

Frequency of Contrail Occurrence from Surface Observations Over the United States

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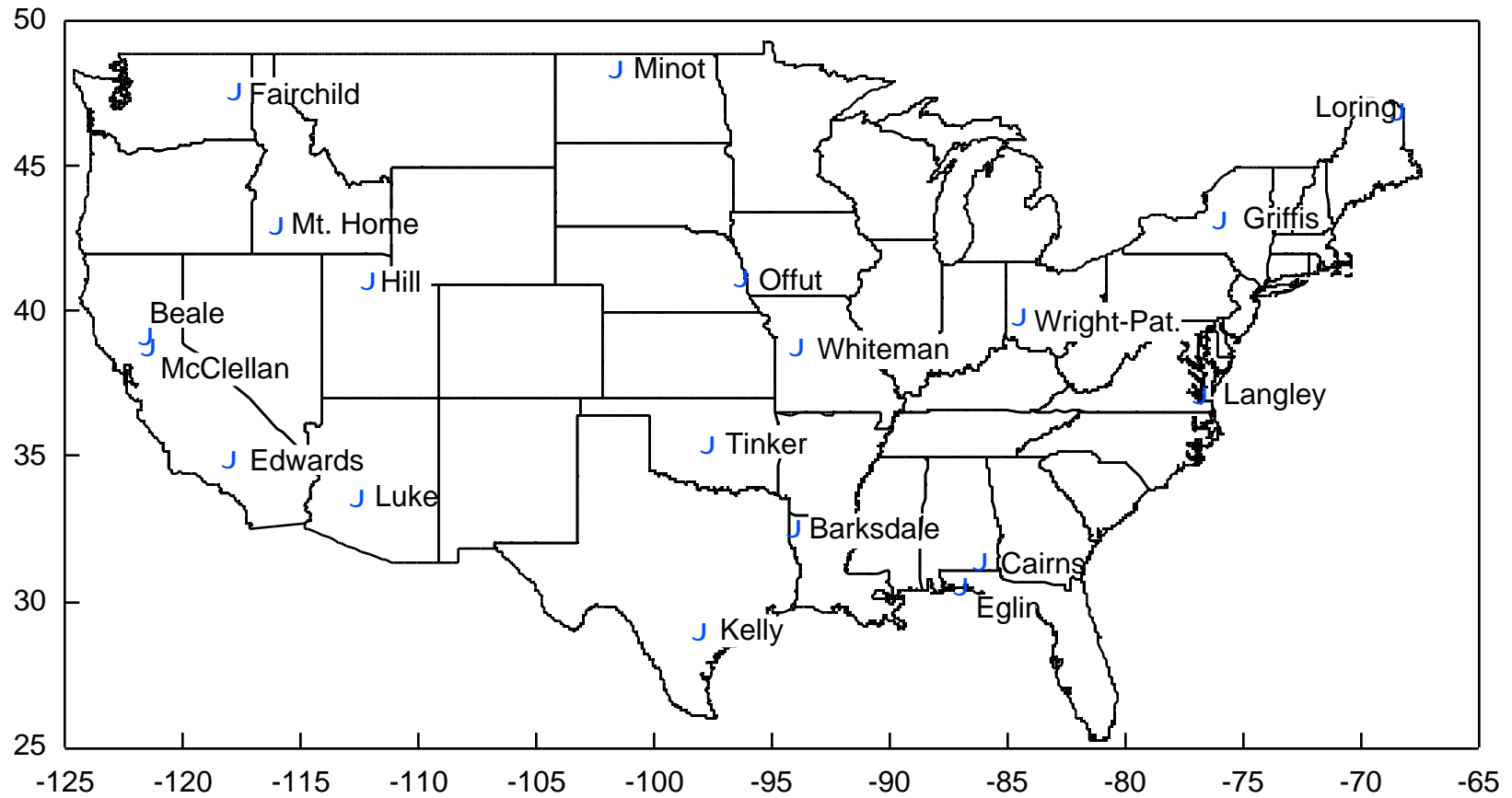
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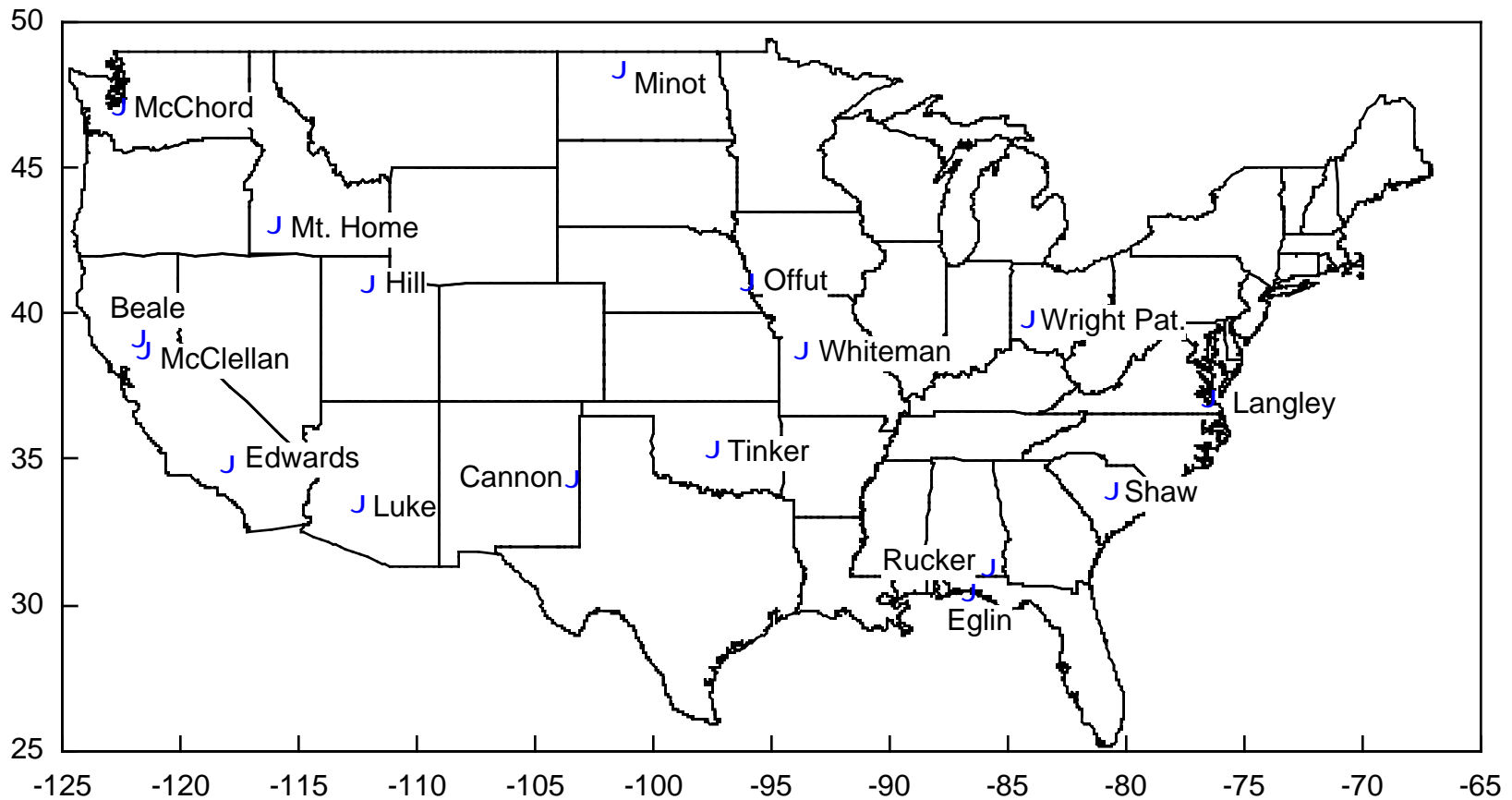
Purpose

- Develop a climatology for contrail frequency of occurrence over the USA
- Provide a validation source for satellite contrail analyses
- Provide input for radiative forcing studies
- Basically a repeat of 93/94 study (NASA RP 1404, December 1997, Minnis, Ayers, Weaver)

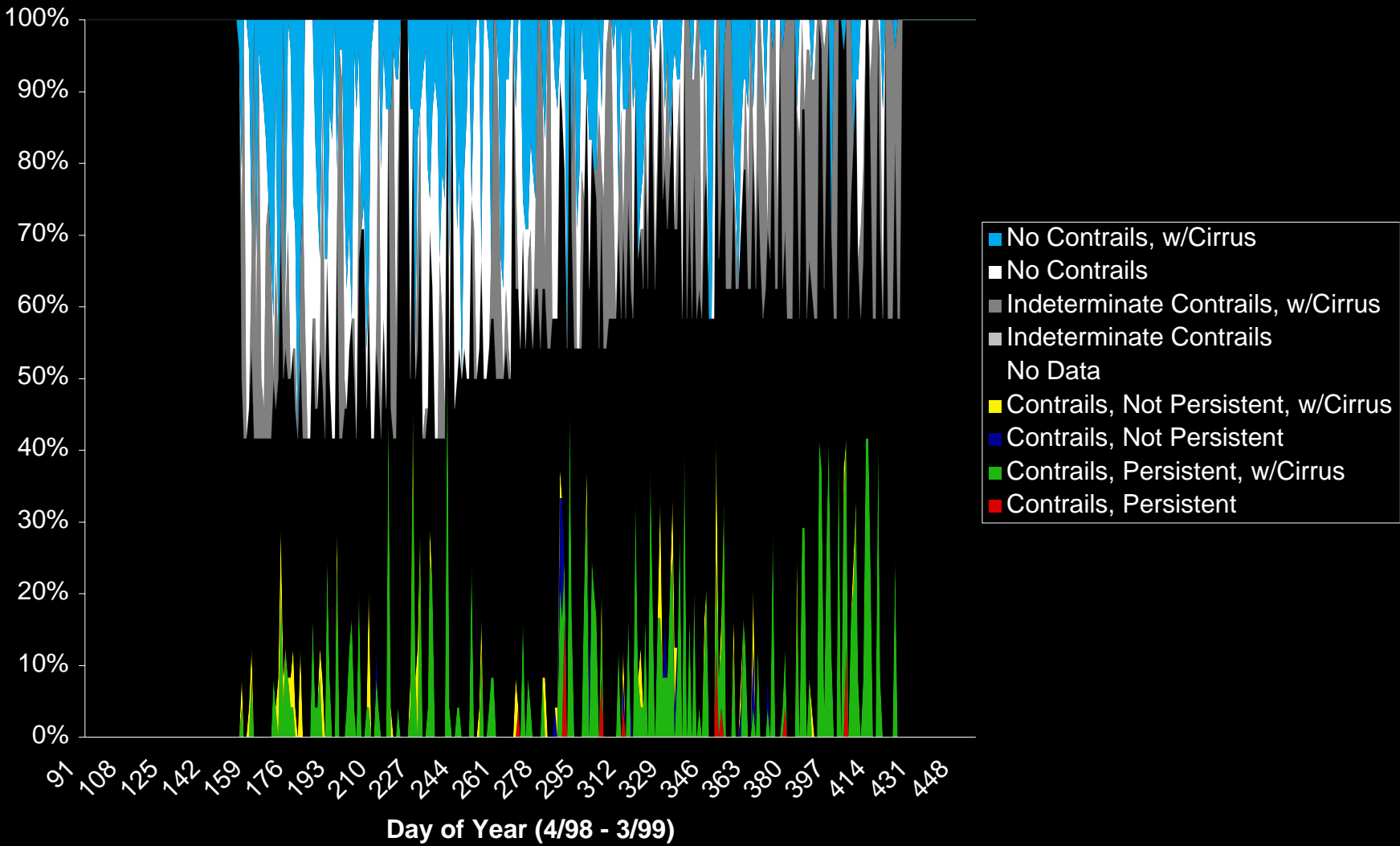
1993/1994 CONTRAIL OBSERVATION NETWORK



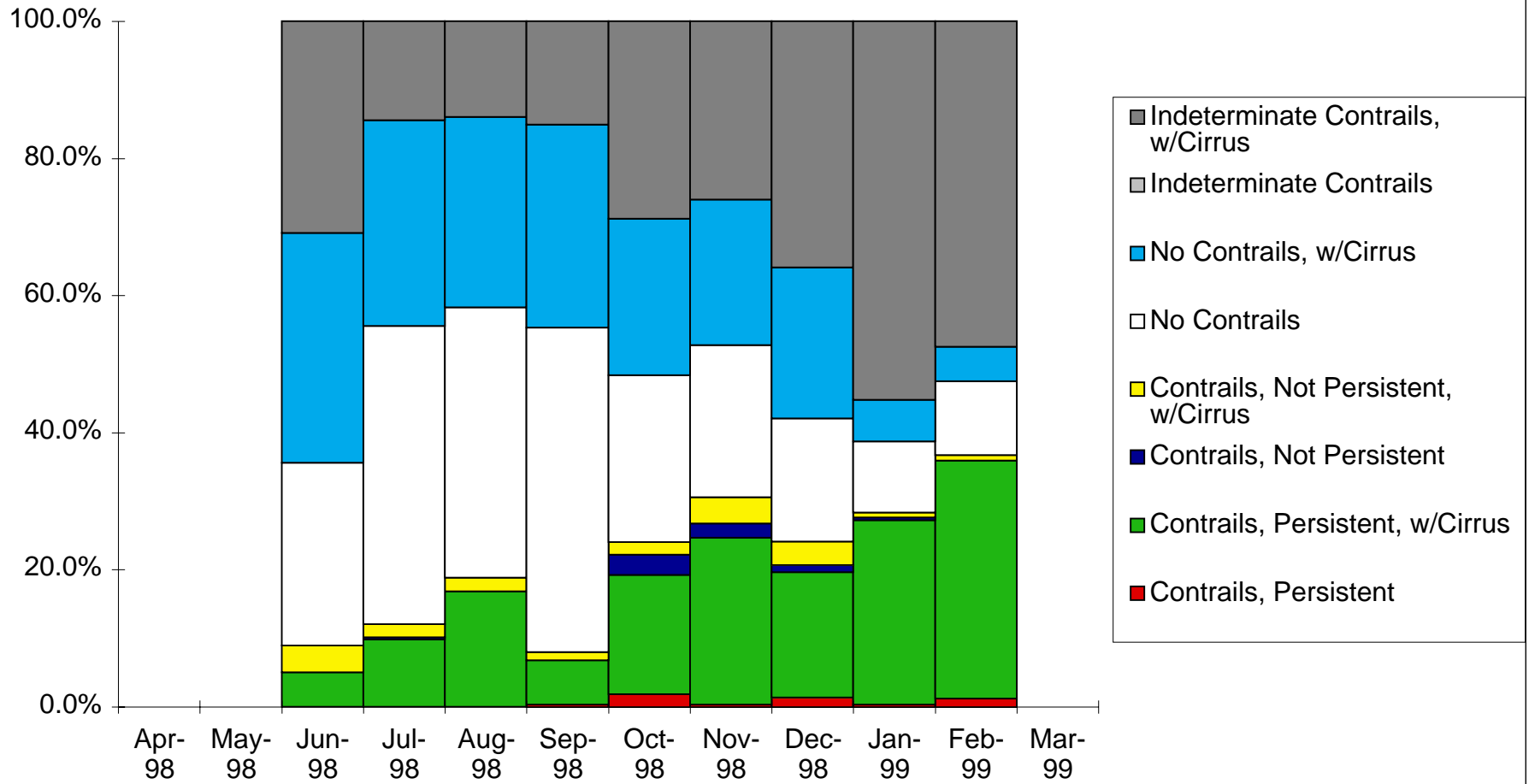
1998/1999 CONTRAIL OBSERVATION NETWORK



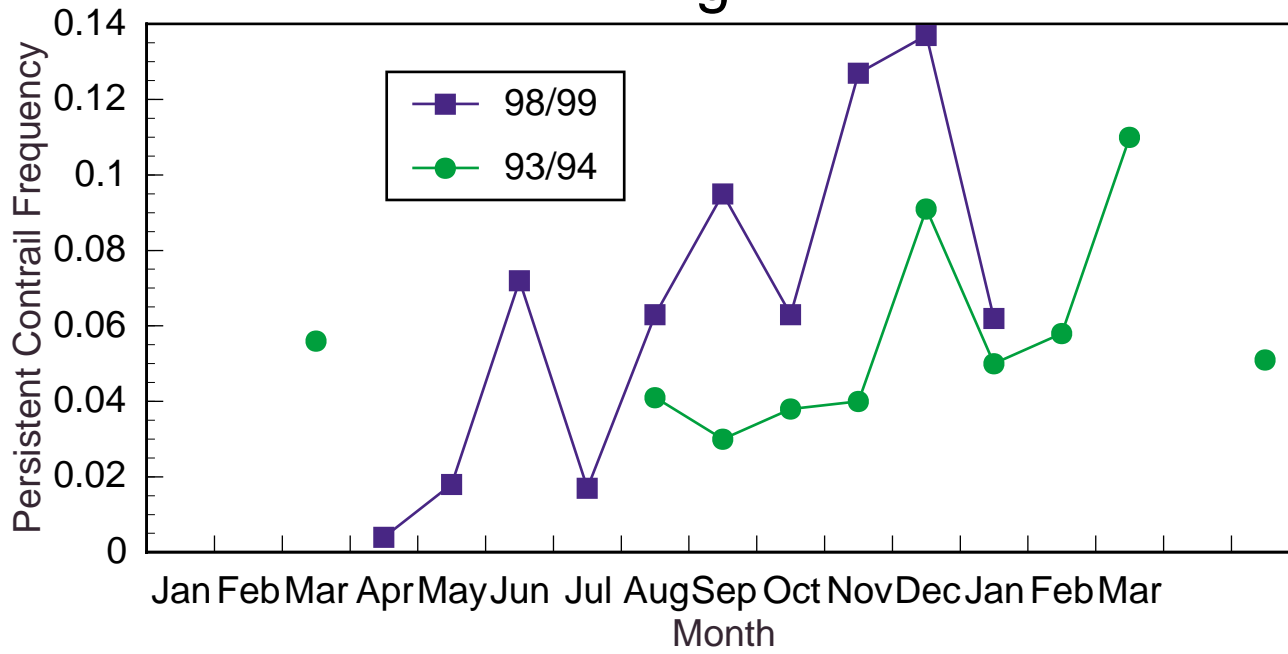
Wright Patterson AFB Daily Contrail and Cirrus Data



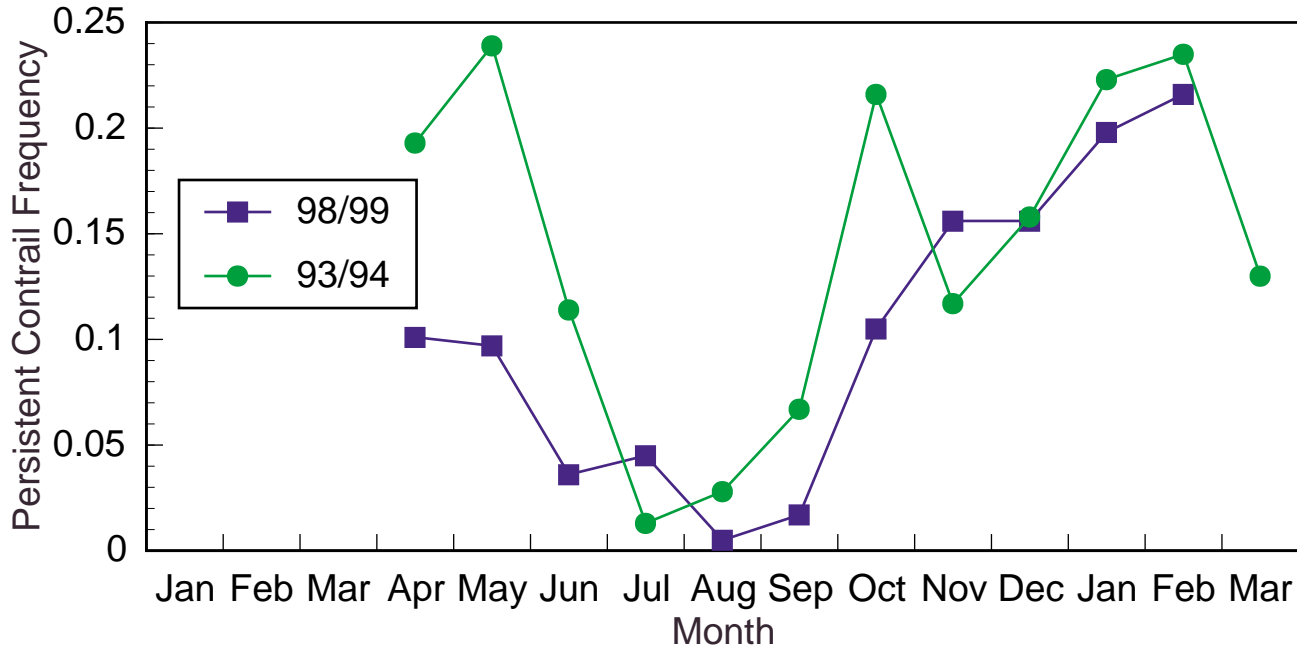
Wright Patterson AFB Monthly Contrail and Cirrus Data



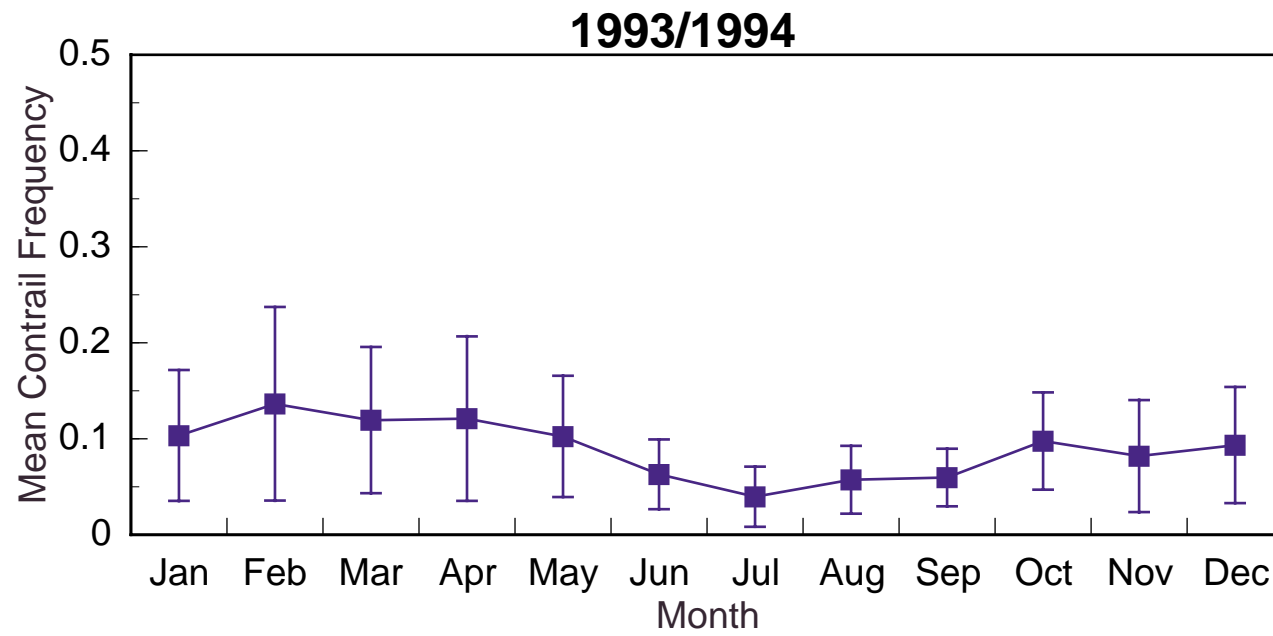
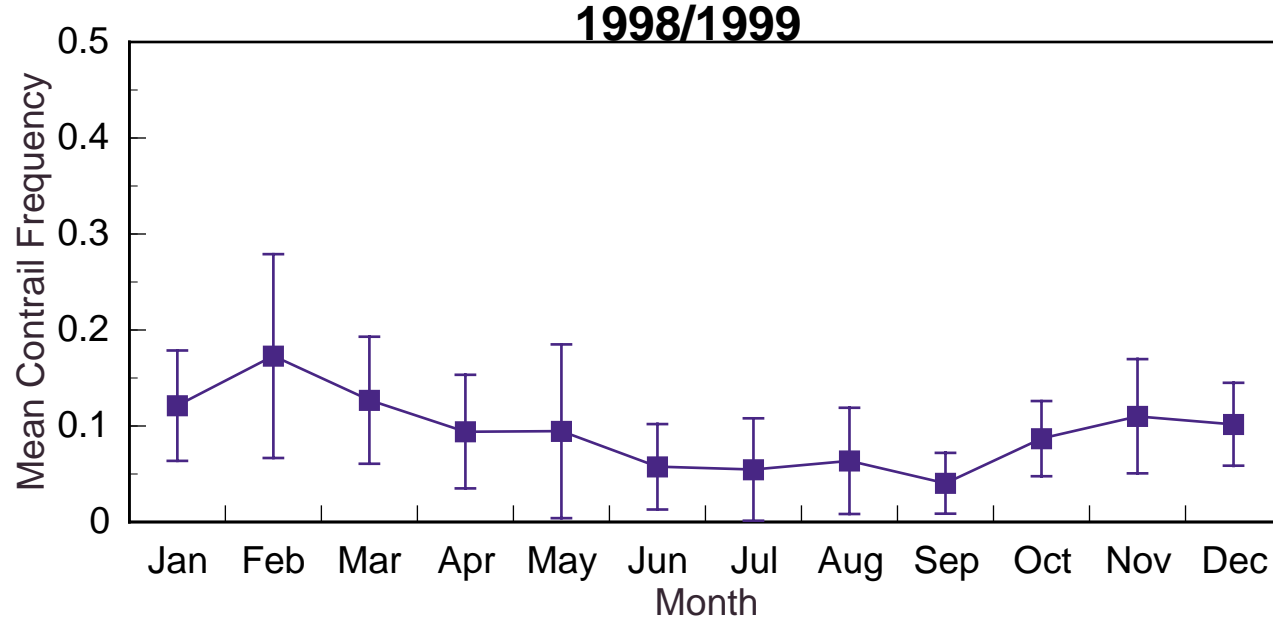
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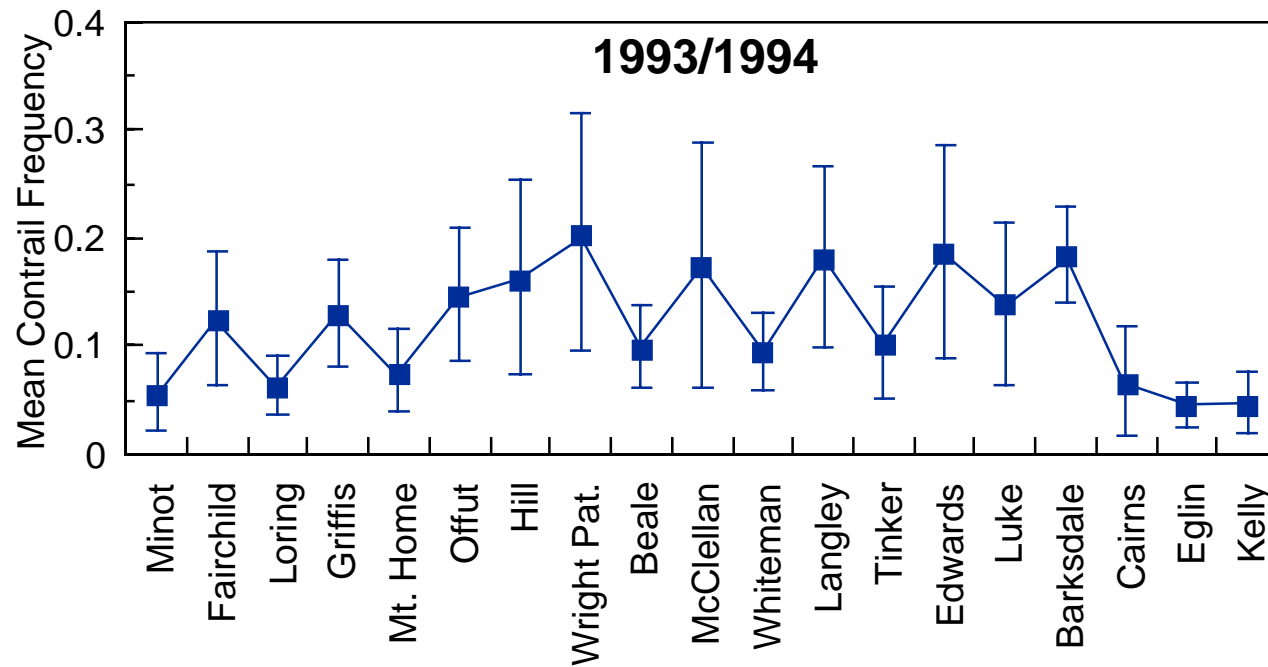
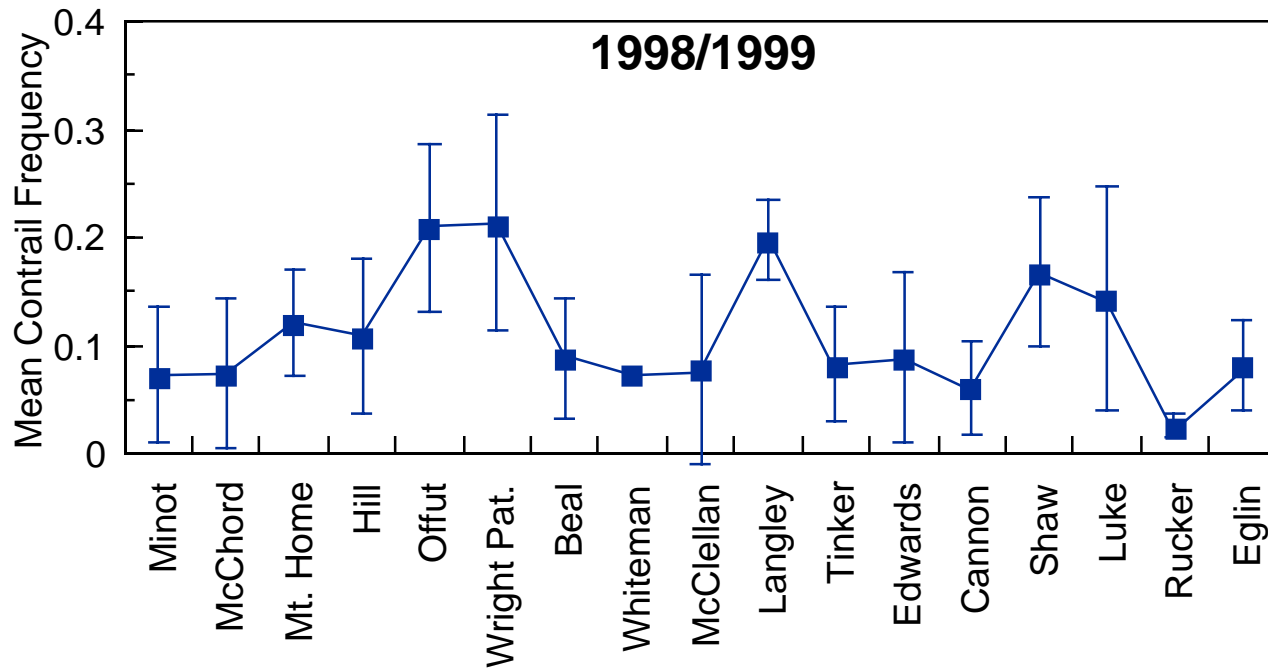
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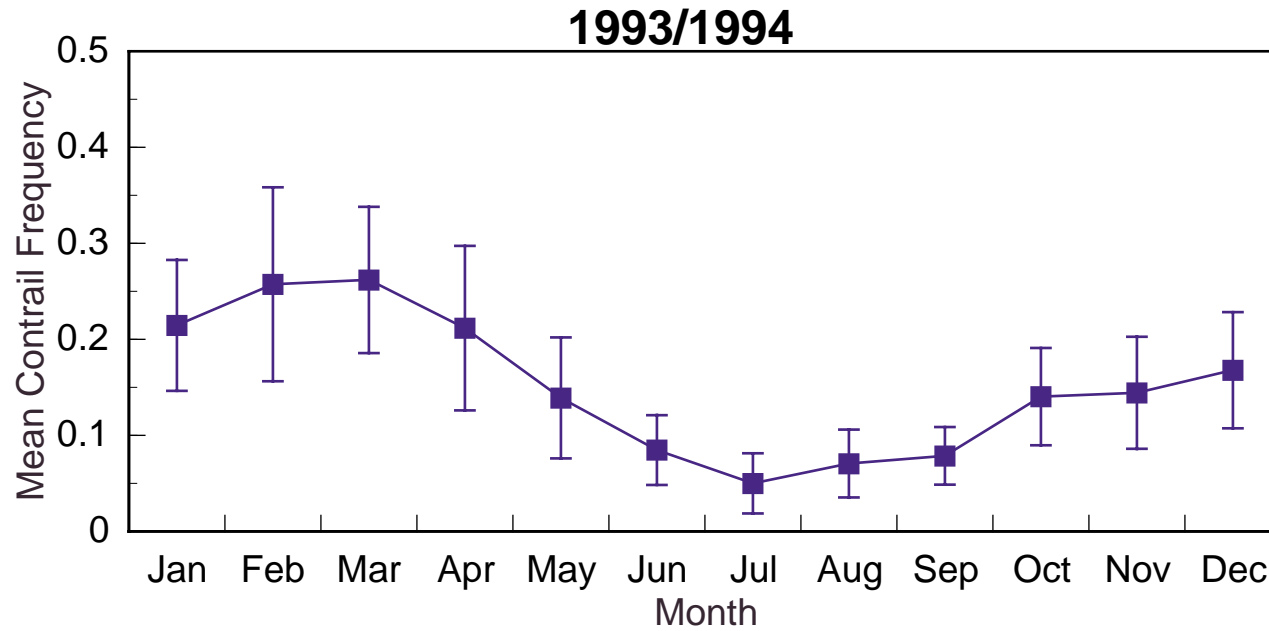
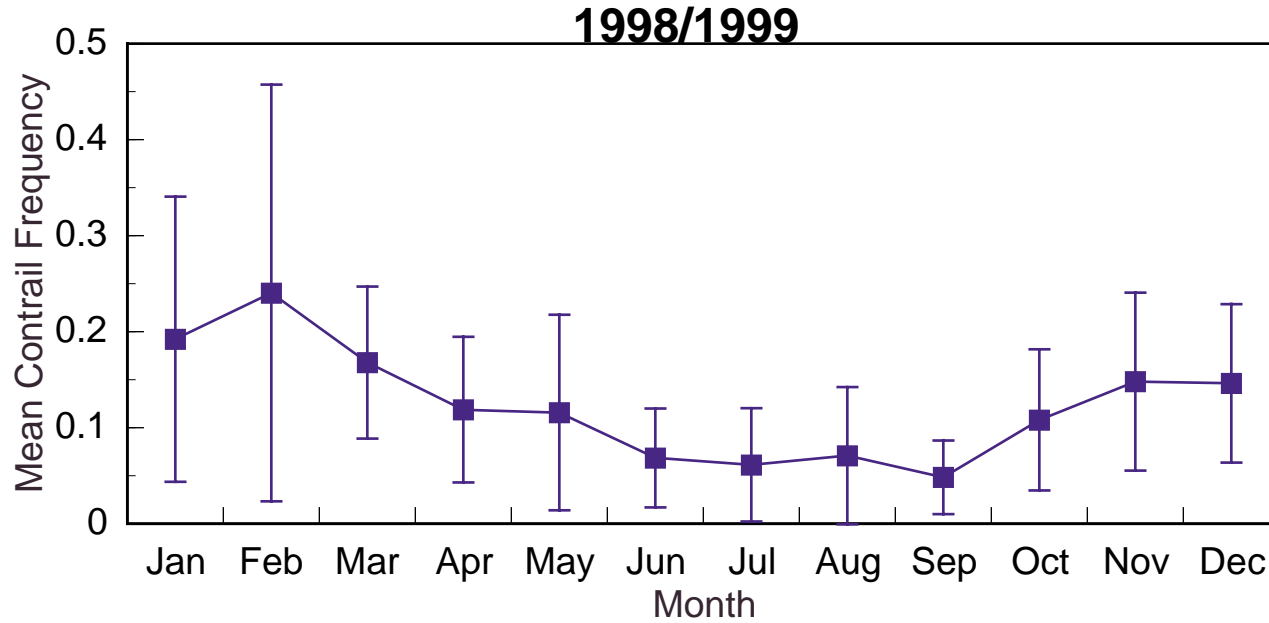
Monthly Mean Persistent Contrail Frequency (All Daytime Data)



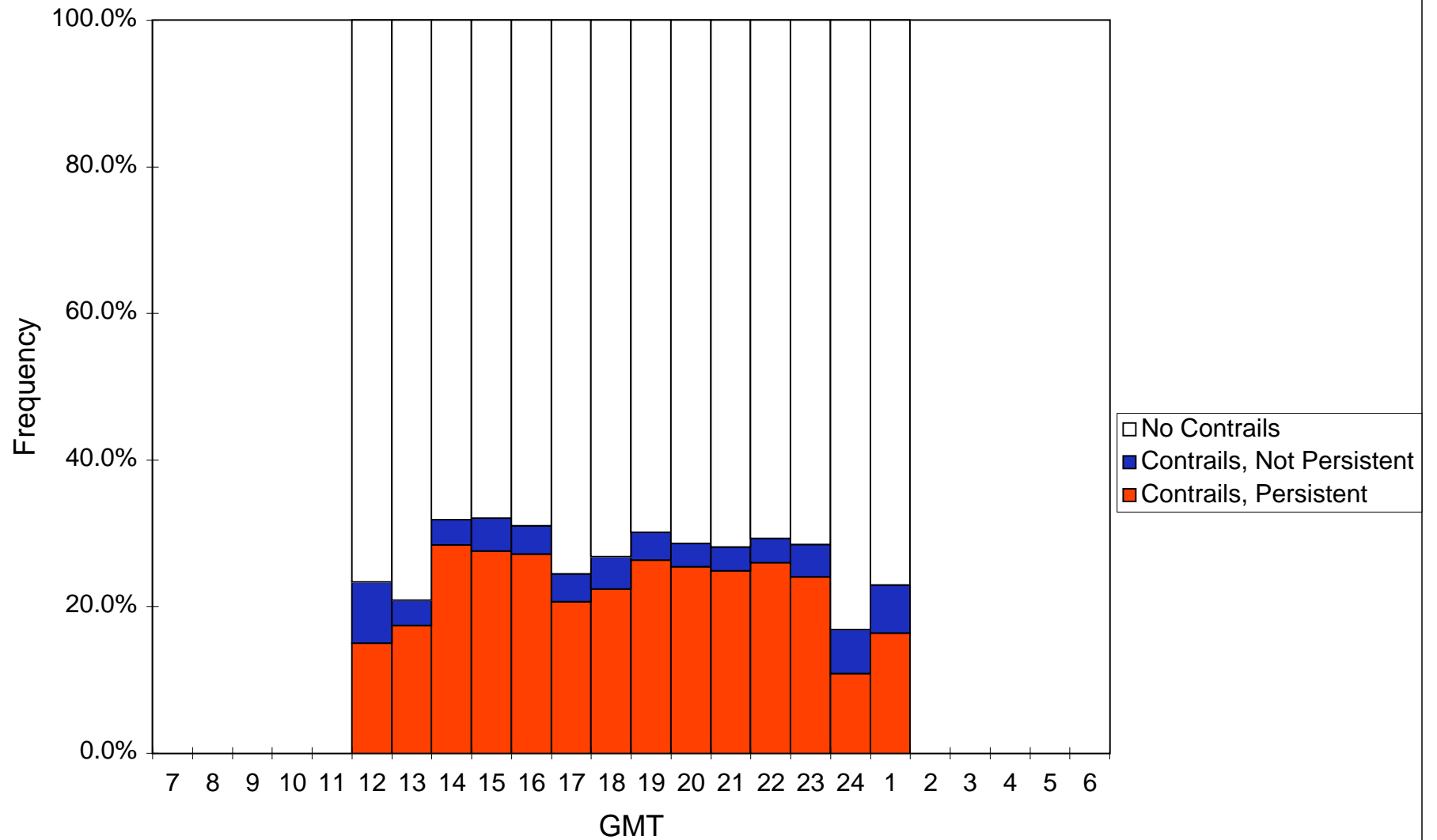
Mean Monthly Total Contrail Frequency (All Daytime Data)



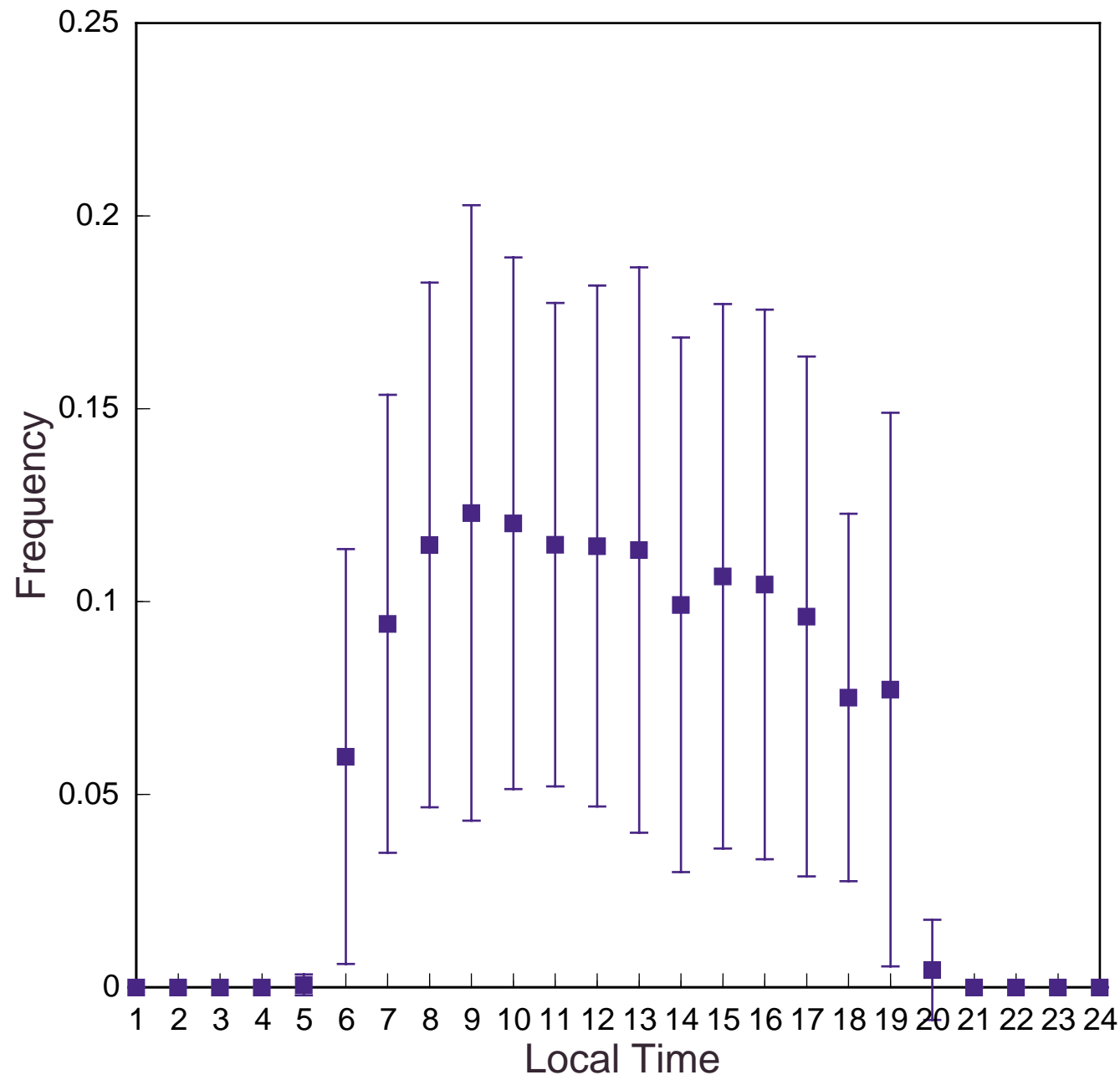
Monthly Mean Persistent Contrail Frequency (Indeterminate Data Excluded)



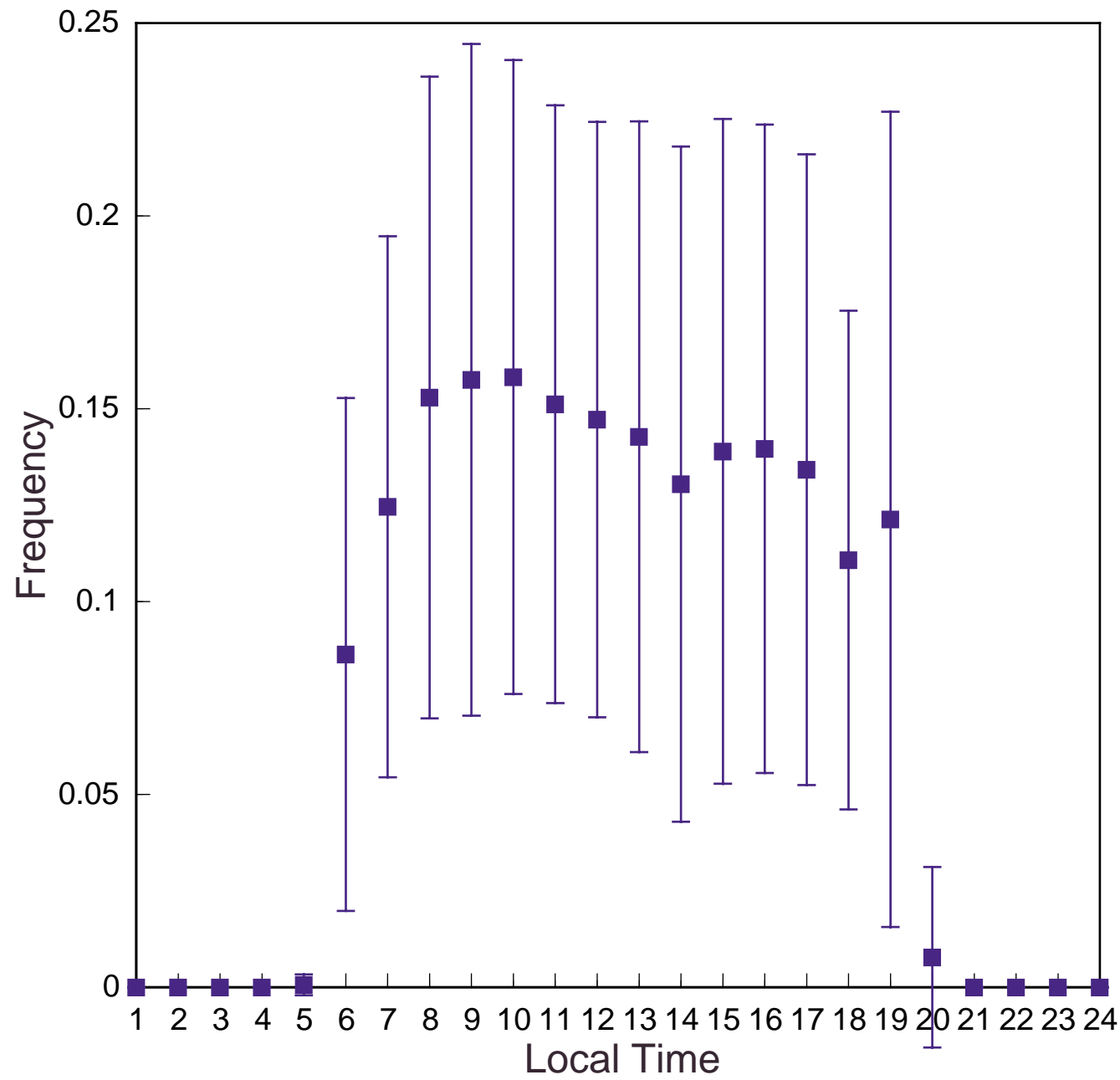
Wright Patterson AFB Hourly Contrail Data



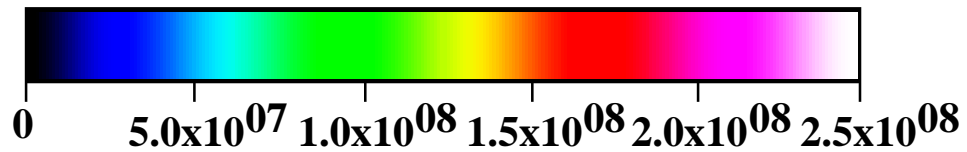
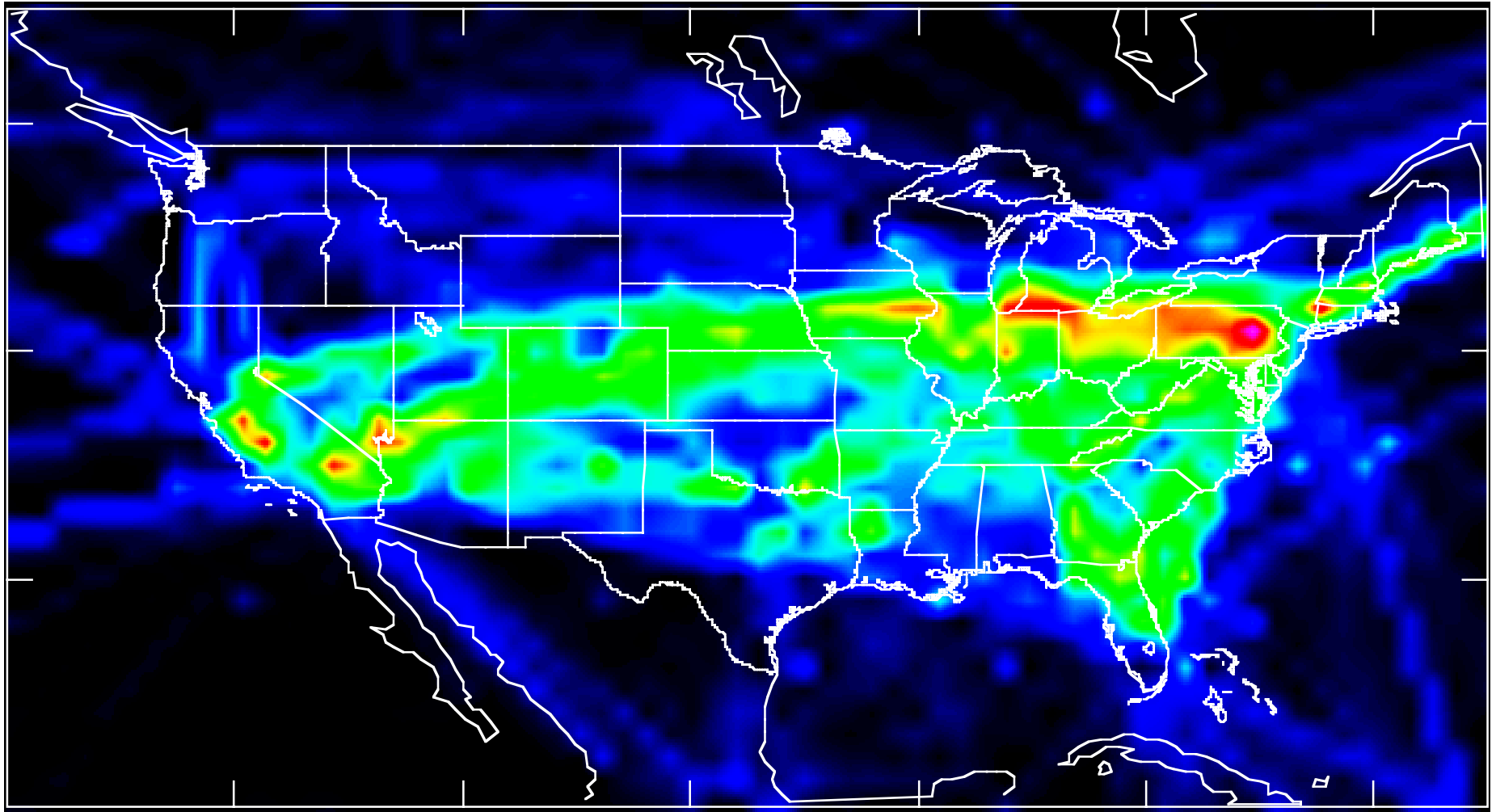
Mean Hourly Persistent Contrail Frequency (98/99)



Mean Hourly Total Contrail Frequency (98/99)

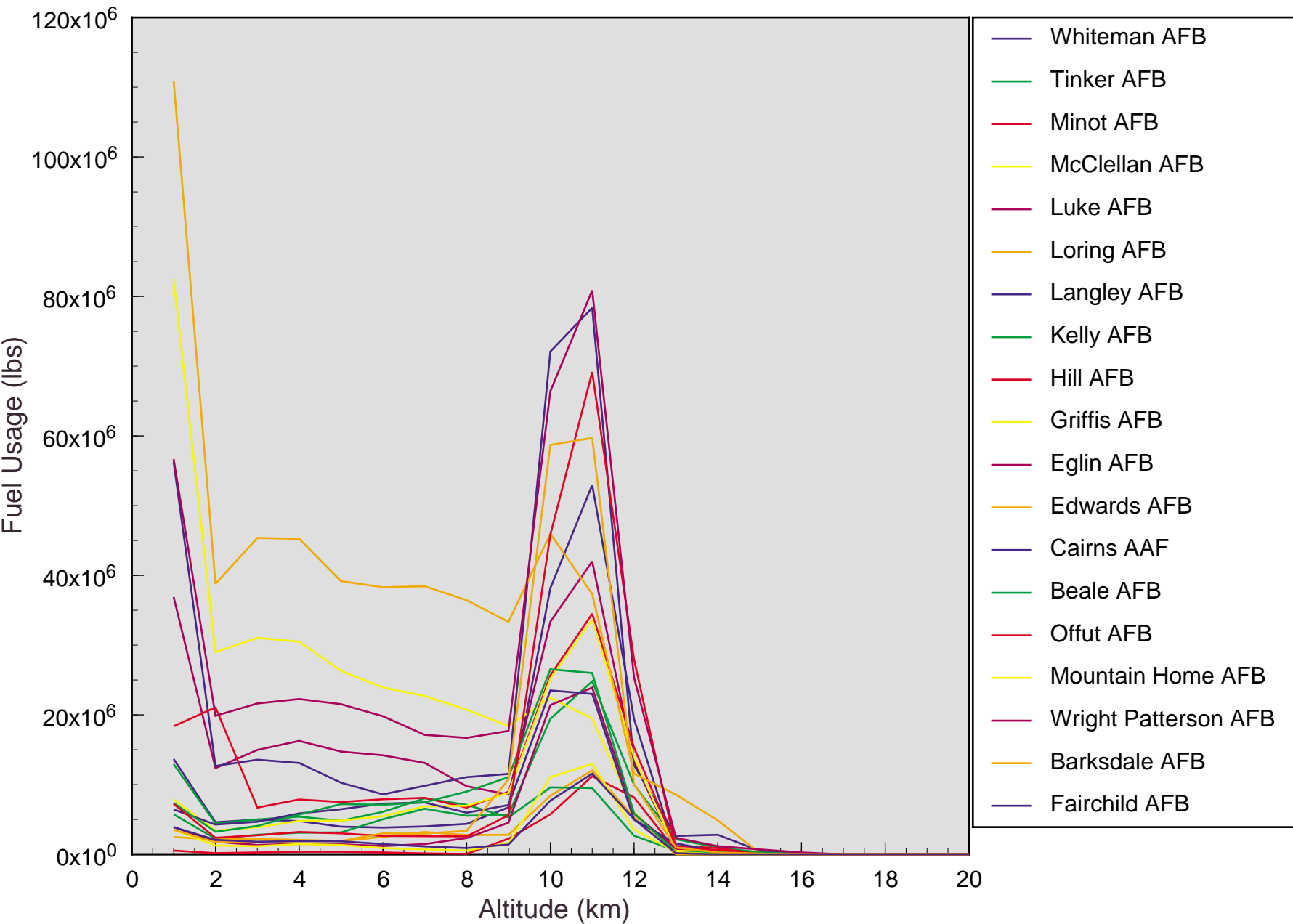


1990 Aircraft Fleet Fuel Usage Above 7 Kilometers

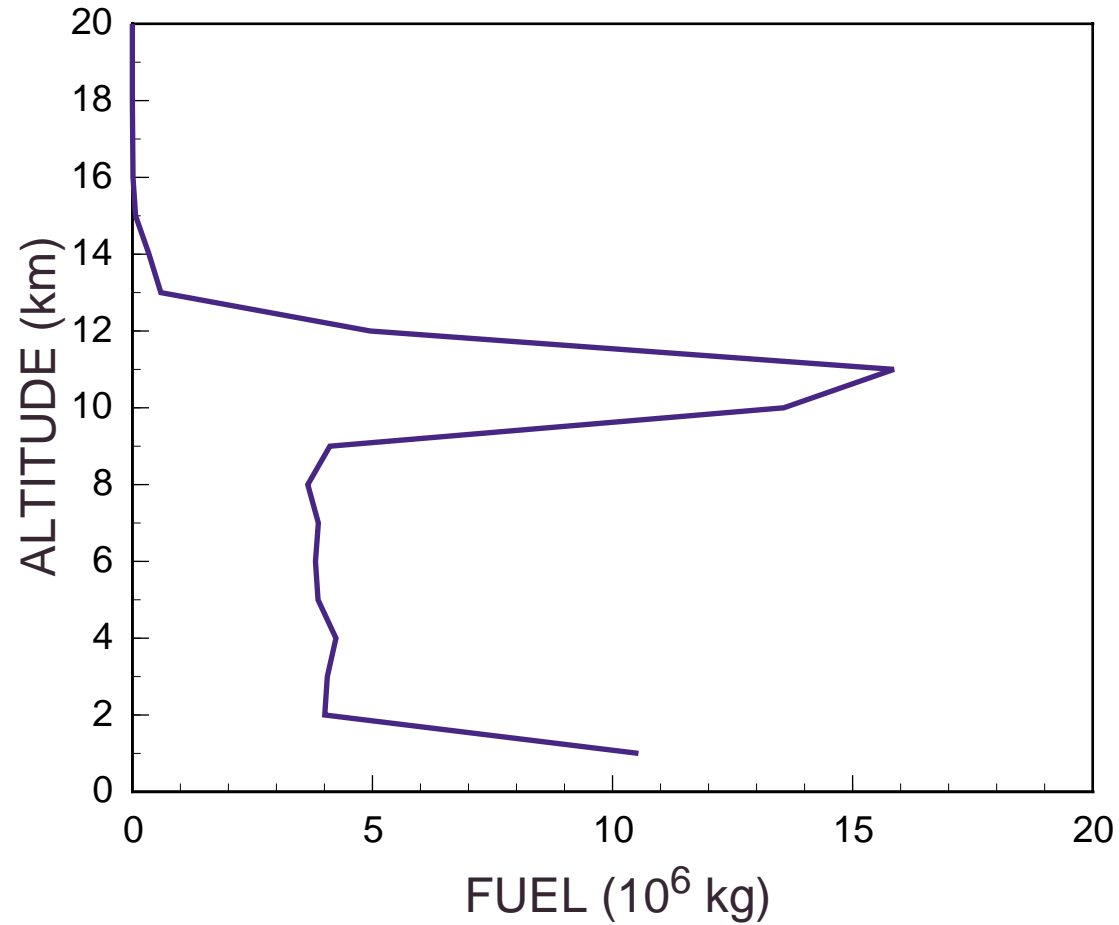


Fuel Use (lbs)

Fuel Usage Profiles

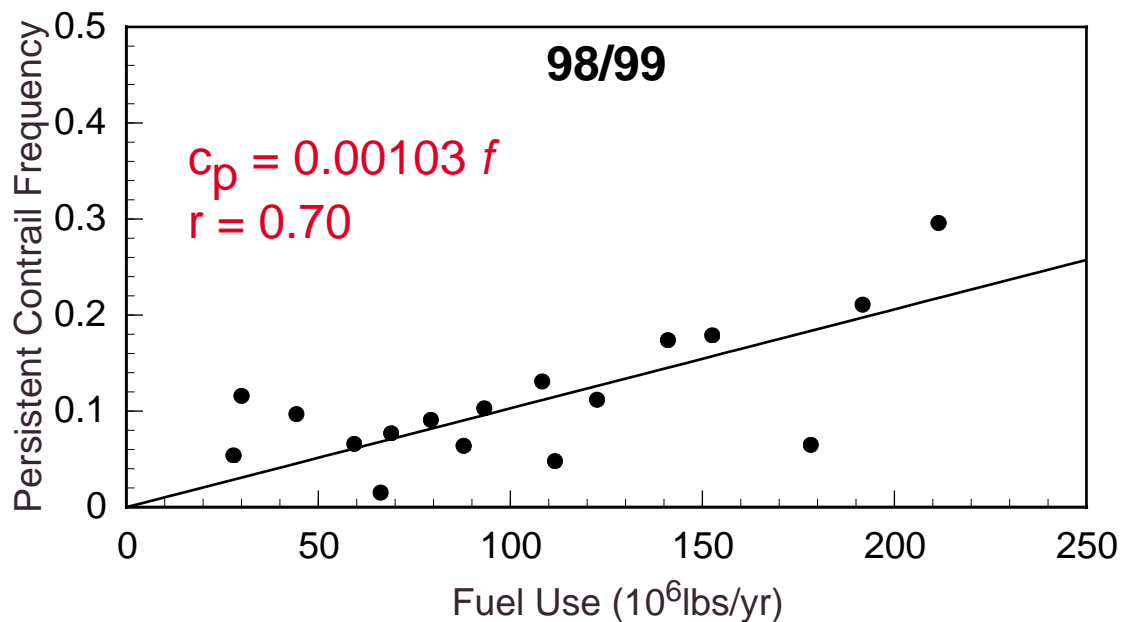
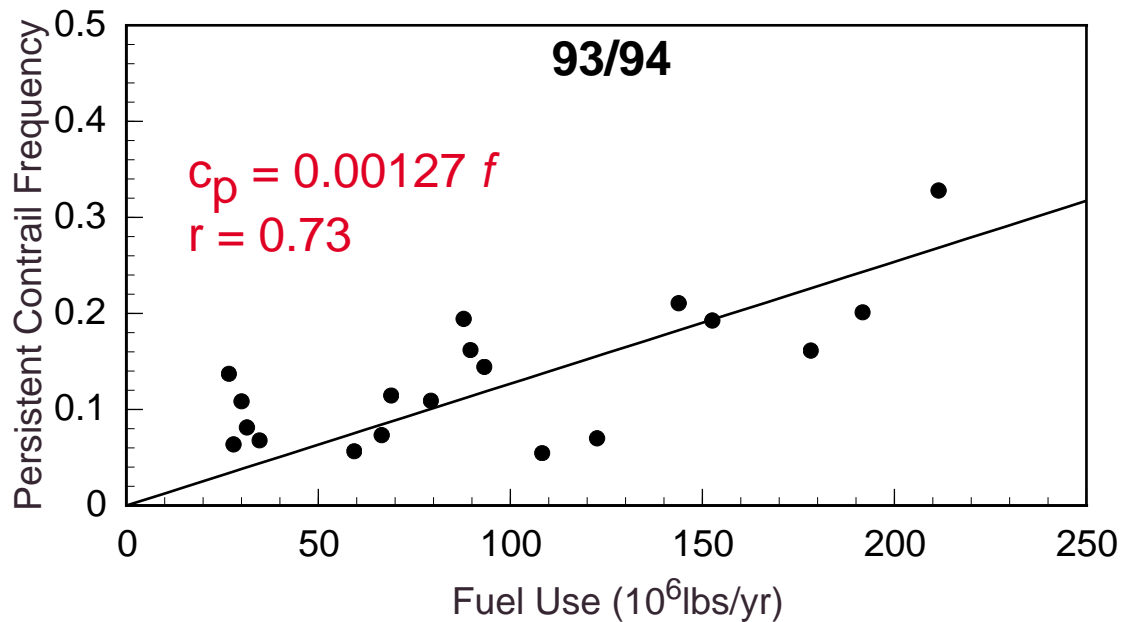


Vertical distribution of annual mean fuel use for 3° lat-lon boxes centered over the 93/94 surface sites

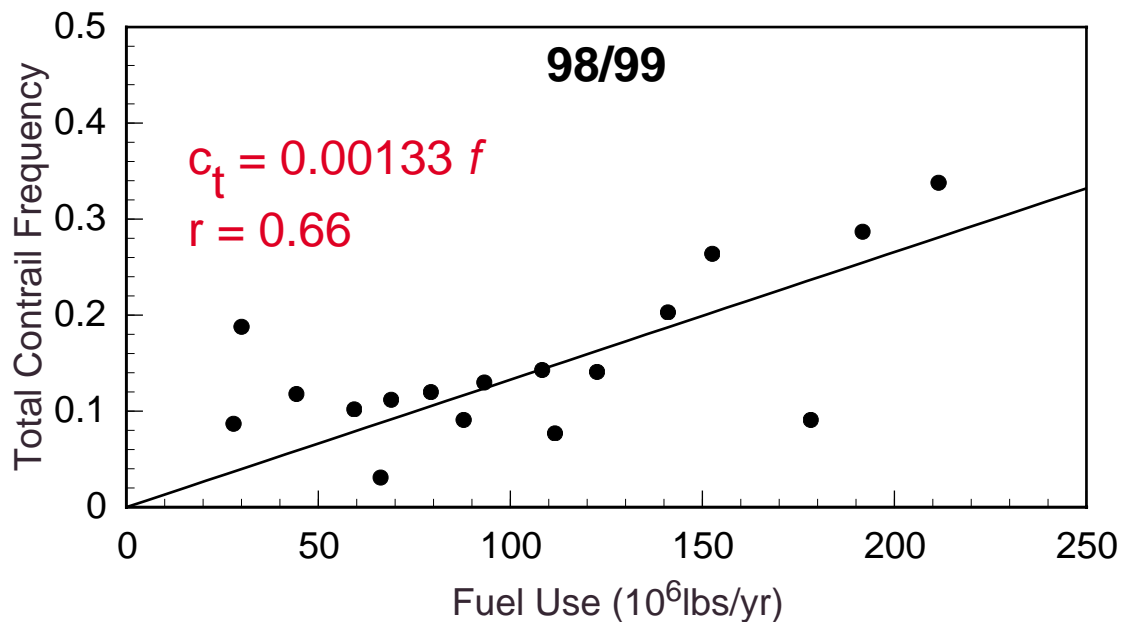
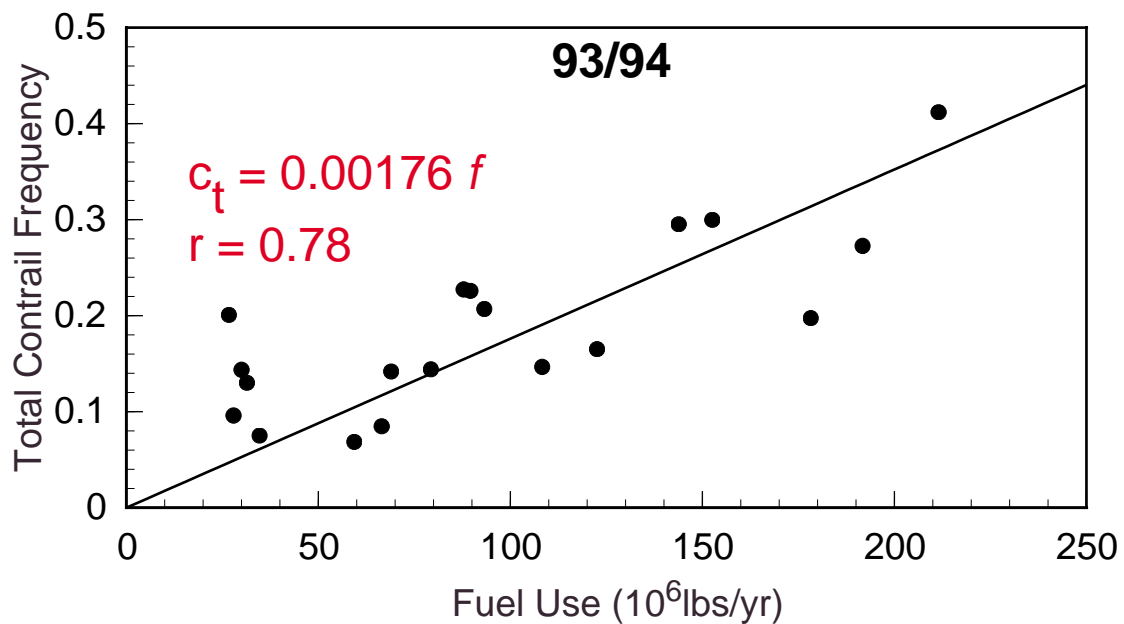


based on May 1990 data from Baughcum et al. (1993).

Persistent Contrail Frequency as a Function of Fuel Use



Total Contrail Frequency as a Function of Fuel Use



Conclusions

- 93/94 results show that a random observer anywhere in the US has a 8.5% chance of seeing a contrail
- 98/99 results show that a random observer anywhere in the US has a 6.8% chance of seeing a contrail
- February is the month with the highest contrail frequency for both the 93/94 and the 98/99 data
- July is the month with the lowest contrail frequency for the 93/94 data
- September is the month with the lowest contrail frequency for the 98/99 data
- Results from 98/99 data are very similar to those from the 93/94 data
- Due to various uncertainties the overall differences between the 93/94 and 98/99 data are insignificant