Next Generation Ammonia Inventory for the San Joaquin Valley of California

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Introduction

- Improved ammonia inventory for use in data analysis and grid-based aerosol modeling for the California Regional PM10/PM2.5 Air Quality Study (CRPAQS);
- 1-hour temporal resolution and 1-kilometer by 1-kilometer spatial resolution;
- emphasis is on important sources within the SJV.

Introduction

- Important anthropogenic sources in the SJV: livestock operations, fertilizer application, on-road vehicles, and biomass burning;

- Primary objectives of this study are to: incorporate information from new studies; improve spatial and temporal allocation of emissions; and develop an ammonia emissions model for use in developing updated inventories.

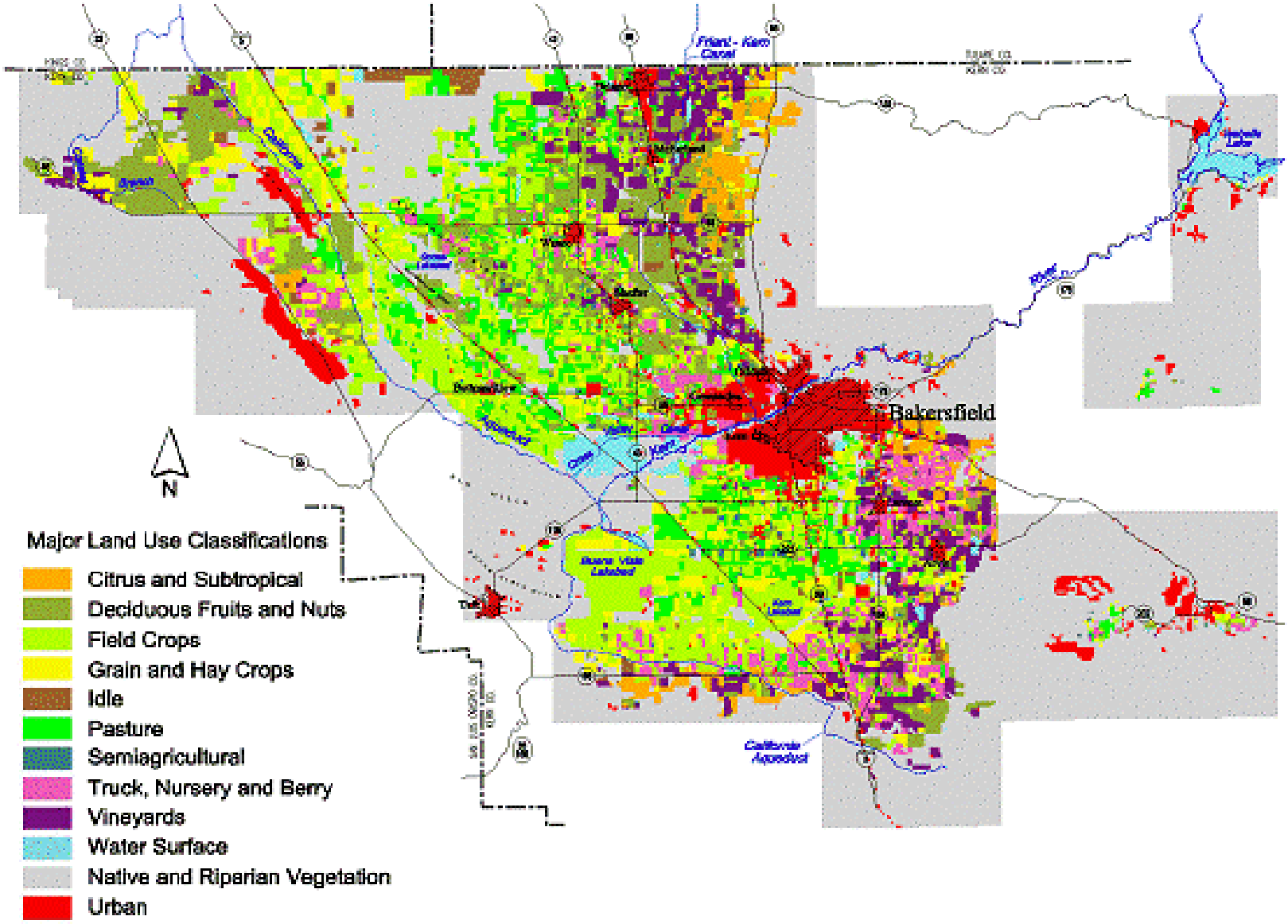
Methods

- Disaggregate emissions for better spatial and temporal allocation;
- Acquire/develop emission estimates and temporal allocation factors at the disaggregated level;
- Spatially allocate emissions to the best available land cover data.

Fertilizer Application

EIC Description[1]	EIC	CES
	Existing Code	
Misc. Agricultural Losses	420-418-6000-0000	47050
	Proposed Codes	
Fertilization Losses – Grain and Hay	420-418-6001-0001	47051
Fertilization Losses – Truck Crops	420-418-6001-0002	47052
Fertilization Losses – Citrus	420-418-6001-0003	47053
Fertilization Losses – Rice	420-418-6001-0004	47054
Fertilization Losses – Pasture	420-418-6001-0005	47055
Fertilization Losses – Vineyards	420-418-6001-0006	47056
Fertilization Losses – Deciduous Fruit and Nuts	420-418-6001-0007	47057
Fertilization Losses – Field Crops	420-418-6001-0008	47058

Kern Co. 1998 Land Use



Livestock Operations

EIC Description	EIC	CES
Existing Code		
Livestock Wastes	630-618-0262-0000	66605
Proposed Codes		
Cattle - Confined Dairy Operations	630-618-0262-0001	66606
Cattle - Confined Beef Operations	630-618-0262-0002	66607
Cattle - Grazing	630-618-0262-0003	66608
Cattle - Manure Spreading	630-618-0262-0004	66609
Poultry - Broiler Chickens	630-618-0264-0001	66612
Poultry - Layer and Pullet Chickens	630-618-0264-0002	66613
Poultry - Turkeys	630-618-0264-0003	66614
Hogs and Pigs	630-618-0266-0001	66618
Goats	630-618-0268-0001	66620
Rabbits	630-618-0270-0001	66622
Sheep and Lambs	630-618-0272-0001	66624
Mules, Burros and Donkeys	630-618-0274-0001	66626
Horses	630-618-0276-0001	66628

Cattle Emissions

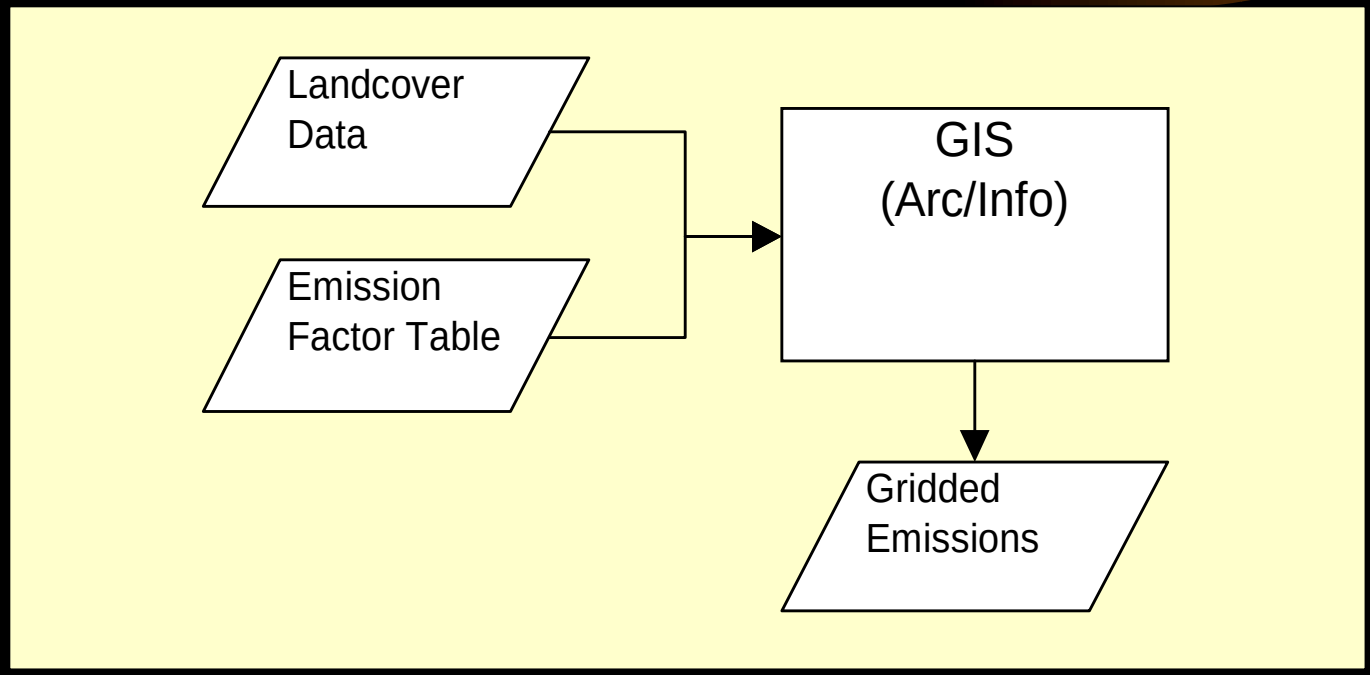
- Spatial Allocation
  - Geocode large dairies and beef feedlots as point sources;
  - Investigate spatial coverages for grazing operations;
  - Research SJV practices for manure spreading.
- Temporal Allocation: develop seasonal and diurnal allocation factors based on previously proposed empirical models.

Other Sources

- Natural Soils - incorporate recent CARB-sponsored soil gas modeling results;
- On-Road Vehicles - develop emissions based on previously-gridded VMT and a fleet-wide emission factor from recent tunnel studies in CA;
- Biomass Burning - (e.g., residential wood) - use emission ratios of NH3 to CO based on wildfire studies and the existing CO inventory.

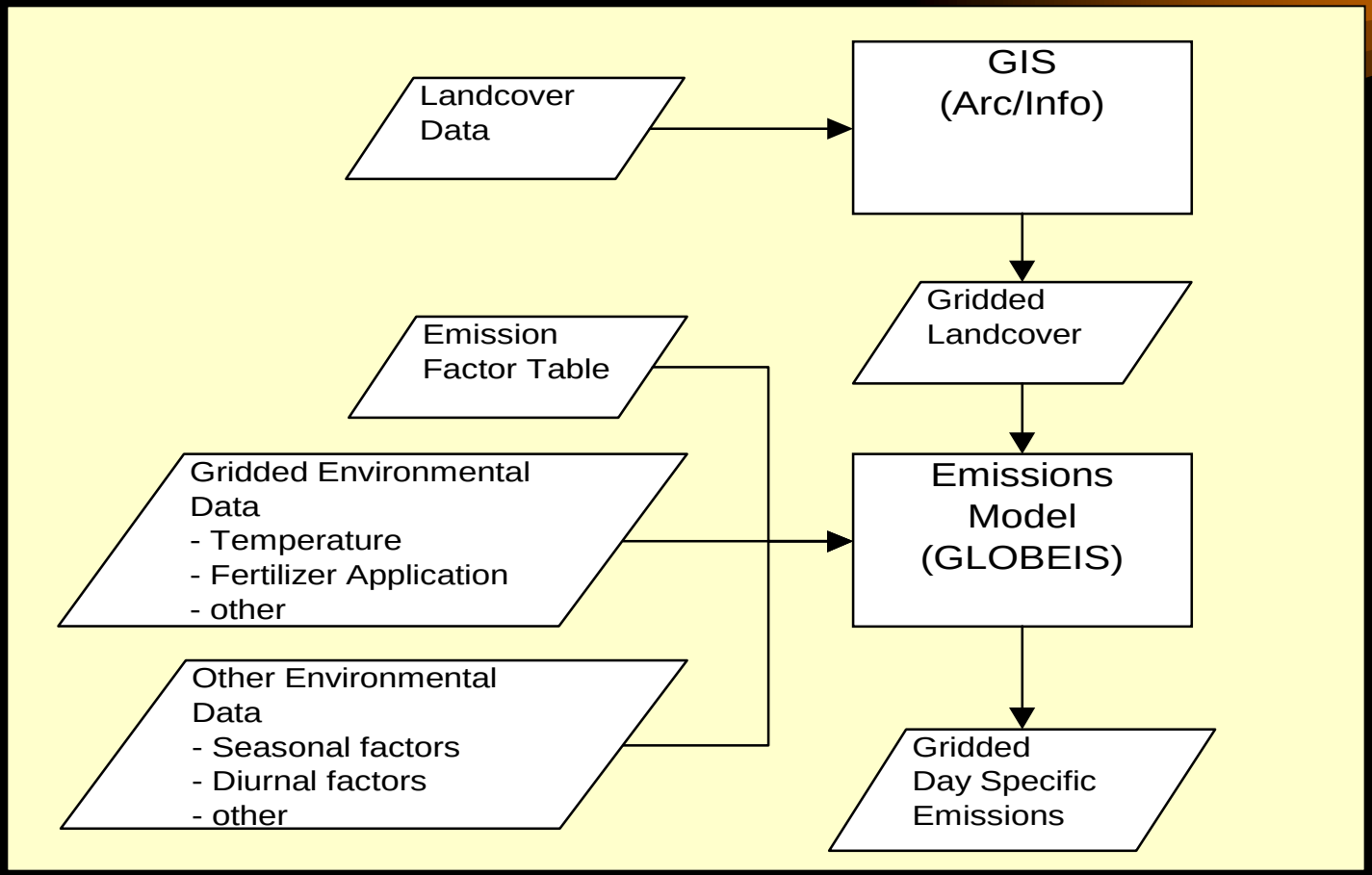
Ammonia Emissions Model

(Simple approach to estimating ammonia emissions within the GIS)



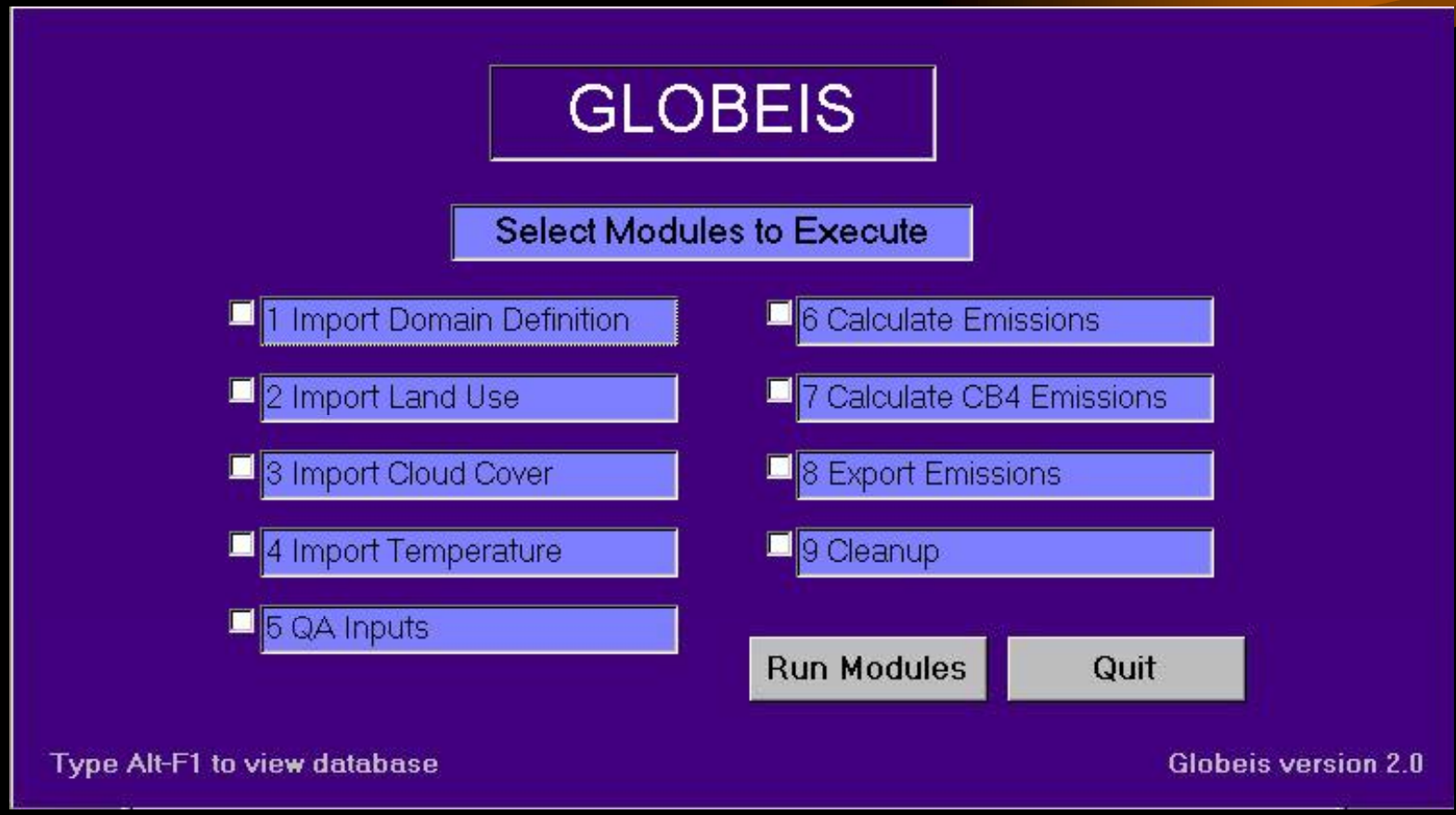
Ammonia Emissions Model

(Estimating emissions using a model to account for environmental effects)



Ammonia Emissions Model

(Main GLOBEIS Interface)



Ammonia Emissions Model

Enhancements to GLOBEIS for CRPAQS Study:

- Switch to turn off biogenic emissions calculations for ammonia applications;
- Add ability to specify seasonal and temporal profiles by source category;
- Add environmental relationships between ammonia emission factor and environmental factors (temperature, RH, soil pH, soil moisture, etc);

Ammonia Emissions Model

Enhancements to GLOBEIS for CRPAQS Study:

- Add ability to treat point source emissions data;
- Update look-up tables for source-specific and land use-specific emission factors.