Session 8:
Subgroup #3 - Research Needs

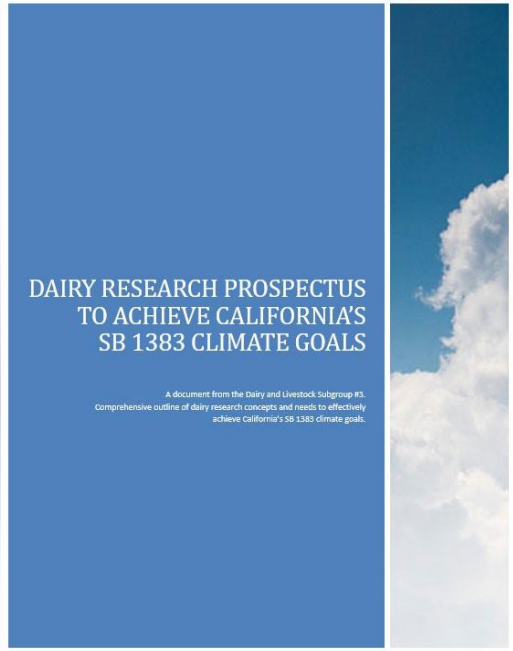
March 29, 2022

Dairy and Livestock Subgroup #3

Subgroup #3 Process

- Discussed past and current dairy research in California
- Implemented publicly open Request-for-Idea (RFI) Solicitation
- Identified and evaluated knowledge shortfalls and research needs

Subgroup #3 Recommendations Document



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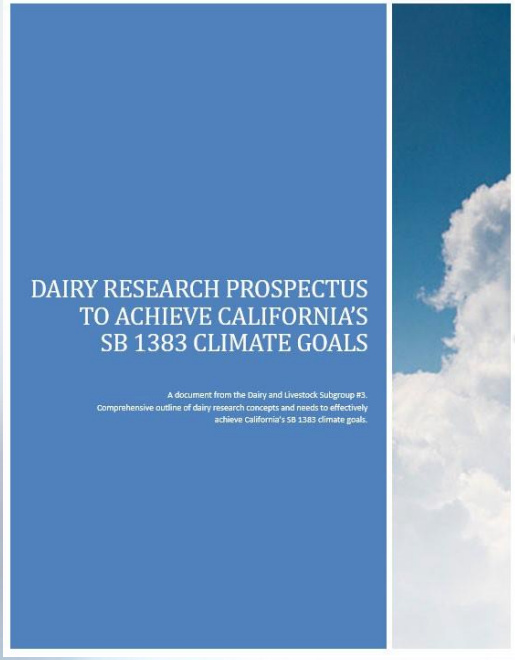
Dairy and Livestock Subgroup #3

Subgroup #3
Recommendations Document



- Refine emission inventories using California-specific data
- Develop methane-centric monitoring programs
- Evaluate pollution impacts on adjacent communities
- Evaluate mitigation strategies for enteric fermentation
- Other recommendations

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Dairy Research Recommendations

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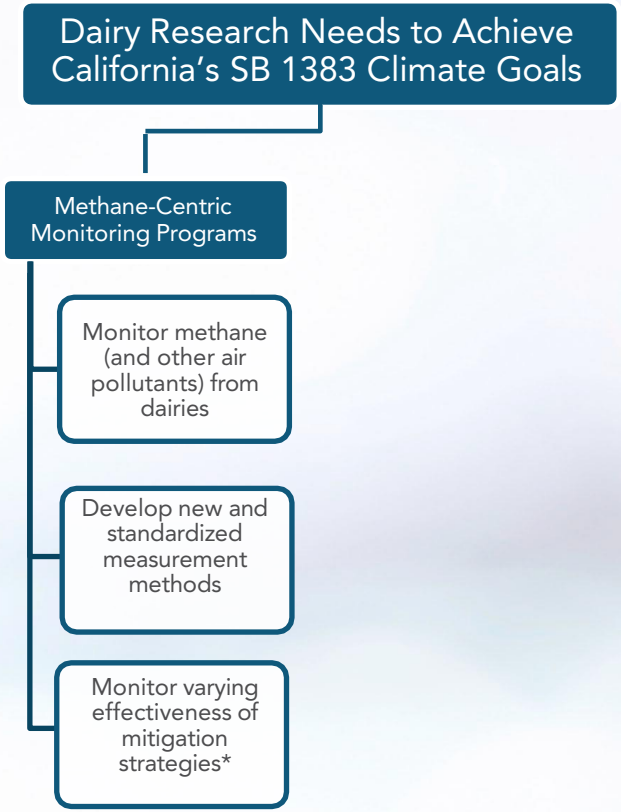
Dairy Research Recommendations



Dairy Research Recommendations

Dairy Research Recommendations

Dairy Research Needs

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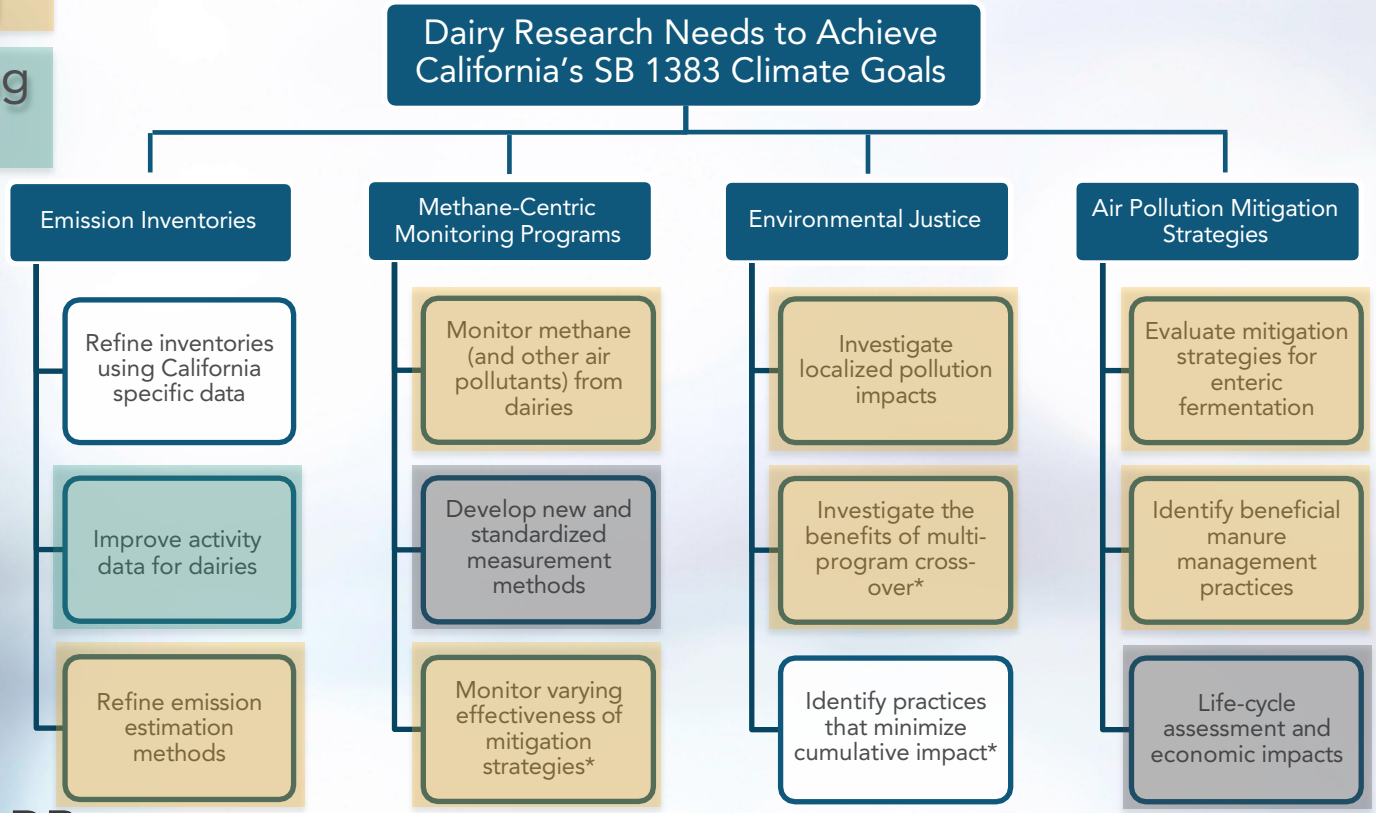
Recently Initiated

Ongoing

Completing Soon

Dairy Research Needs



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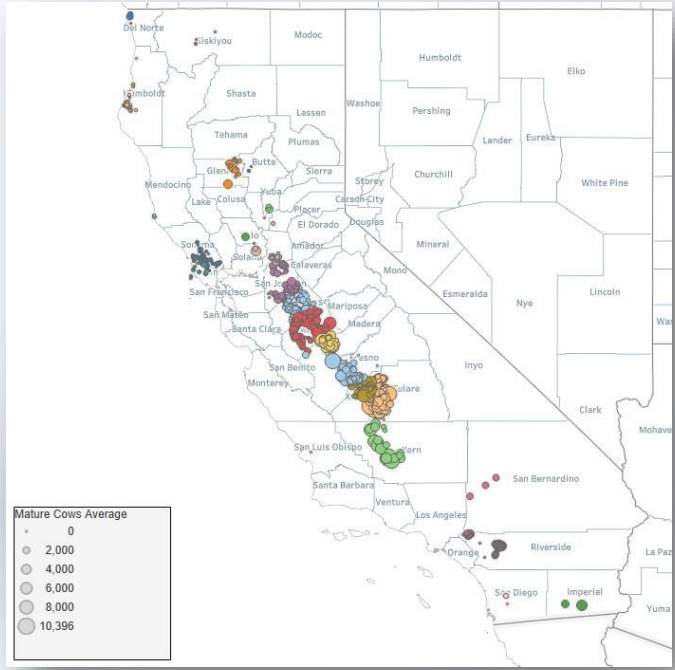
Modeling and Accounting

California Dairy and Livestock Database (CADD) provides extensive data to support farm-level emissions modeling

- Partnership with the Regional Water Quality Control Board

California Dairy Emission Model (CADEM) allows California to adhere to IPCC Tier 3 Guidelines

- Contracts
  - 19RD028 – Development of the California Dairy Emissions Model
  - 21RD019 – Development of a Testing Standard and a Mechanistic Model for Enteric Fermentation CH_4



Ground-Level

Mobile platforms being used to characterize air pollutant sources

- In-House – Evaluating California Dairy Methane Emission Factors Using Short-Term Ground-Level and Airborne Measurements

California GHG Monitoring Network being used to track changes and evaluate model performance

- Long-term monitoring (since 2010) of ambient mixing ratios at 8 sites

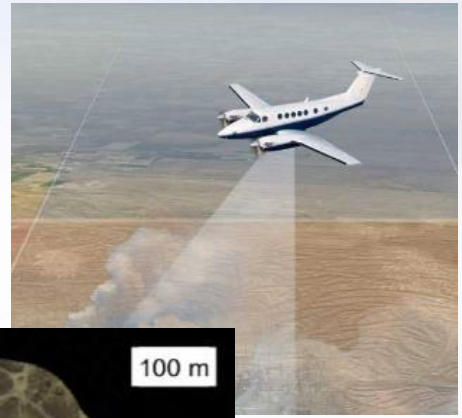
Airborne

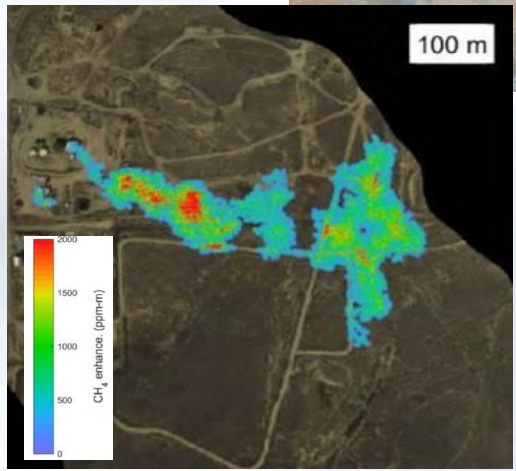
AB 1496 - California Aerial Methane Survey

- 16RD018 and 18RD032 – Statewide Airborne Methane Emissions Measurement Survey
- 15RD028 and CEC 500-15-004 – California Baseline Methane Survey

Since 2015, CARB and partners have used AVIRIS-NG on planes to identify CH_4 sources

- Some of the large CH_4 point sources were livestock manure management
- Large point sources contribute to disproportionately large amount of CH_4 emissions in the state





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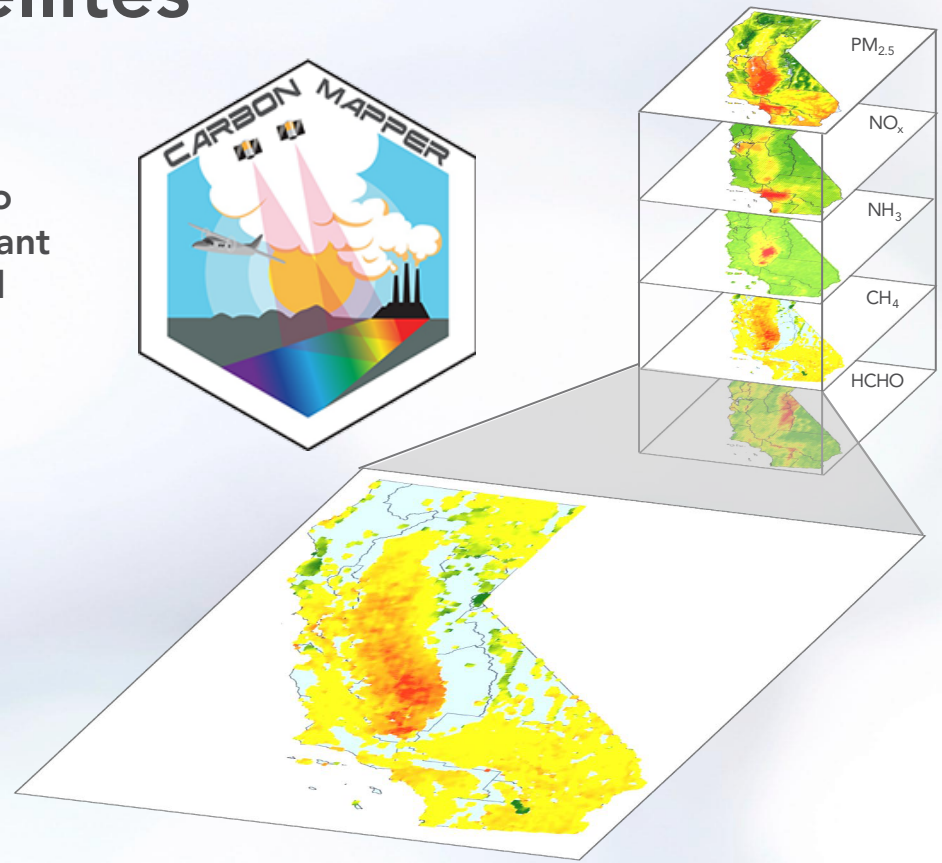
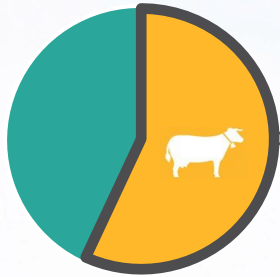
Satellites

- **Carbon Mapper (two satellites scheduled to launch in 2023) expected to play an important role in detecting CH_4 leaks in California and beyond**
  - A partnership between CARB, Carbon Mapper (non-profit), NASA JPL, Planet, Arizona State University, High Tide, and RMI



Scientific Progress: Agricultural Sector

39.33 MMT CO_2e
2019 CA CH_4
EMISSIONS



Manure Management
26%

Enteric Fermentation
28%

Pathway to Full Mitigation

Identify Sources → Characterize Source Emissions → Viable Emission Mitigation Strategies → Emission Mitigation

Animal Enteric Fermentation

Animal Manure Management

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THANK YOU FOR LISTENING

RESEARCH QUESTIONS

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For more information, please visit:
https://ww2.arb.ca.gov

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