

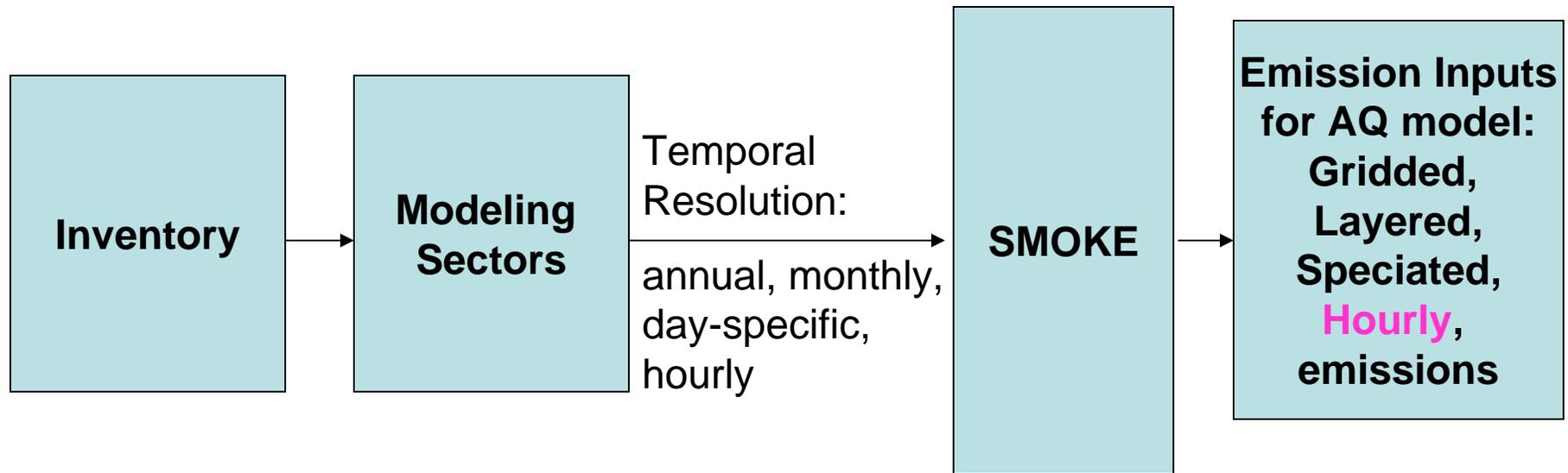
Estimating the Monthly Variation in California's Nonroad Equipment Emissions For the 2002 Emissions and Air Quality Modeling Platform



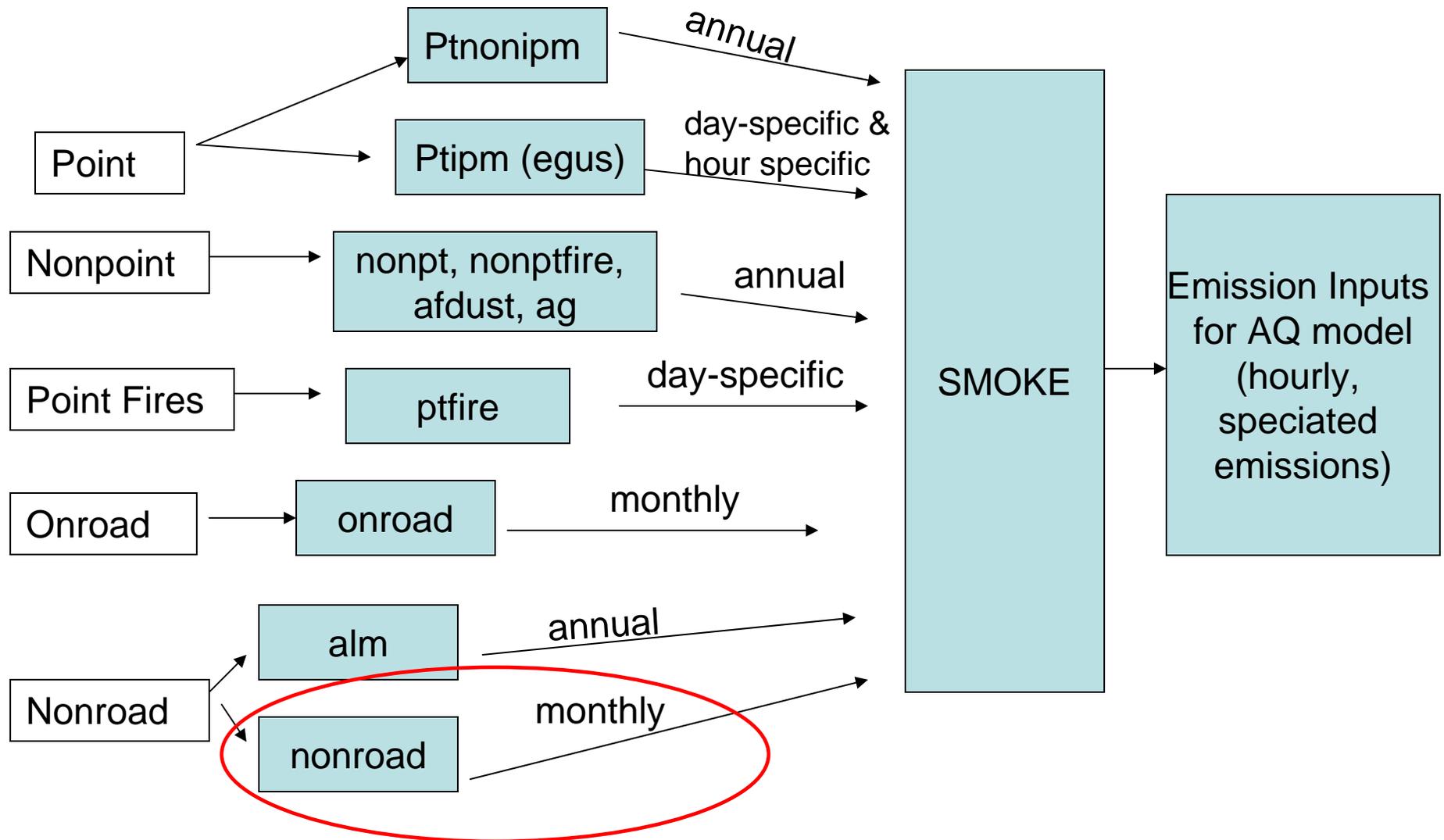
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2002 Platform: From NEI to Model Ready Emissions



2002 Platform: From NEI to Model Ready Emissions



The Nonroad Sector of the 2002 Platform

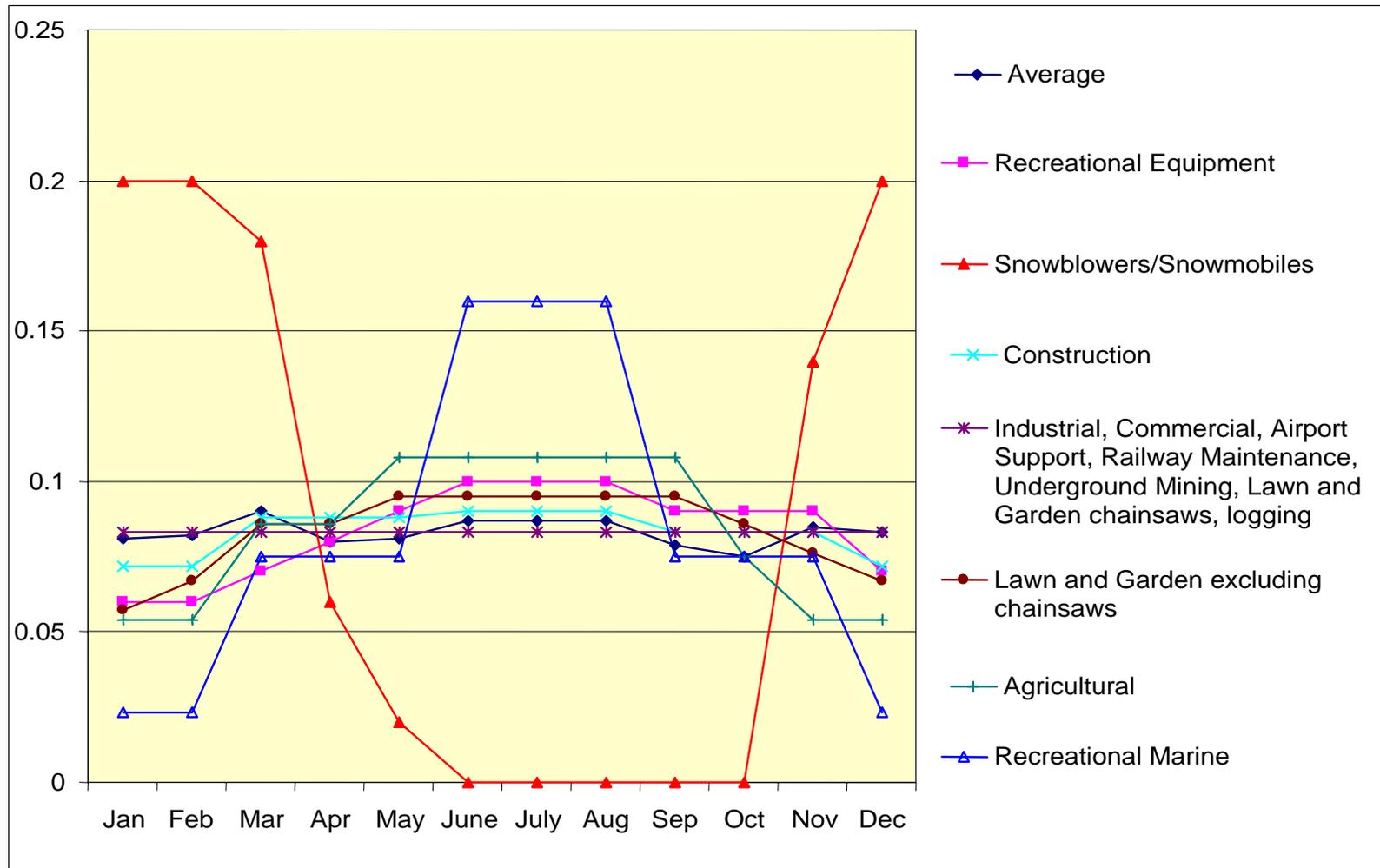
- Consists of **monthly** estimates of equipment categories using National Mobile Inventory Model (NMIM) with NR2005 for 49 States
 - ~ 200 SCCs describe fuel/engine type, equipment category, specific equipment
 - Excludes aircraft, locomotive and commercial marine (alm)
 - “MODE”-specific emissions: Exhaust, Evaporative, Refueling
 - Accounts for impact of fuels/temperature/equipment activity
 - Uses state-submitted NMIM inputs where provided
- Uses California-submitted **annual** emission estimates only for California
 - ~40 SCCs provided by California
 - no modes
 - NH₃ for California from NMIM (~200 SCCs)

Issue: How process California-submitted
annual, non-MODE-specific
nonroad sector emissions

Options:

1. Apply NMIM monthly variation for California to annual emissions to develop monthly emissions
2. Develop monthly temporal factors based on equipment variation (NMIM “season.dat” file)

Monthly Equipment Activity Variation for Nonroad Equipment In California



Most Categories show Large Monthly Variation In Activity

We chose NMIM approach



Just Kidding.....

Implementation of NMIM Approach

- Compute “allocation factors” that account for monthly and mode variation of emissions from NMIM results for California
- Mode variation for only one criteria air pollutant (VOC). All other criteria pollutants are exhaust mode.
- Apply allocation factors to California emissions by county /SCC*/pollutant

The hard part

* Requires mapping NMIM SCCs to California SCCS

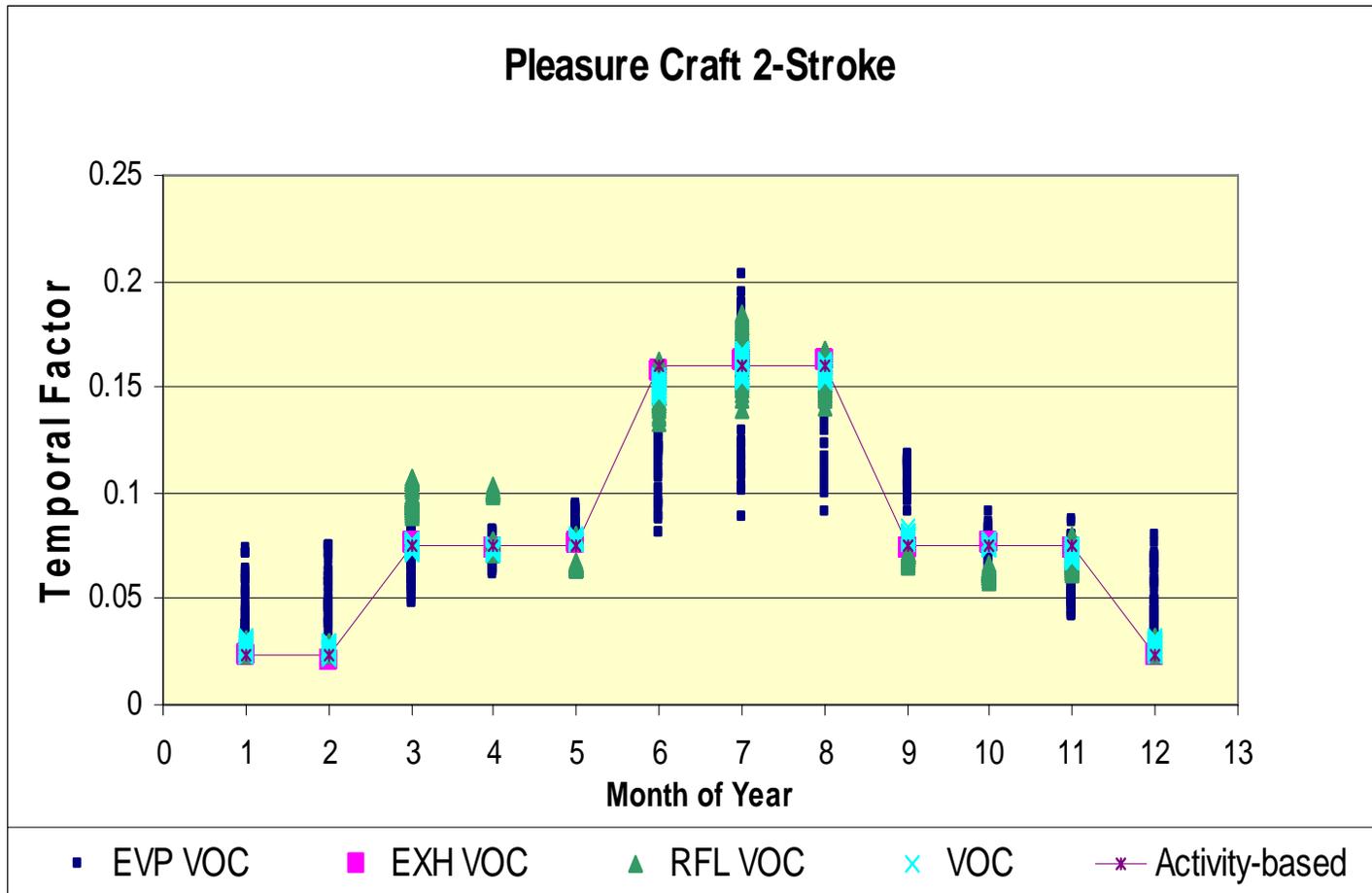
California Nonroad Inventory SCCs much broader than NEI SCCs, for example

NEI SCC in CALIFORNIA		NMIM SCC used as a surrogate	
2260002000	2-Stroke;Construction & Mining Equip.;Total	2270002051	Diesel;Construction &Mining Equip.;Off-highway Trucks
2260003000	2-Stroke;Industrial Equip.;Total	2260003040	2-Stroke;Industrial Equip.;Other Genl Industrial Equip.
2260004000	2-Stroke;Lawn and Garden Equip.;All	2260004071	2-Stroke;Lawn & Garden Equip.;Turf Equip. (Comm)
2260006000	2-Stroke;Commercial Equip.;Total	2260006005	2-Stroke;Commercial Equip.;Generator Sets
2260007000	2-Stroke;Logging Equip.;Total	2260007005	2-Stroke;Logging Equip.;Chain Saws > 6 HP
2265001020	4-Stroke;Rec. Equip.;Snowmobiles	2260001020	2-Stroke;Rec. Equip.;Snowmobiles
2265002000	4-Stroke;Construction and Mining Equip.;Total	2270002051	Diesel;Construction and Mining Equip.;Off-hwy Trucks
2265003000	4-Stroke;Industrial Equip.;Total	2265003020	4-Stroke;Industrial Equip.;Forklifts
2265004000	4-Stroke;Lawn and Garden Equip.;All	2265004056	4-Stroke;Lawn and Garden Equip.;Lawn and Garden Tractors (Commercial)
2265005000	4-Stroke;Agricultural Equip.;Total	2265005015	4-Stroke;Agricultural Equip.;Agricultural Tractors
2265006000	4-Stroke;Commercial Equip.;Total	2265006015	4-Stroke;Comm. Equip.;Air Compressors
2265007000	4-Stroke;Logging Equip.;Total	2265007010	4-Stroke;Logging Equip.;Shredders > 6 HP
2282005000	Pleasure Craft;Gasoline 2-Stroke;Total	2282005010	Pleasure Craft;Gasoline 2-Stroke;Outboard
2282010000	Pleasure Craft;Gasoline 4-Stroke;Total	2282010005	Pleasure Craft;Gasoline 4-Stroke;Inboard/Sterndrive

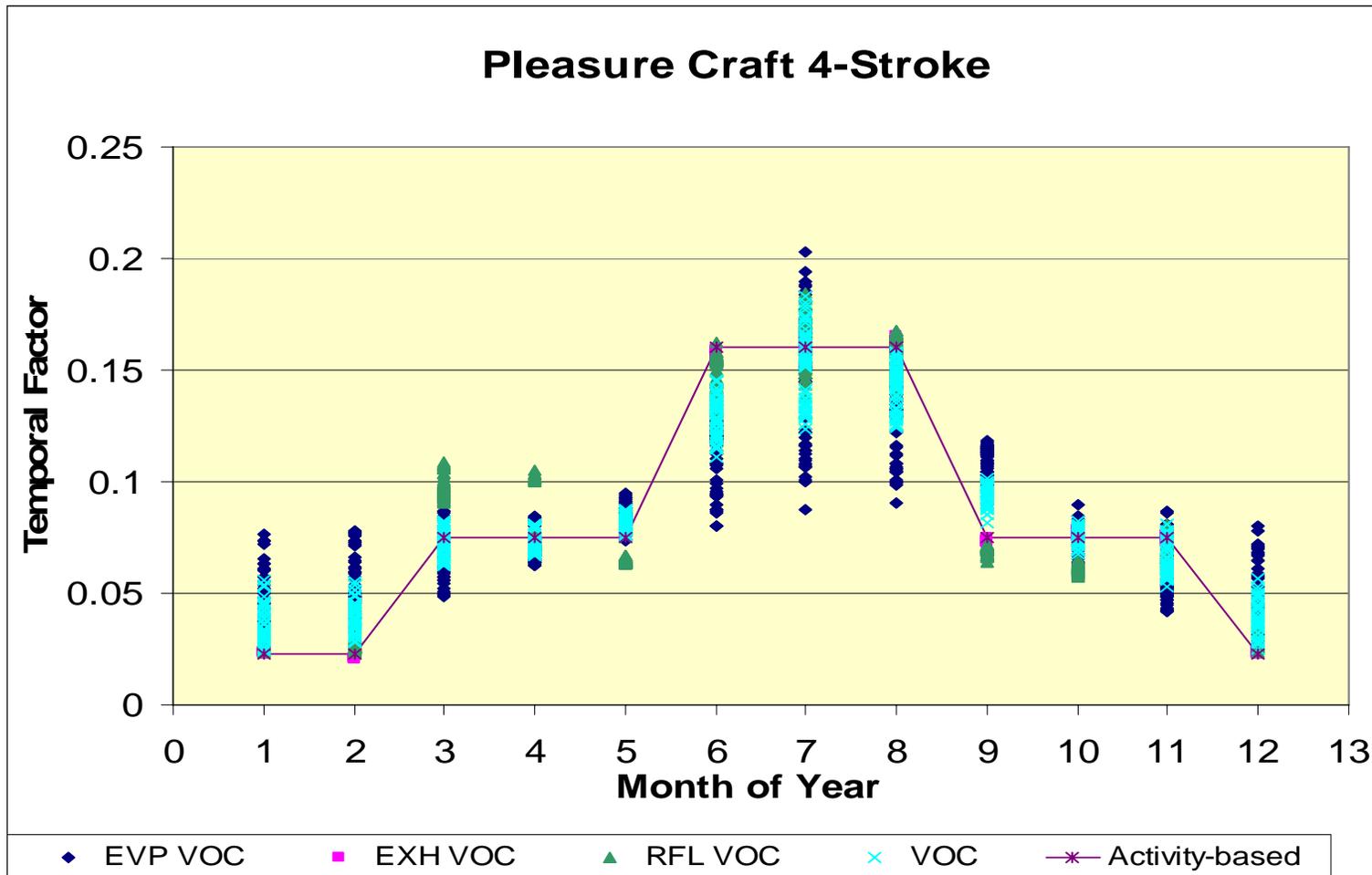
Specific Categories For Which We Examined NMIM-based Monthly Profiles

SCC	Description	Calif . state total VOC from 2002 NEI, V3 (tons)
2282005000	Pleasure Craft;Gasoline 2-Stroke;Total	37,256
2260004000	Off-highway Vehicle Gasoline, 2-Stroke;Lawn and Garden Equipment;All	29,234
2265004000	Off-highway Vehicle Gasoline, 4-Stroke;Lawn and Garden Equipment;All	19,146
2265001020	Off-highway Vehicle Gasoline, 4-Stroke;Recreational Equipment;Snowmobiles	15,186
2270002000	Off-highway Vehicle Diesel;Construction and Mining Equipment;Total	12,089
2282010000	Pleasure Craft; Gasoline 4-Stroke;Total	6,838
SCC	Description	Calif state total NOX from 2002 NEI, V3 tons)
2270002000	Off-highway Vehicle Diesel;Construction and Mining Equipment;Total	117,031
2270005000	Off-highway Vehicle Diesel;Agricultural Equipment;Total	48,885

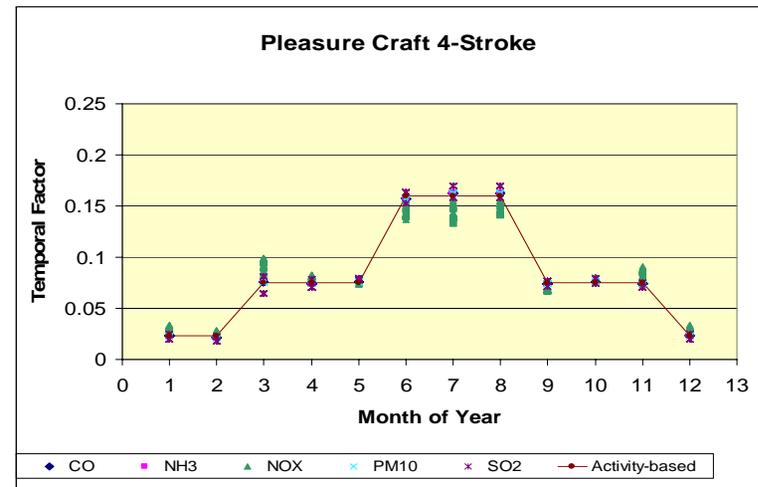
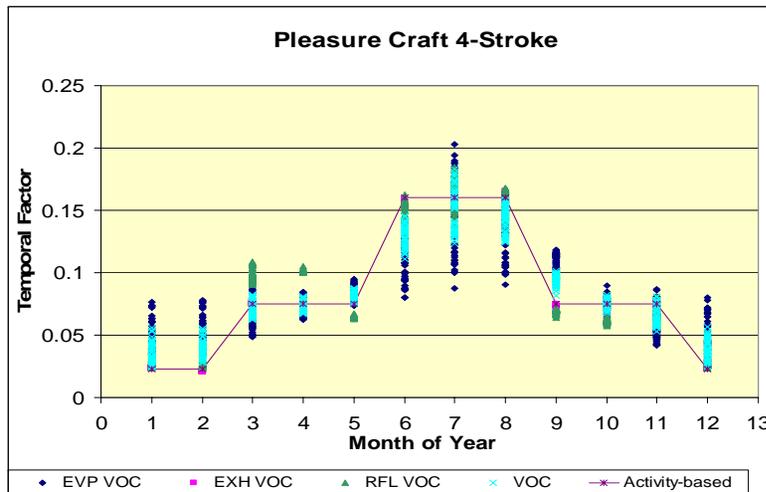
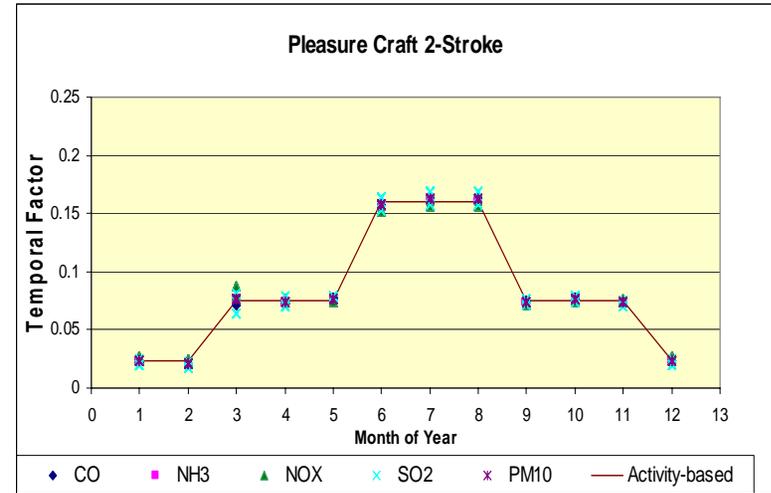
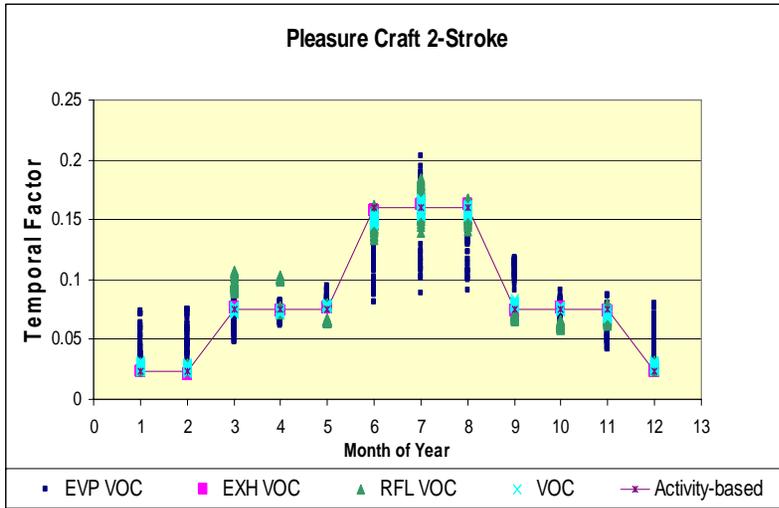
NMIM-based profiles: Pleasure Craft 2 Stroke VOC



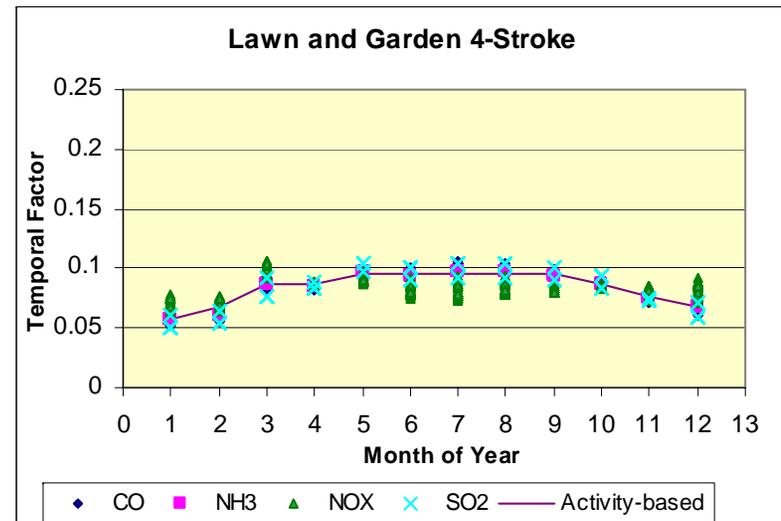
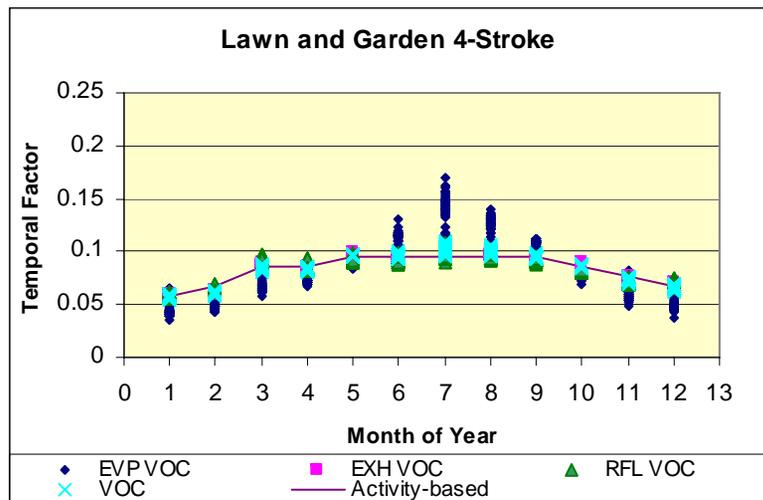
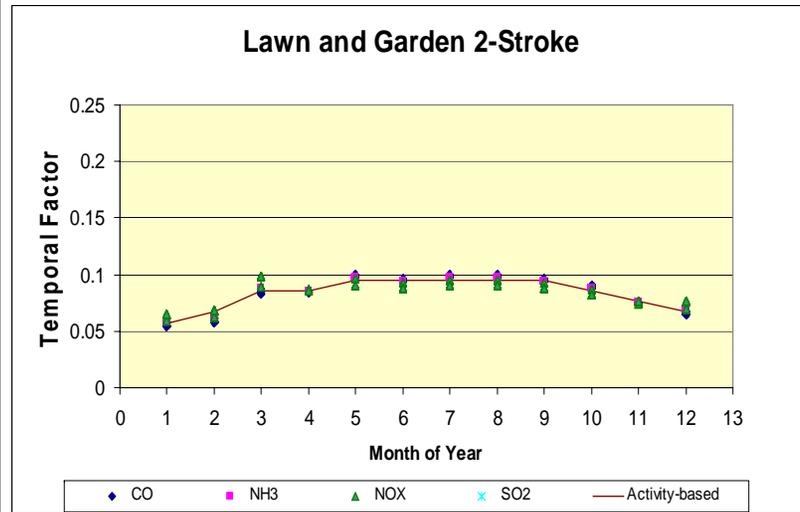
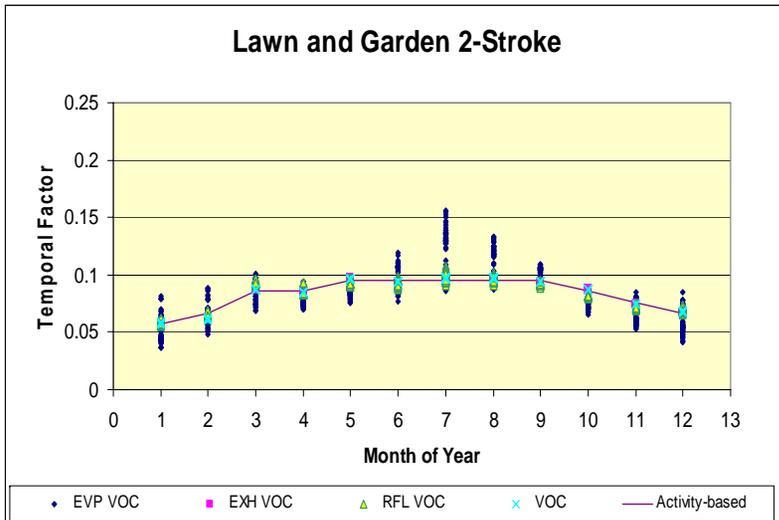
NMIM-based profiles: Pleasure Craft 4 Stroke VOC



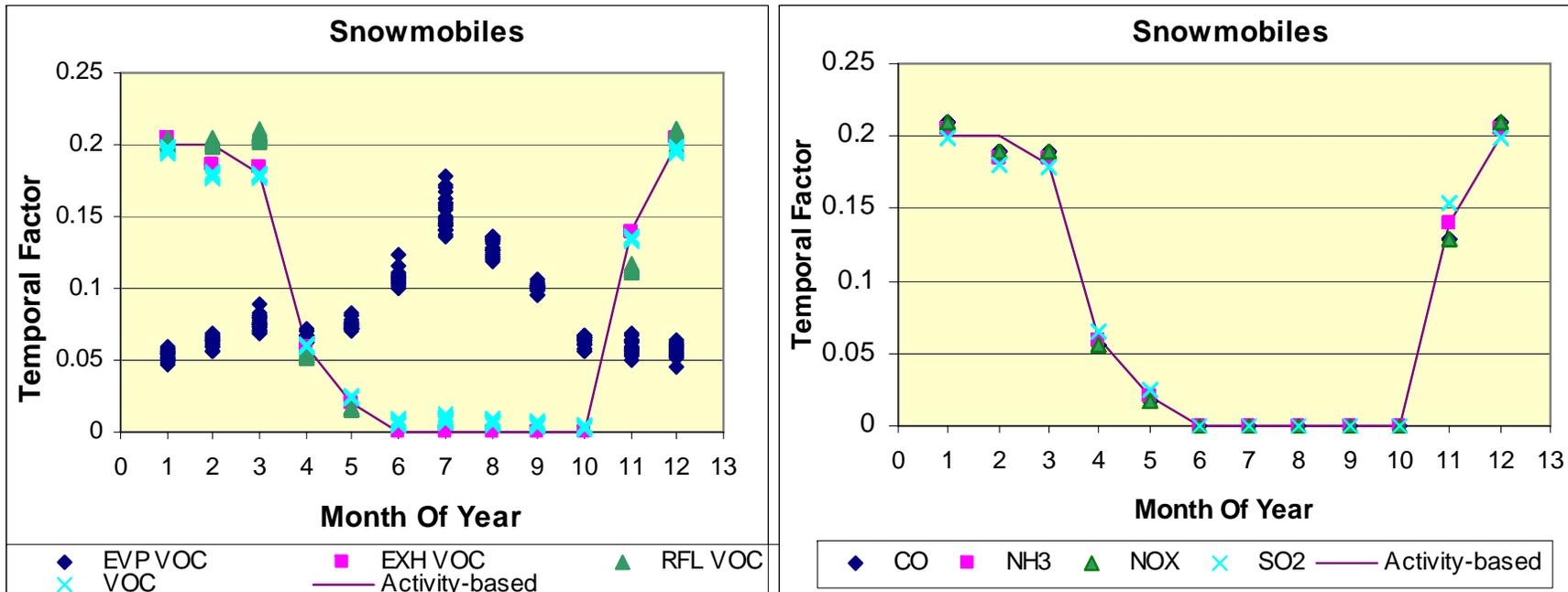
NMIM-based profiles: Pleasure Craft



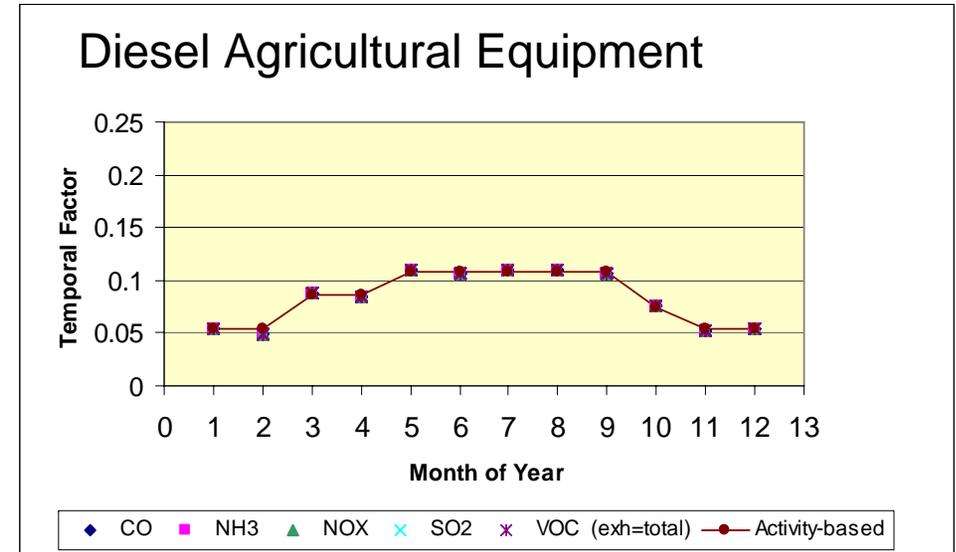
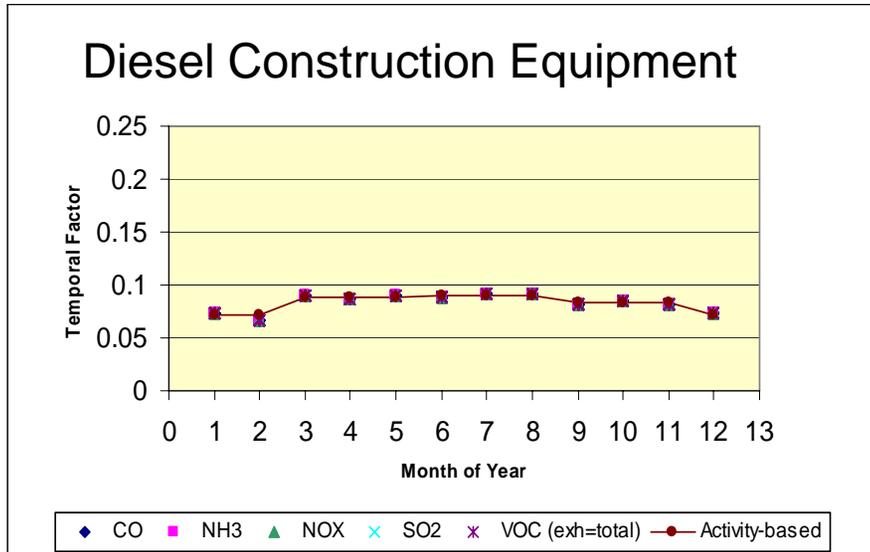
NMIM-based profiles: Lawn & Garden



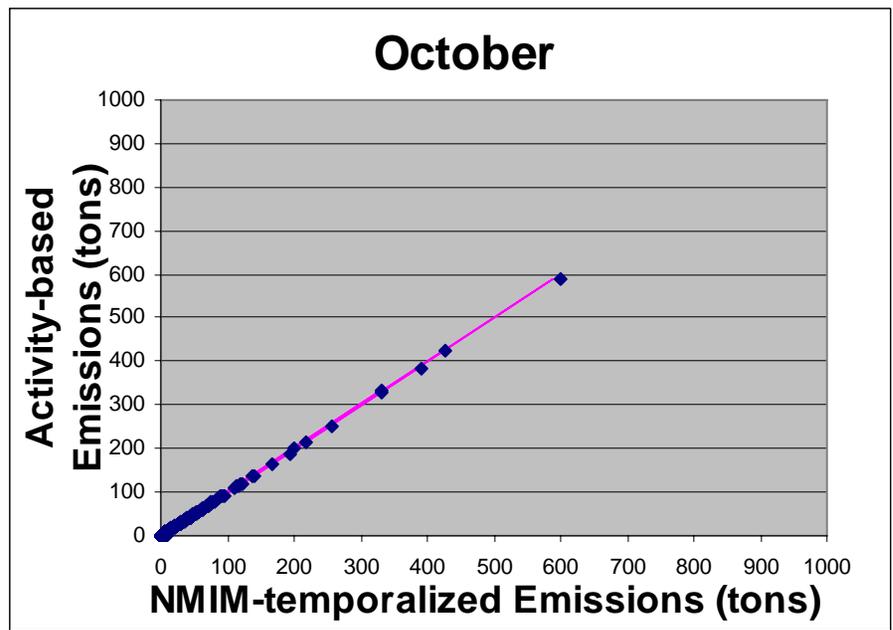
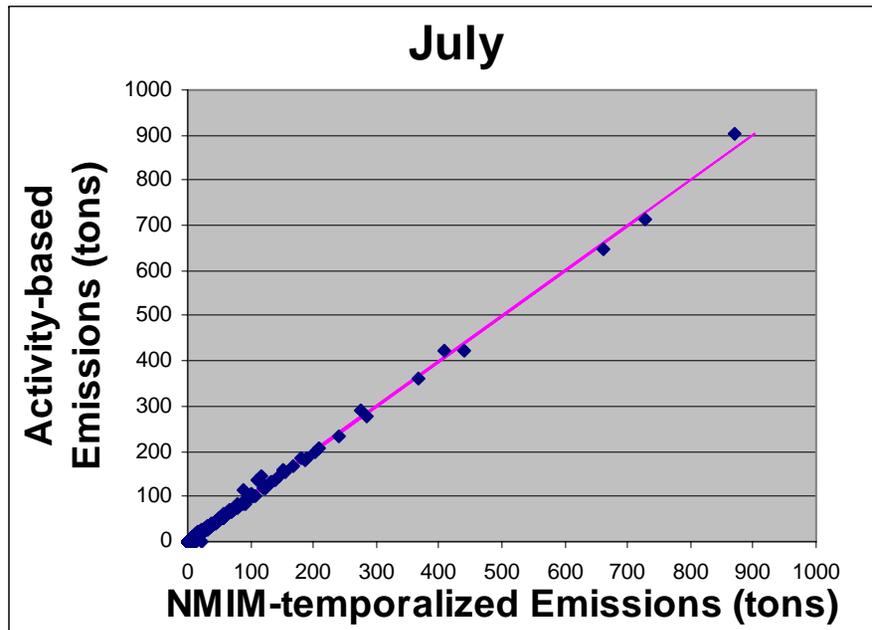
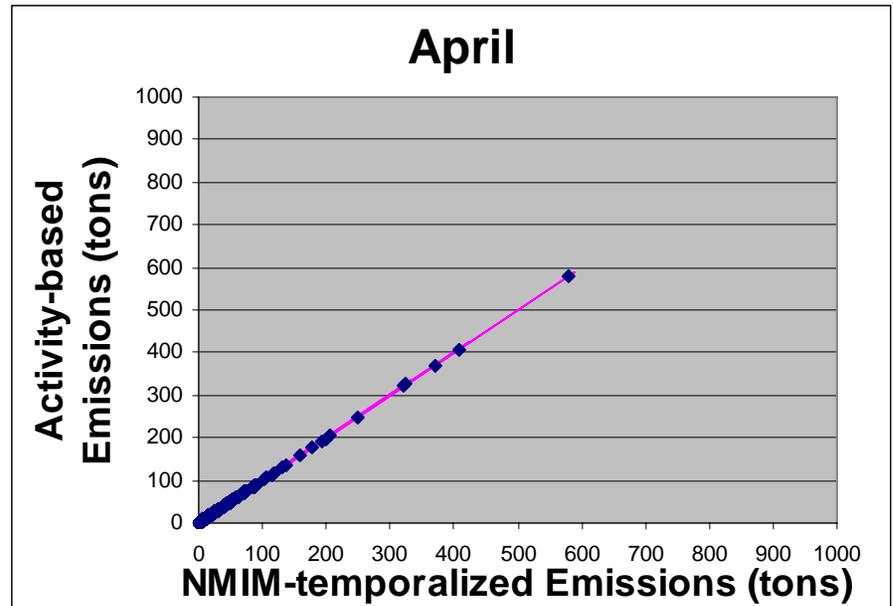
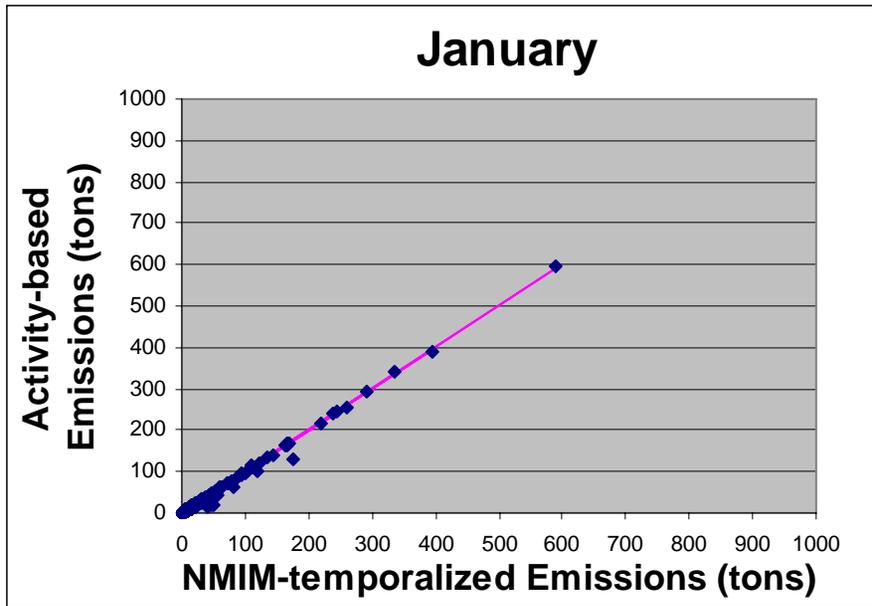
NMIM-based profiles: Snowmobiles



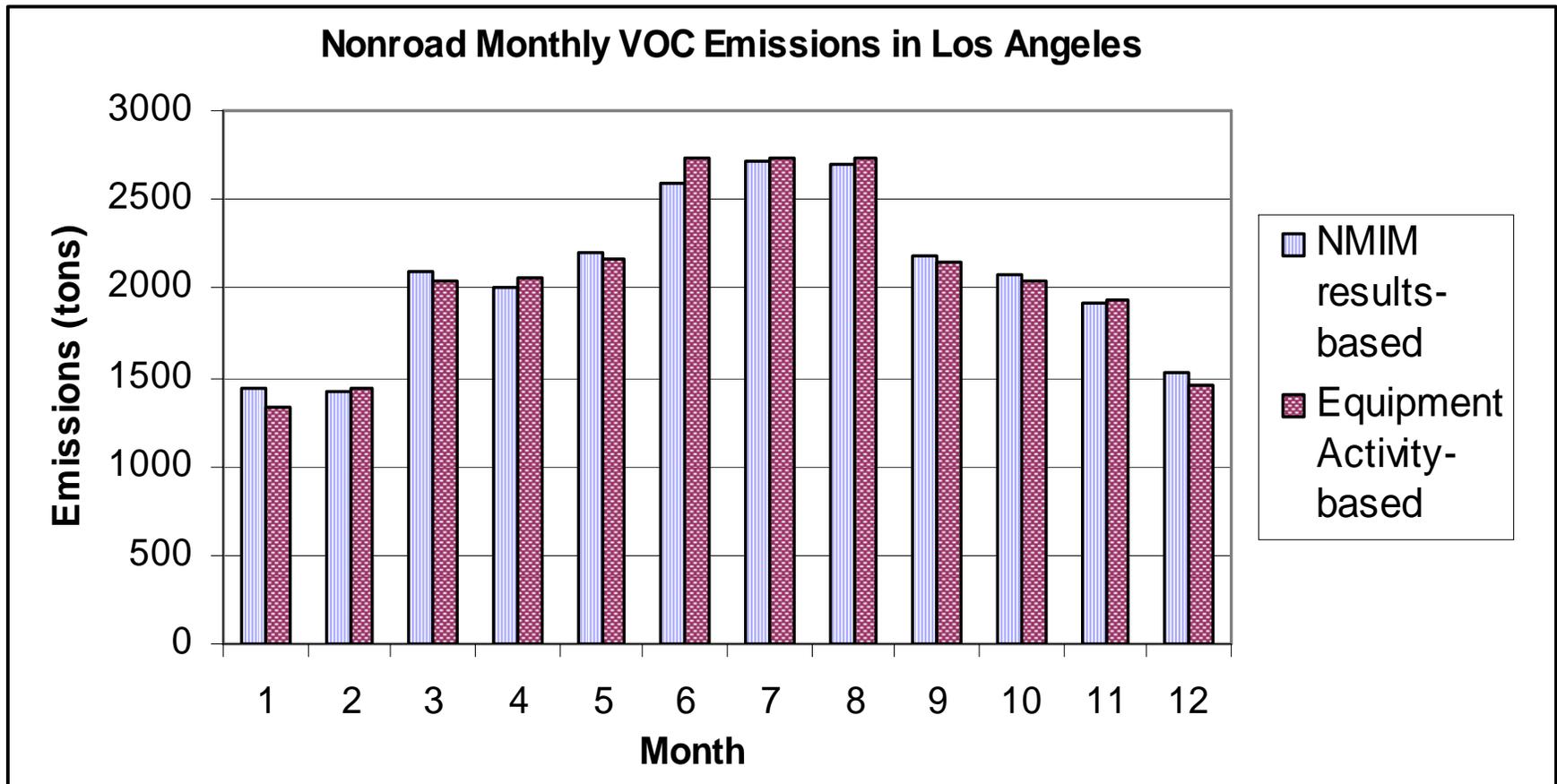
NMIM-based profiles: Diesel Construction and Diesel Agricultural Equipment



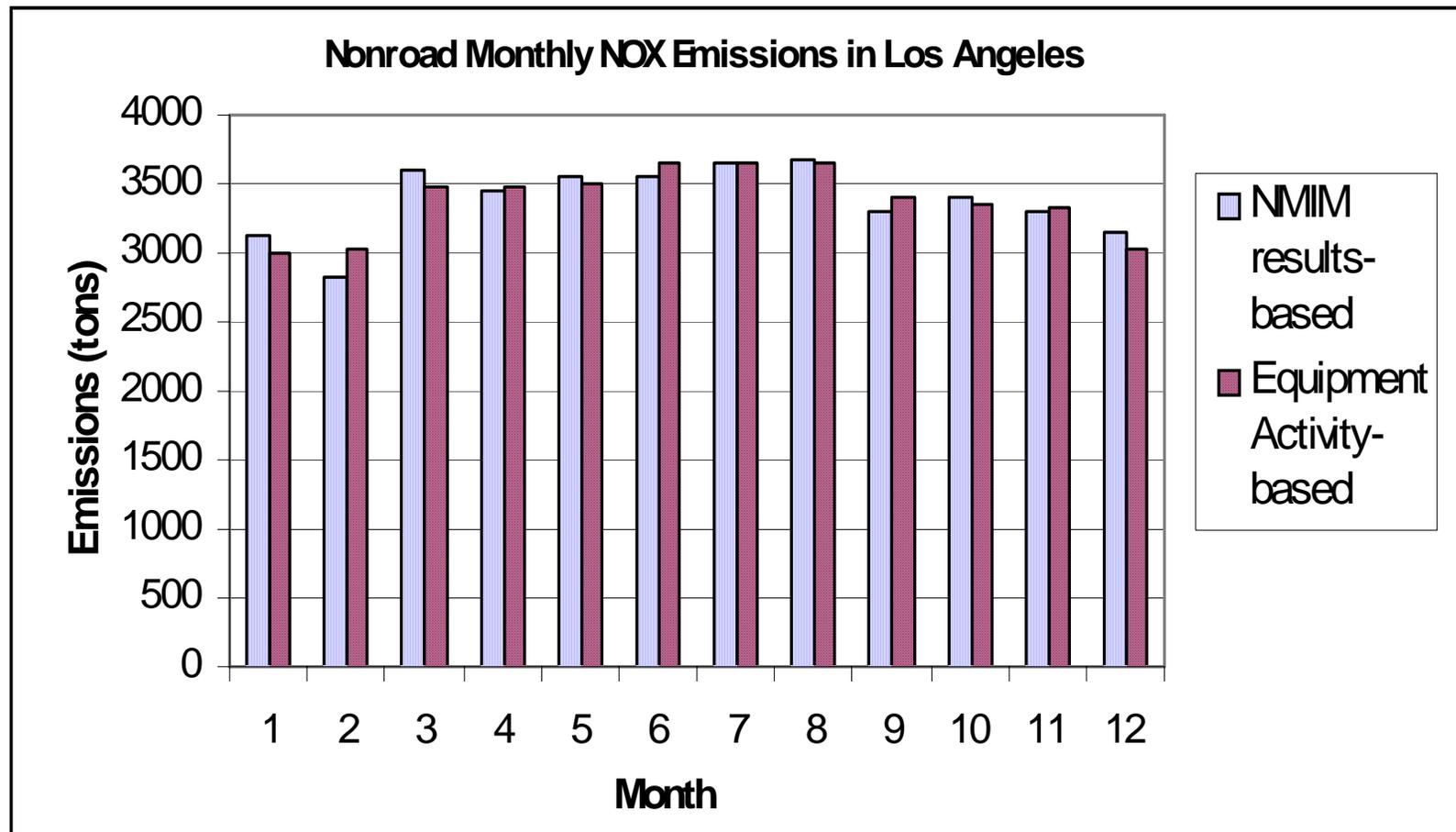
Monthly VOC County Emissions Comparisons



LA County Nonroad Sector Monthly VOC emissions



LA County Nonroad Sector Monthly NOX emissions



Conclusions

- Many nonroad categories show strong monthly variation in emissions, mainly due to equipment activity monthly profiles
- NMIM accounts for these profiles and other factors: temperature, fuel properties which can also impact monthly variation of emissions
- NMIM provides mode-specific emissions, which impact speciation of pollutants
- For 2002 platform, NMIM was used to provide mode and monthly emissions for California nonroad categories
- California monthly emissions very similar using equipment activity profiles vs NMIM, however, did not investigate differences in speciated VOC
- Application of NMIM variation to Calif. Emissions complicated because SCCs are different



Really!