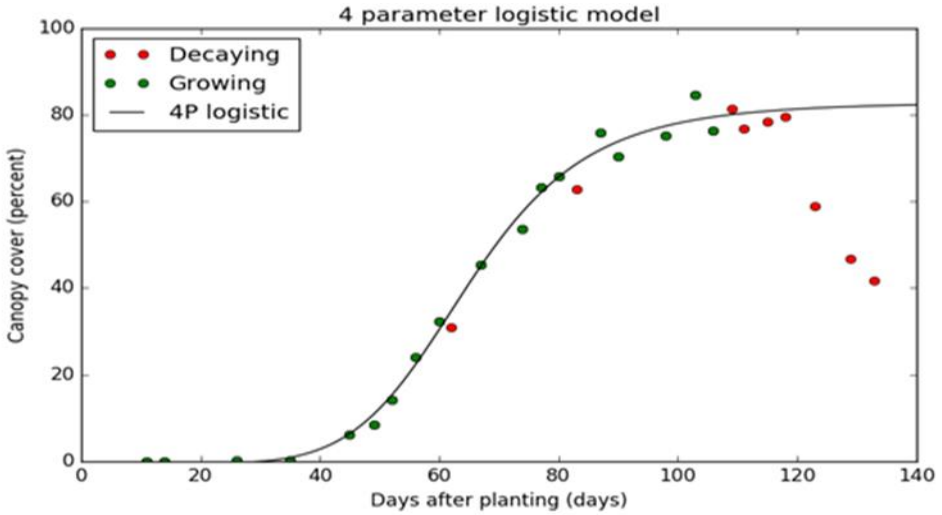
Agisoft Metashape software

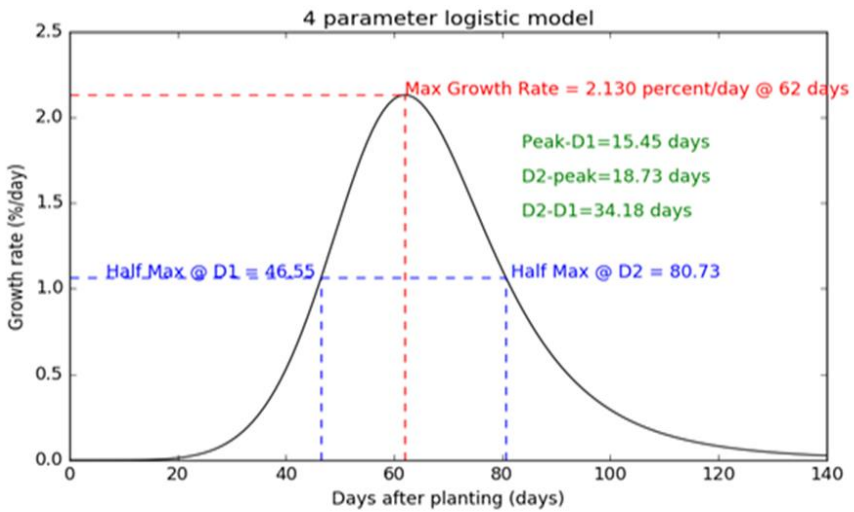
- Level 0 photos/folder upload
- Align photos
- Georeferencing
- Build dense point cloud
- Build digital elevation model
- Build orthomosaic
- Export orthomosaic
- Export digital surface model



**Plot and grid boundaries to extract phenotypic data**

# Level 3 data products: growth analysis based on multi-temporal canopy features




**Growth parameters**

| Rate | Timing |
|---|---|
| 1. Early Relative Growth Rate | 7) Early Half-Max Date |
| 2. Late Relative Growth Rate | 8) Early Half-Max Duration |
| 3. Early Half-Max Rate | 9) Late Half-Max Date |
| 4. Late Half-Max Rate | 10) Late Half-Max Duration |
| 5. Maximum Growth Rate | 11) Max Growth Rate Date |
| 6. Maximum Height (from sigmoid) | 12) Half-Max Duration |

# Wheat CAP UAS Hub

# UAS Hub Technical Support

- For technical support with the Wheat CAP UAS Hub, contact Jose L. Scott at: jose.landivarscott@ag.tamu.edu
- Office: (361) 265-9201
  - Access
  - Project creation
  - Data submission
  - Data download
  - Etc.