

Multivariate GeoSpatial Evaluation of Land and Airspace Encroachment Issues

**Relating to
Military Value Criteria
By**

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Major Encroachment Issues

-  **Airspace competition**
-  **Availability of land**
-  **Population density and related commercial or residential development**
-  **Land and airspace to accommodate contingency, mobilization and future total force requirements**
-  **Climate that can adversely affect high priority training, mobilization and other military operations**

Data Sources



DoD



USAF



US Army



US Navy



US Marines



NGA



NASA



NOAA



FAA



BLM



USGS



Bureau of The Census



Airspace competition and encroachment

Sufficient Land and Airspace to meet DOD Requirements:

-  **Training**
-  **Mobilization;**
-  **Future total force Requirements; and**
-  **Contingency.**

MOAs and Restricted Airspace



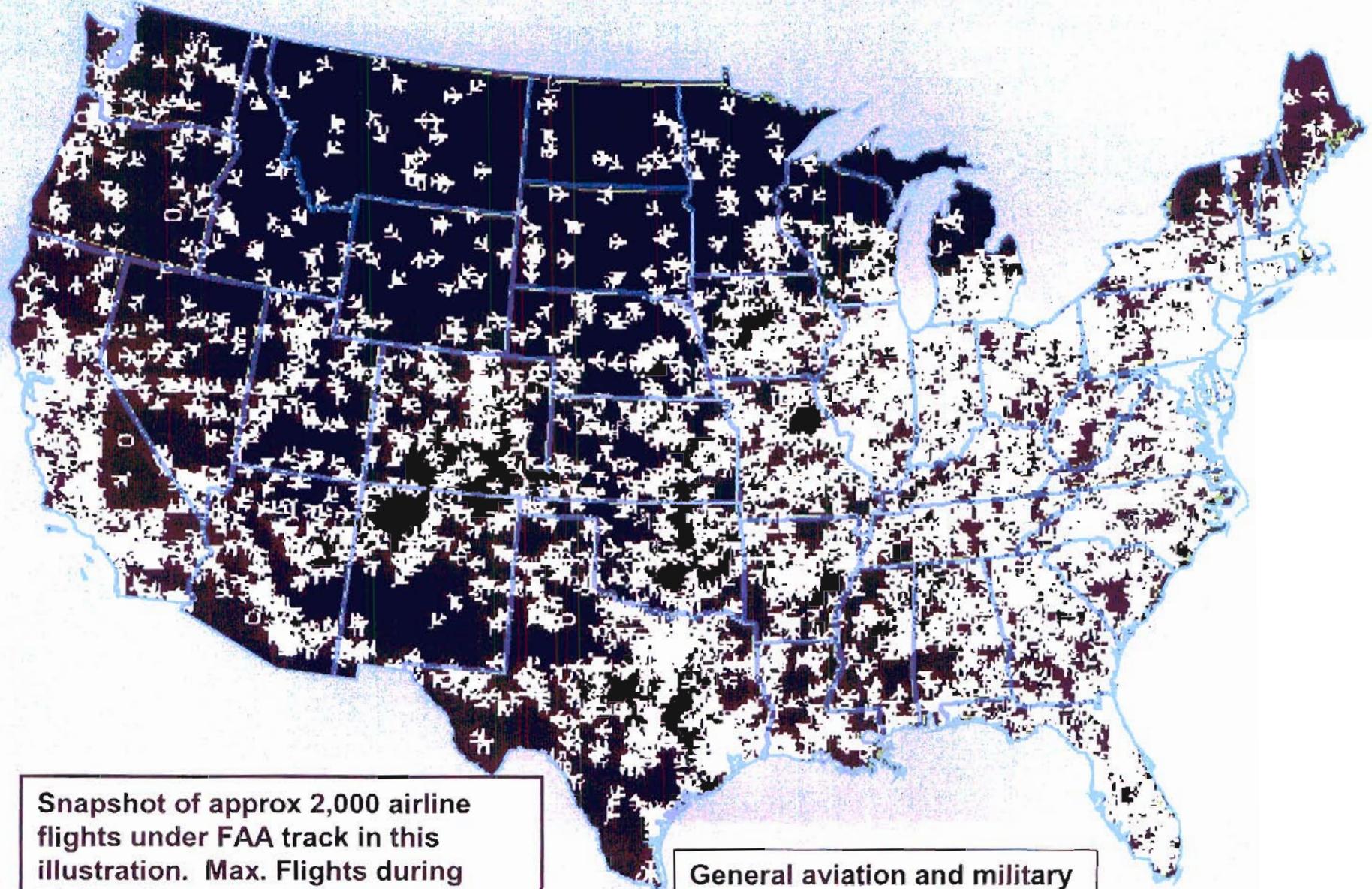
Legend

DAFIF: Restricted Use Airspace

TYPE

-  Military Airspace
-  Restricted Airspace

Airspace Competition from Commercial Airlines



Snapshot of approx 2,000 airline flights under FAA track in this illustration. Max. Flights during high traffic periods would be twice this number or approx. 4,000 flights

General aviation and military traffic not included in this illustration

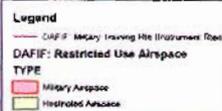
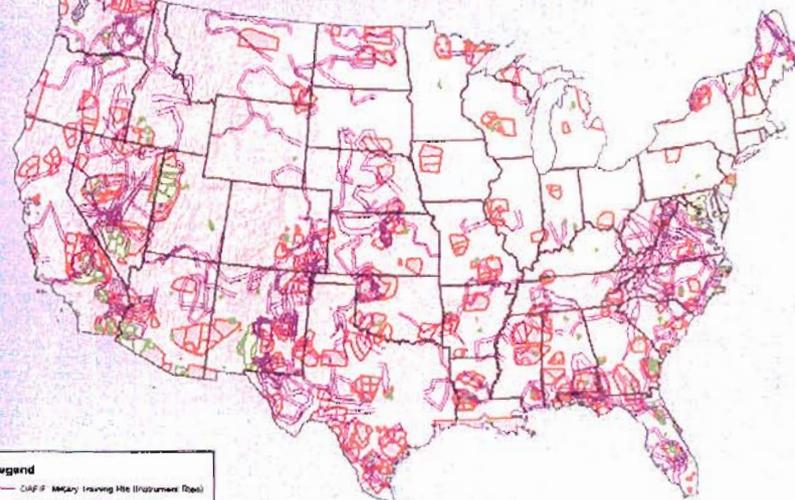
Military Training Routes

- Instrument

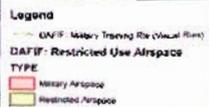
- VFR

- Slow

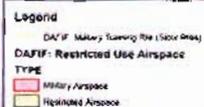
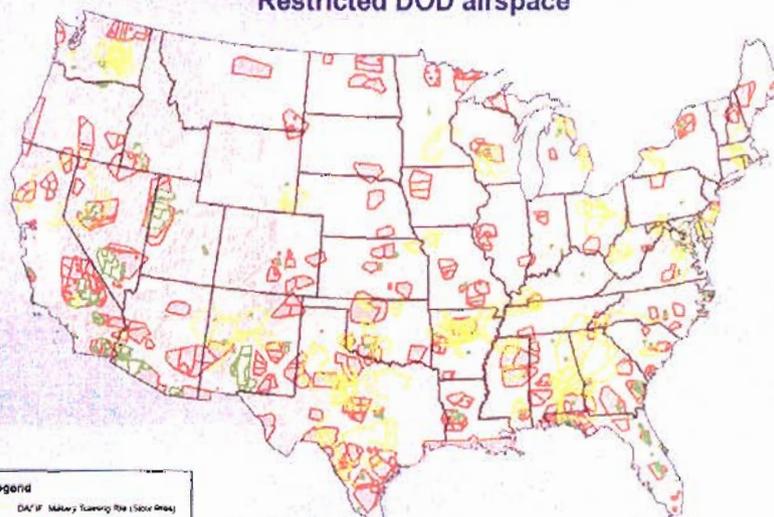
Instrument Training Routes overlaid on MOAs and Restricted DOD airspace



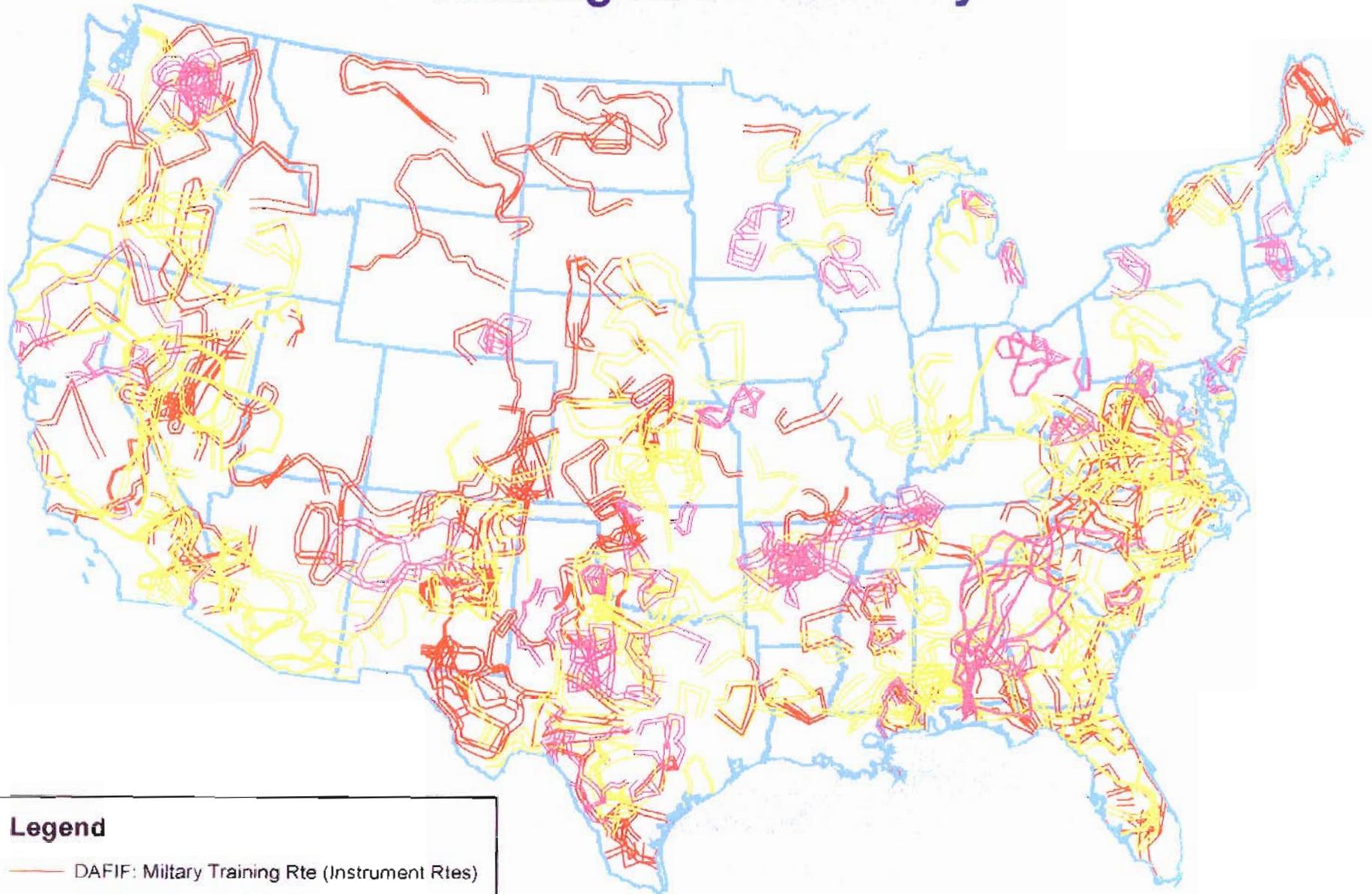
VFR Training Routes overlaid on MOAs and Restricted DOD airspace



Slow Training Routes overlaid on MOAs and Restricted DOD airspace



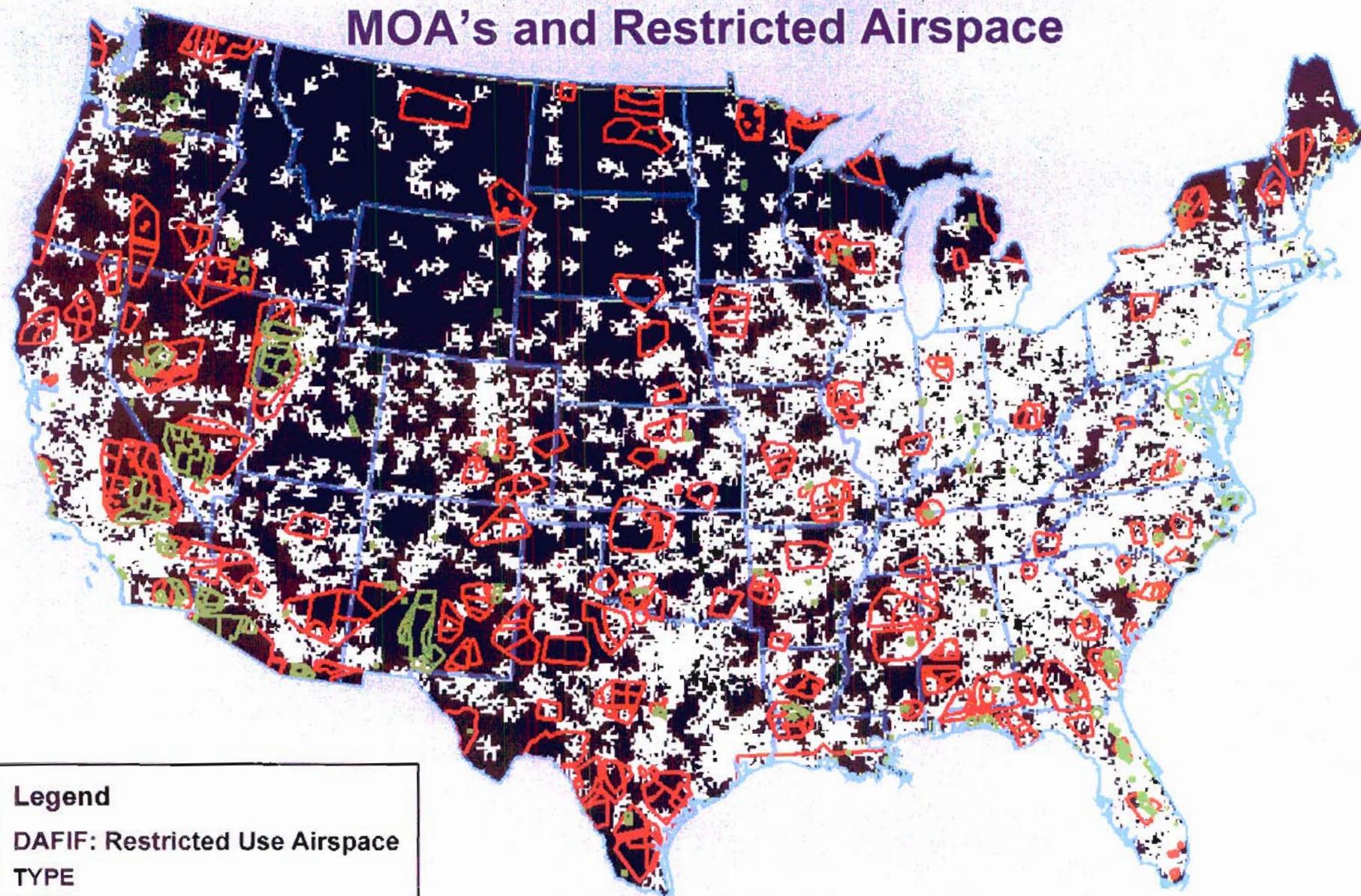
Training Routes Overlay



Legend

- DAFIF: Military Training Rte (Instrument Rtes)
- DAFIF: Military Training Rte (Visual Rtes)
- DAFIF: Military Training Rte (Slow Rtes)

Commercial Airline Flights Overlaid on MOA's and Restricted Airspace



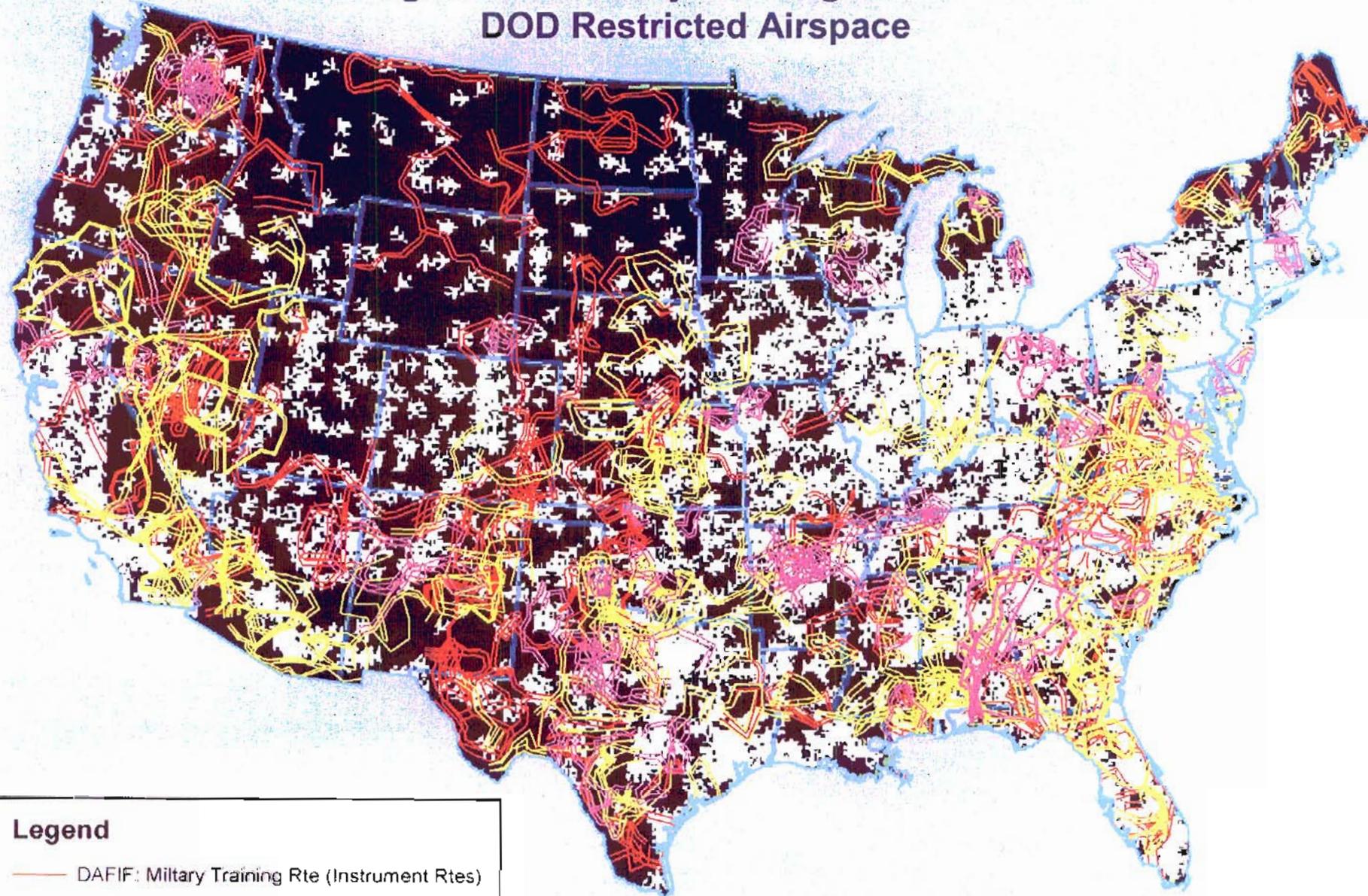
Legend

DAFIF: Restricted Use Airspace

TYPE

-  Military Airspace
-  Restricted Airspace

Commercial Airline Flights and Military Training Routes Overlaid on MOAs and DOD Restricted Airspace



Legend

- DAFIF: Military Training Rte (Instrument Rtes)
- DAFIF: Military Training Rte (Visual Rtes)
- DAFIF: Military Training Rte (Slow Rtes)

Commercial, Military and Private Airports Overlaid on MOAs and Restricted Airspace. Gray and blue dots indicate areas of heaviest general aviation traffic.



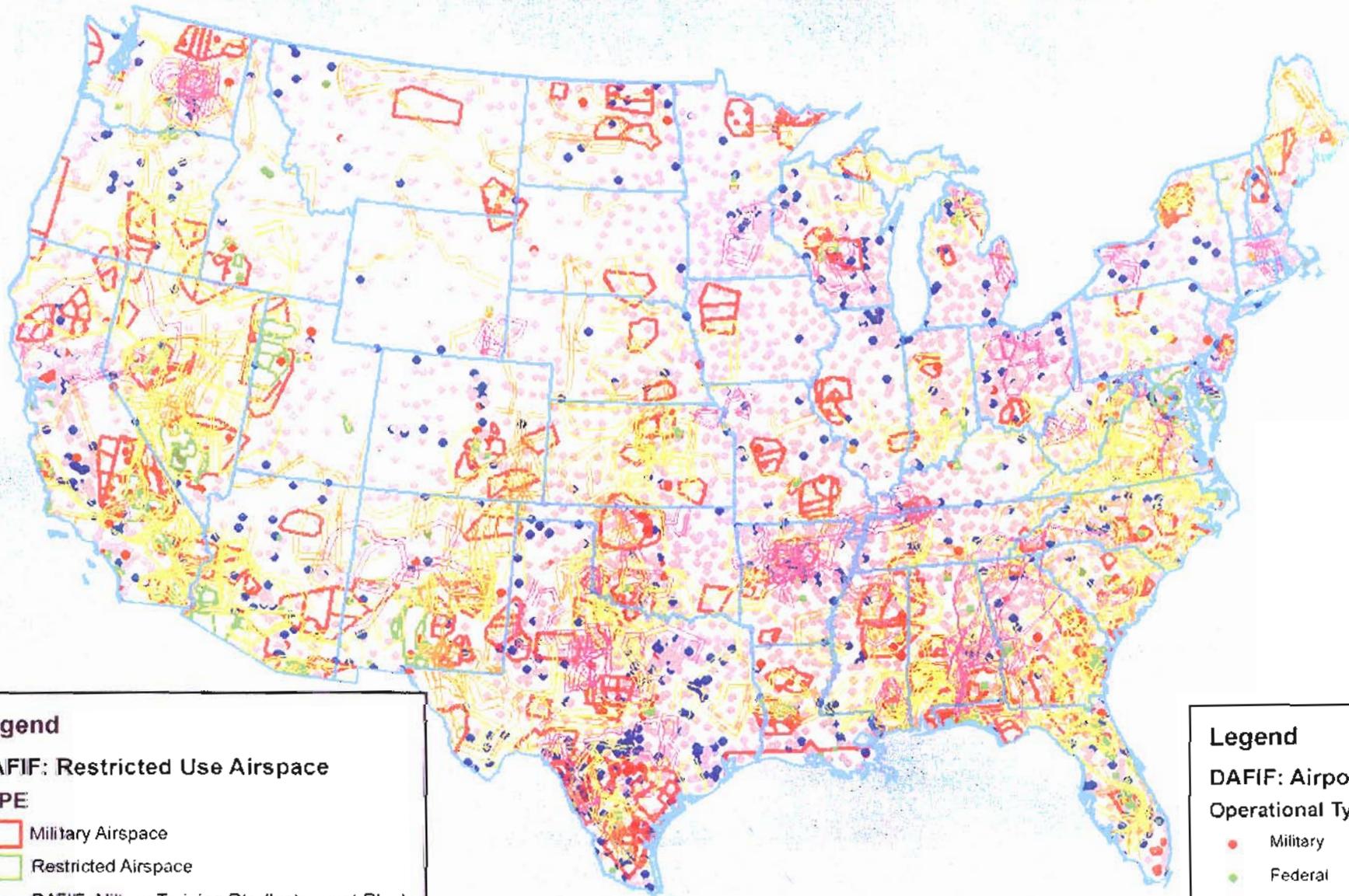
Legend
DAFIF: Restricted Use Airspace
TYPE

- Military Airspace
- Restricted Airspace

Legend
DAFIF: Airports
Operational Type

- Military
- Federal
- Joint: Military/Public
- Public (Municipal)
- Private

Commercial, Military and Private Airports Plus Military Training Routes Overlaid on MOAs and DOD Restricted Airspace



Legend

DAFIF: Restricted Use Airspace

TYPE

- Military Airspace
- Restricted Airspace
- DAFIF: Military Training Rte (Instrument Rtes)
- DAFIF: Military Training Rte (Visual Rtes)
- DAFIF: Military Training Rte (Slow Rtes)

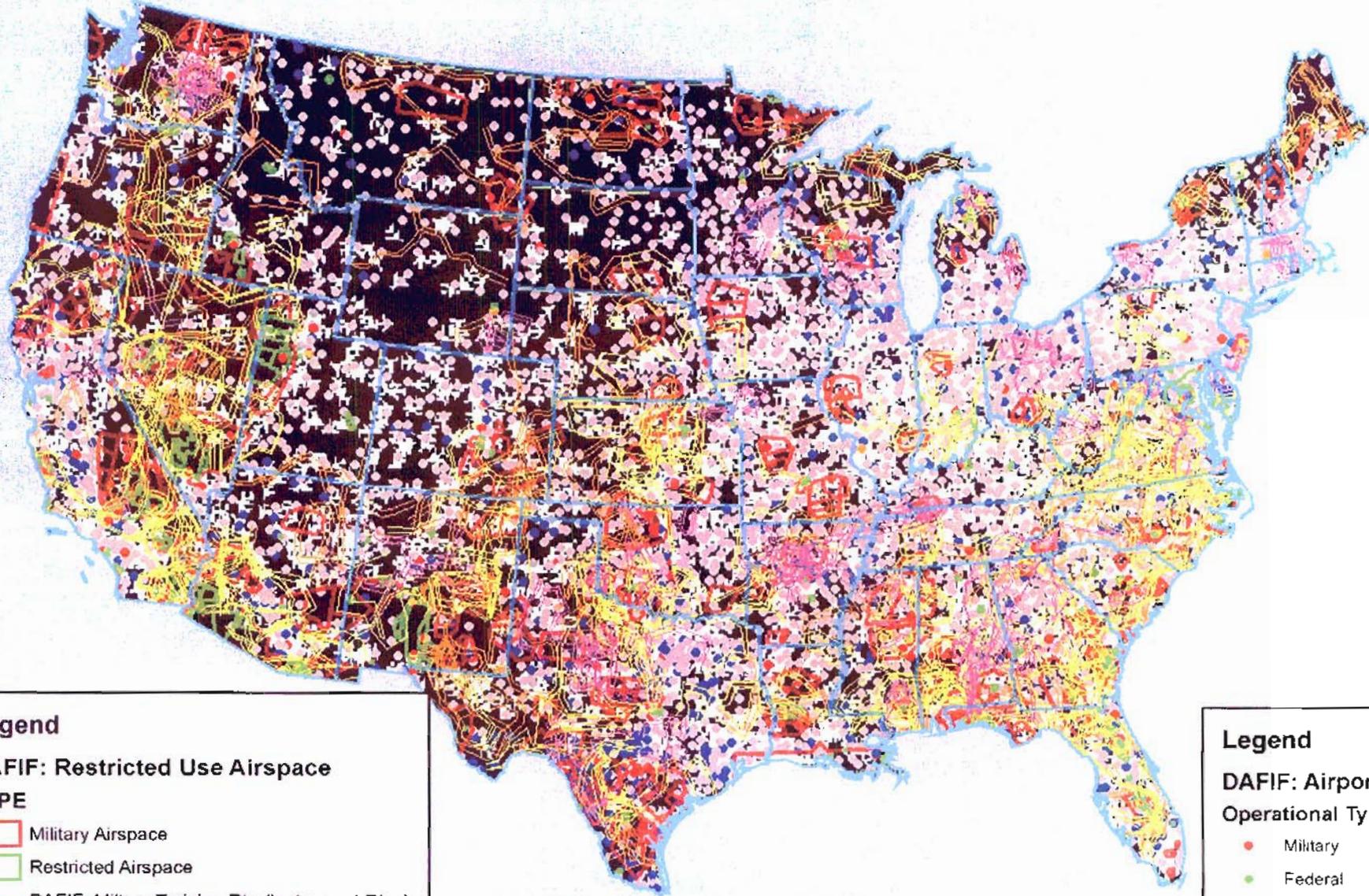
Legend

DAFIF: Airports

Operational Type

- Military
- Federal
- Joint: Military/Public
- Public (Municipal)
- Private

Commercial, Military and Private Airports, Airline Traffic, Plus Military Training Routes Overlaid on MOAs and Restricted Airspace



Legend

DAFIF: Restricted Use Airspace
TYPE

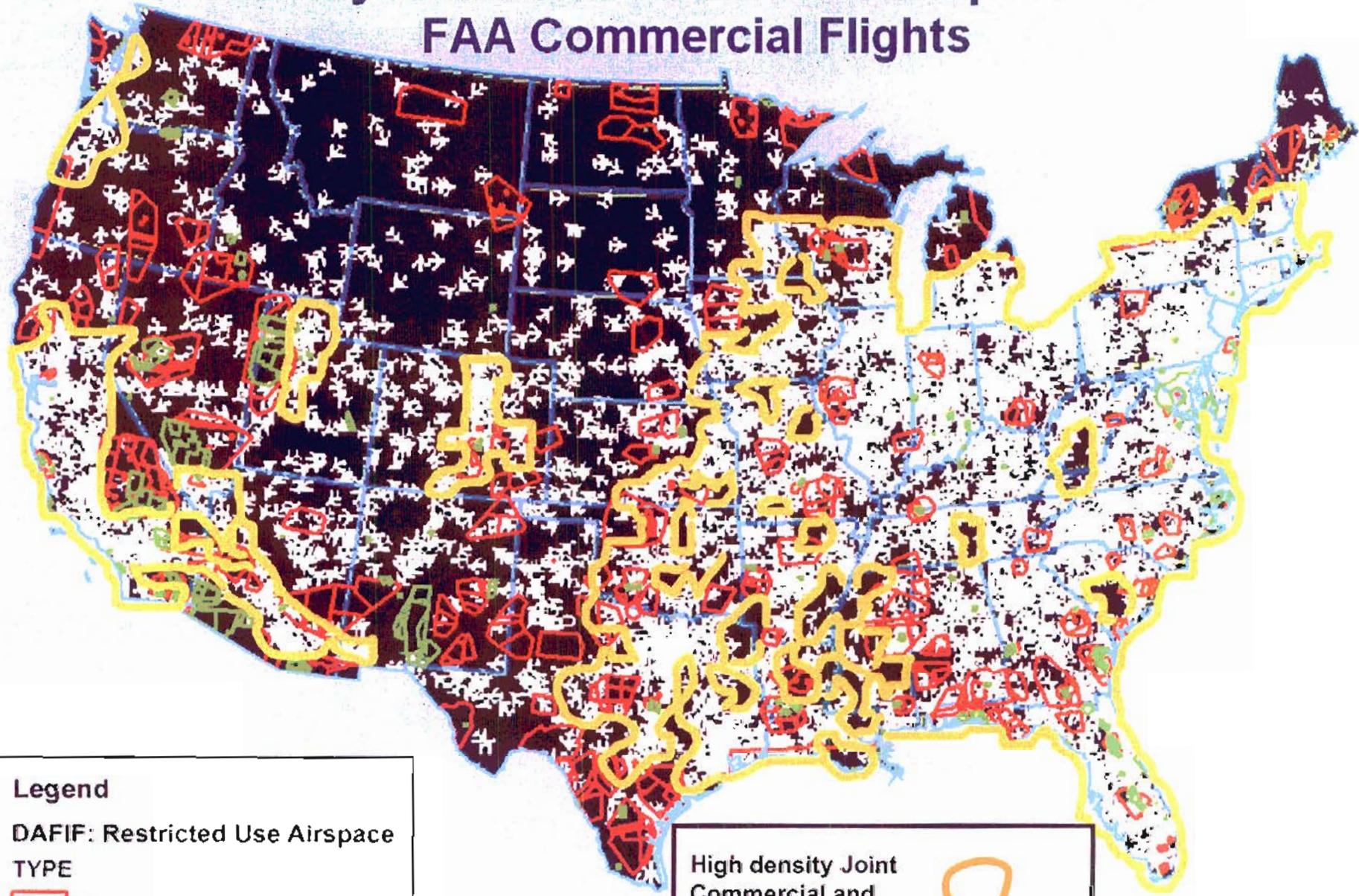
- Military Airspace
- Restricted Airspace
- DAFIF: Military Training Rte (Instrument Rtes)
- DAFIF: Military Training Rte (Visual Rtes)
- DAFIF: Military Training Rte (Slow Rtes)

Legend

DAFIF: Airports
Operational Type

- Military
- Federal
- Joint: Military/Public
- Public (Municipal)
- Private

Military and Other Restricted Airspace with FAA Commercial Flights



Legend

DAFIF: Restricted Use Airspace

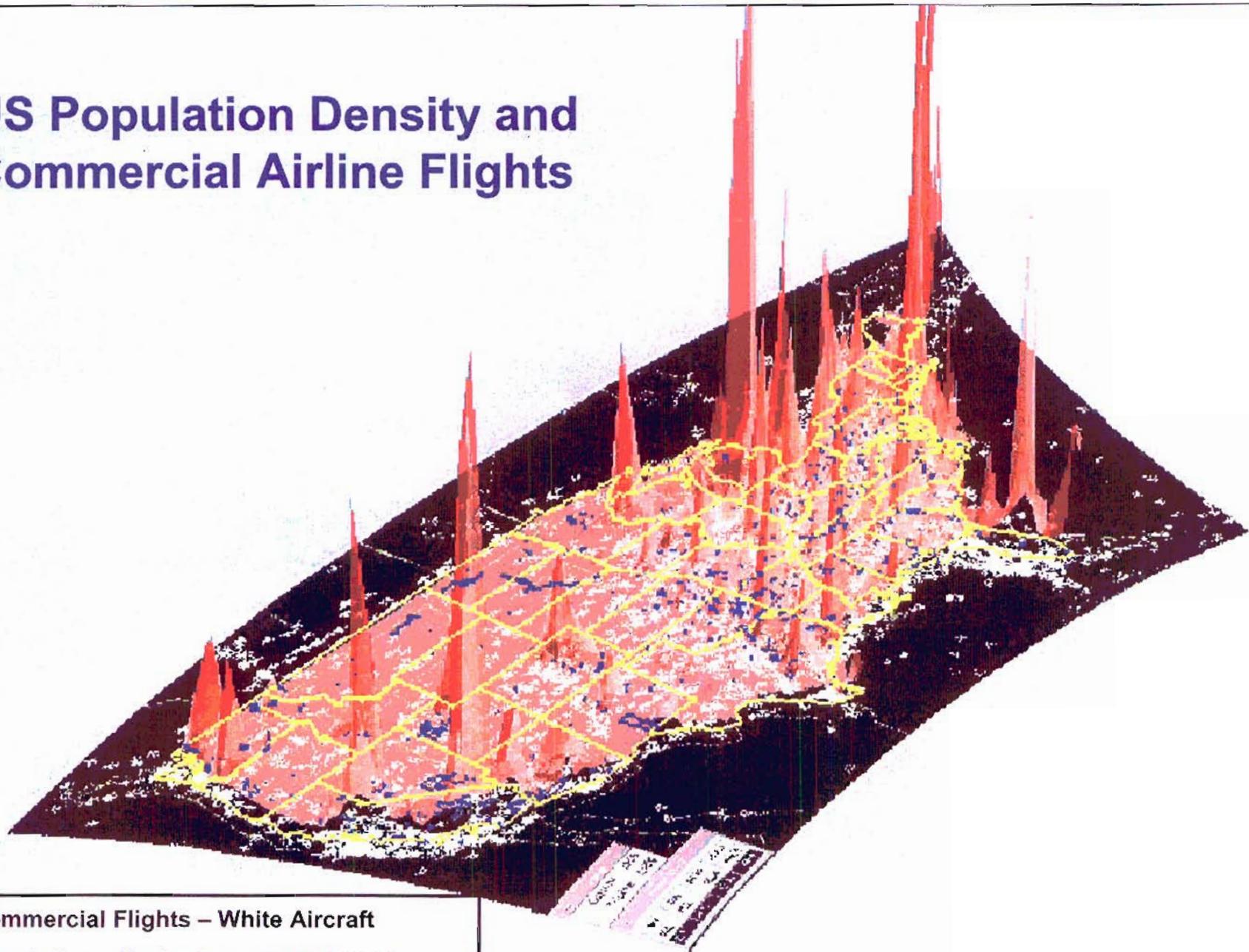
TYPE

-  Military Airspace
-  Restricted Airspace

High density Joint
Commercial and
Military Airspace



US Population Density and Commercial Airline Flights



Commercial Flights – White Aircraft
Population – Peaks in 3 – D Red shades
Military Bases in Blue



Encroachment on the Ground

 **Availability of land**

 **Population density and related commercial or residential development**

Location of Military Bases by Branch



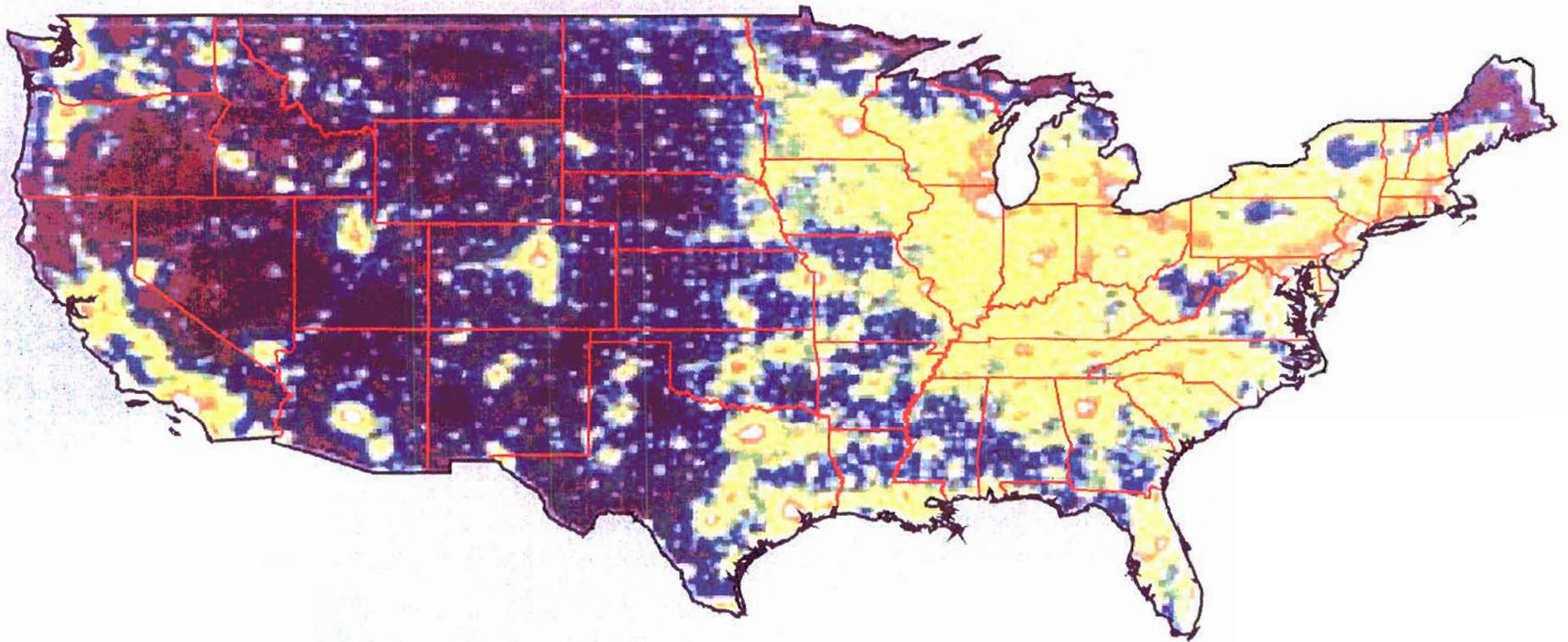
Legend

Military Bases Branch

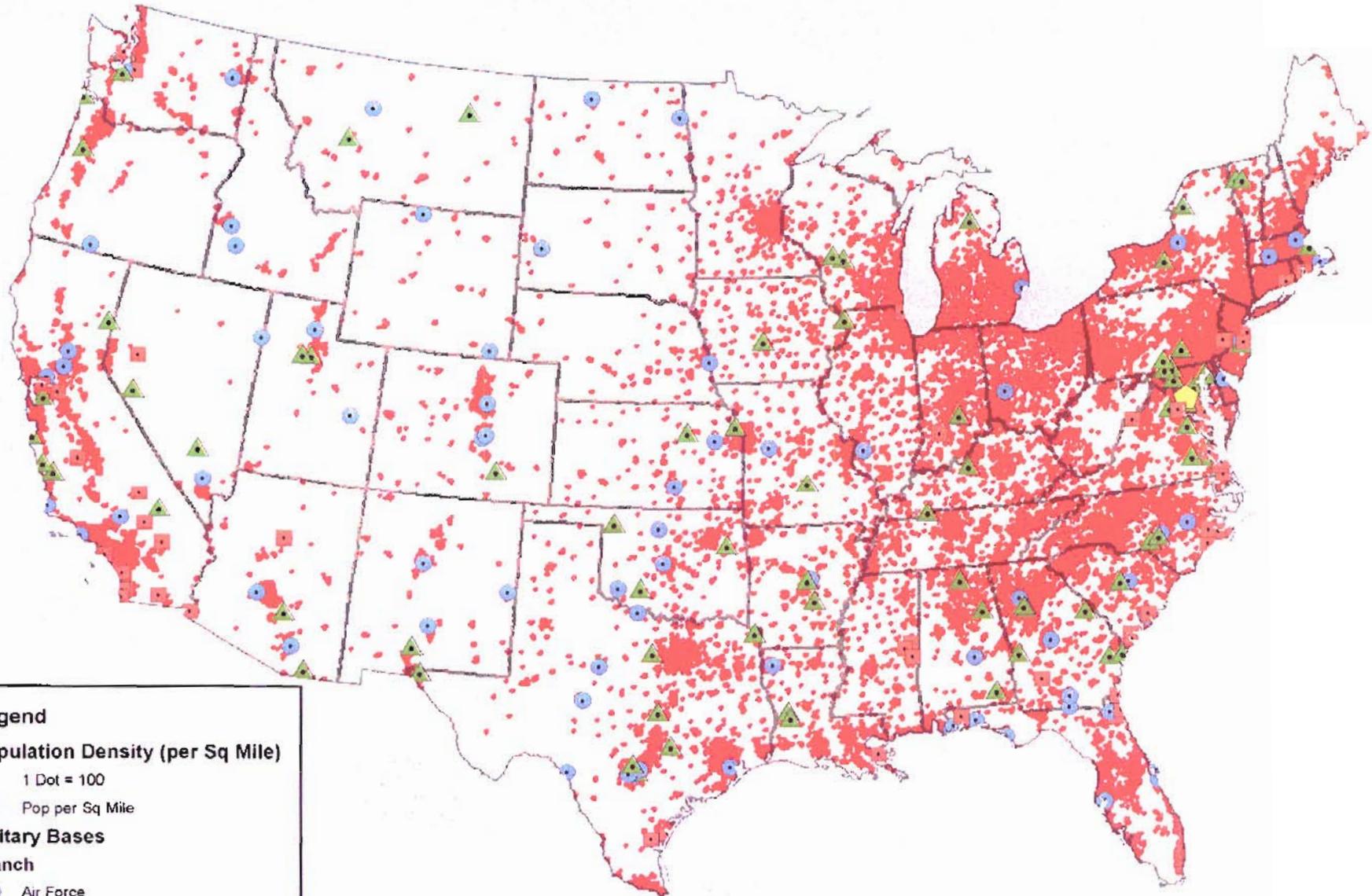
- Air Force
- ▲ Army
- Navy
- ⬠ Pentagon

Light and Population

Light Intensity From Space Illustrating Population
Density Of The United States As Viewed From A NASA Satellite



Population One Dot = 100 Or More Persons Per Square Mile



Legend

Population Density (per Sq Mile)

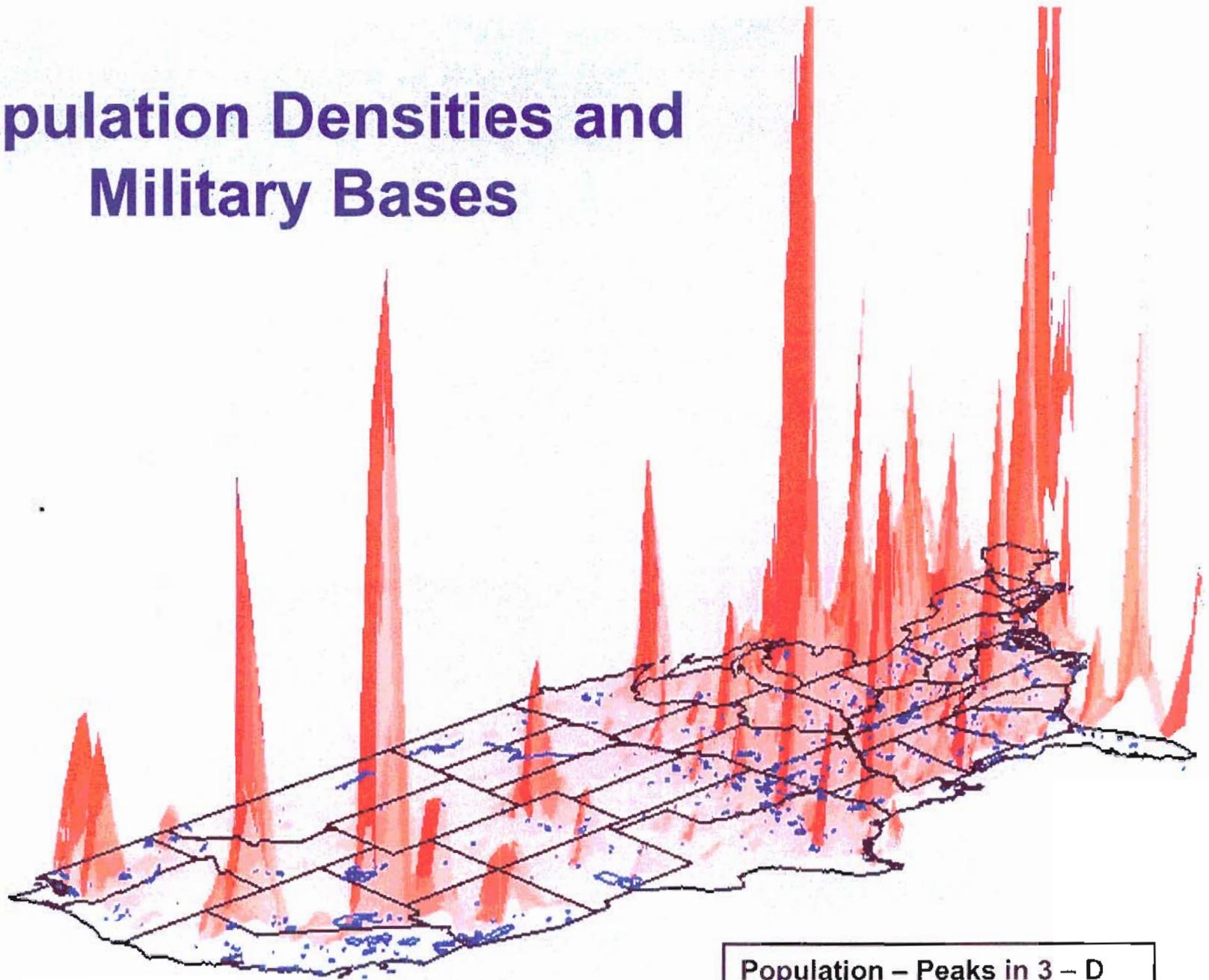
- 1 Dot = 100
- Pop per Sq Mile

Military Bases

Branch

- Air Force
- Army
- Navy
- Pentagon

Population Densities and Military Bases



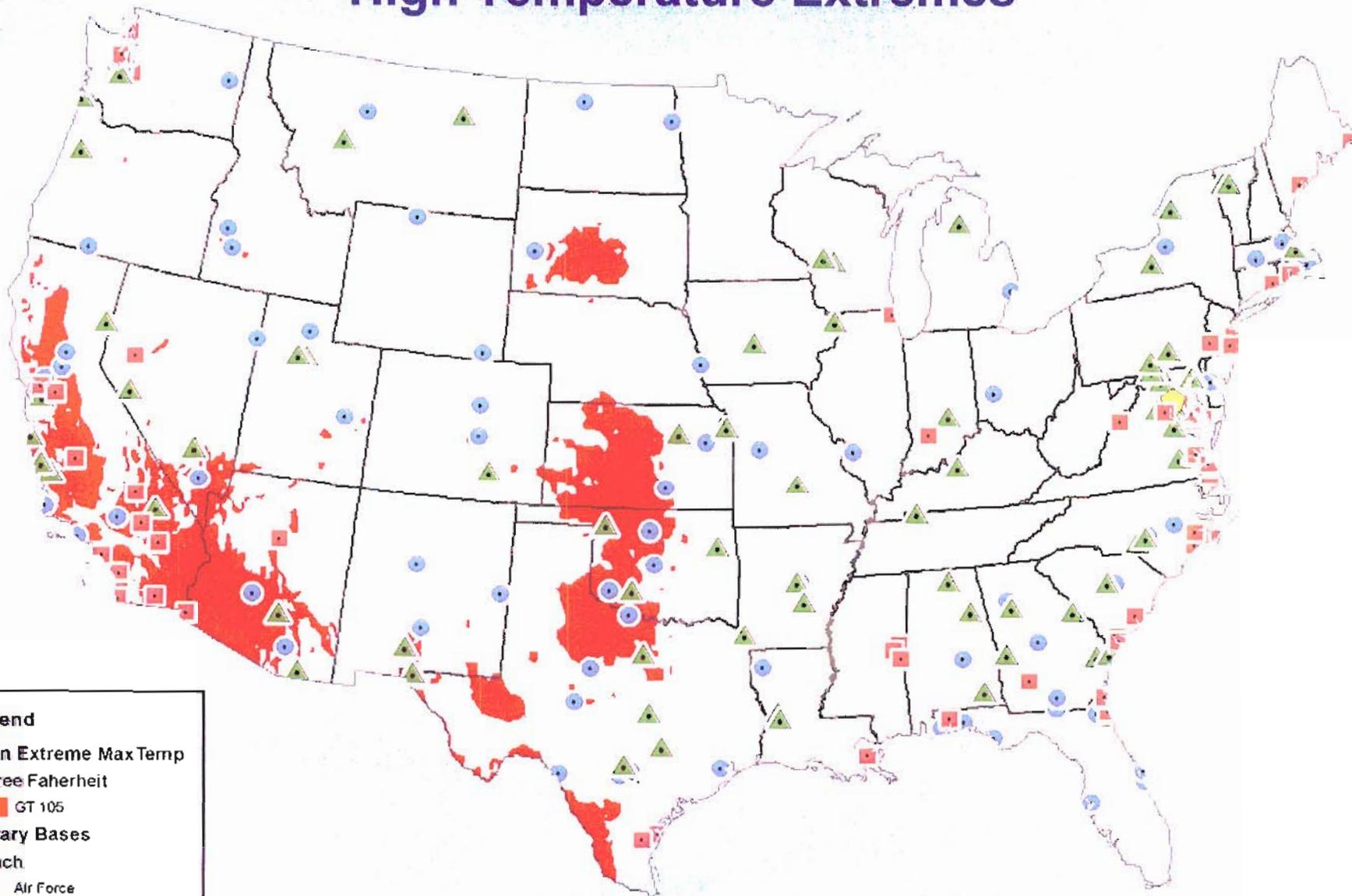
Population – Peaks in 3 – D
Red shades
Military Bases in Blue



Adverse Weather Related to Military Base Locations

 **Adverse weather is defined as climate features that can limit the availability and utility of land and airspace in and around military bases.**

High Temperature Extremes



Legend

Mean Extreme Max Temp
Degree Fahrenheit

GT 105

Military Bases

Branch

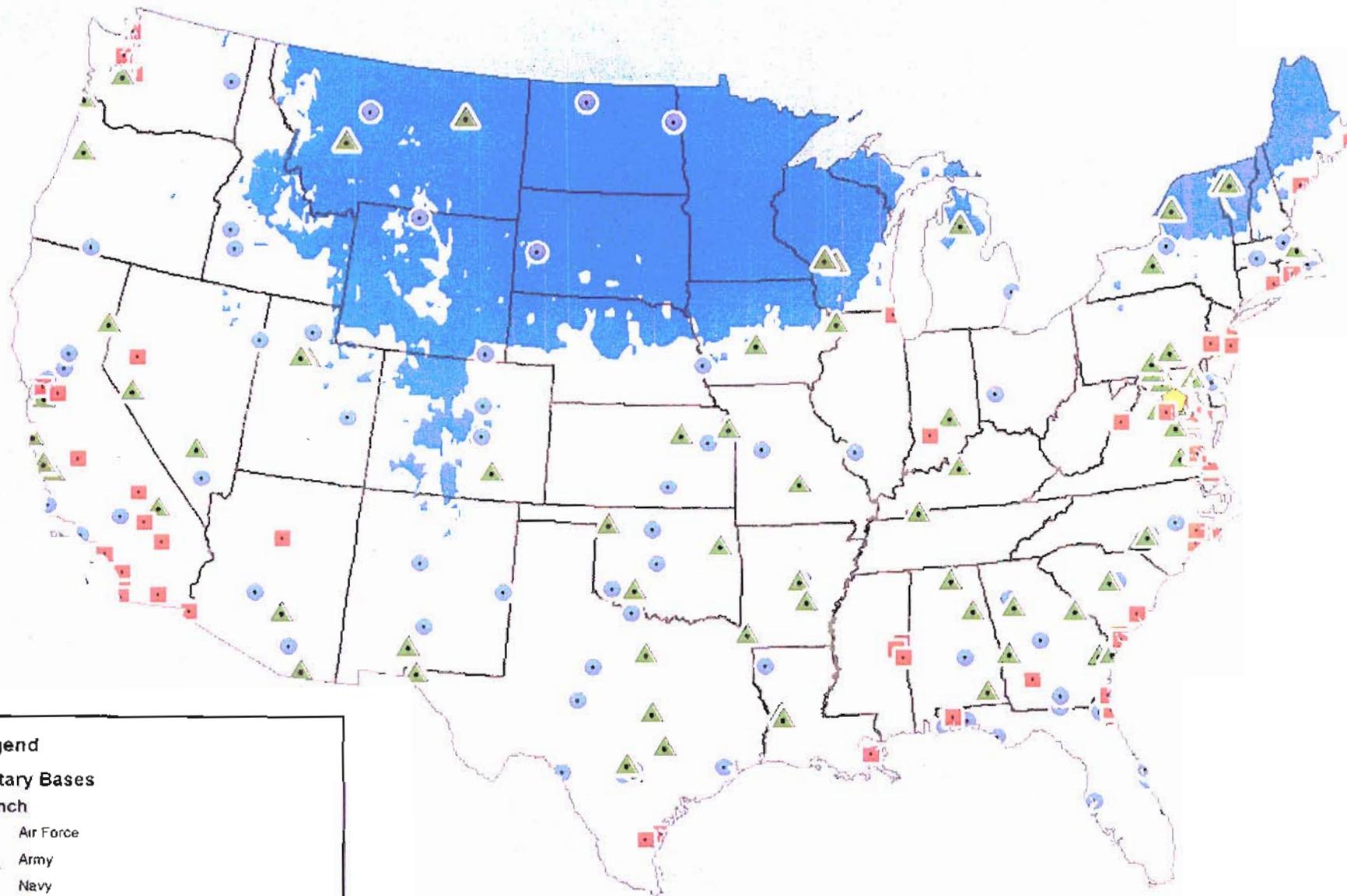
● Air Force

▲ Army

■ Navy

⬠ Pentagon

Low Temperature Extremes



Legend

Military Bases

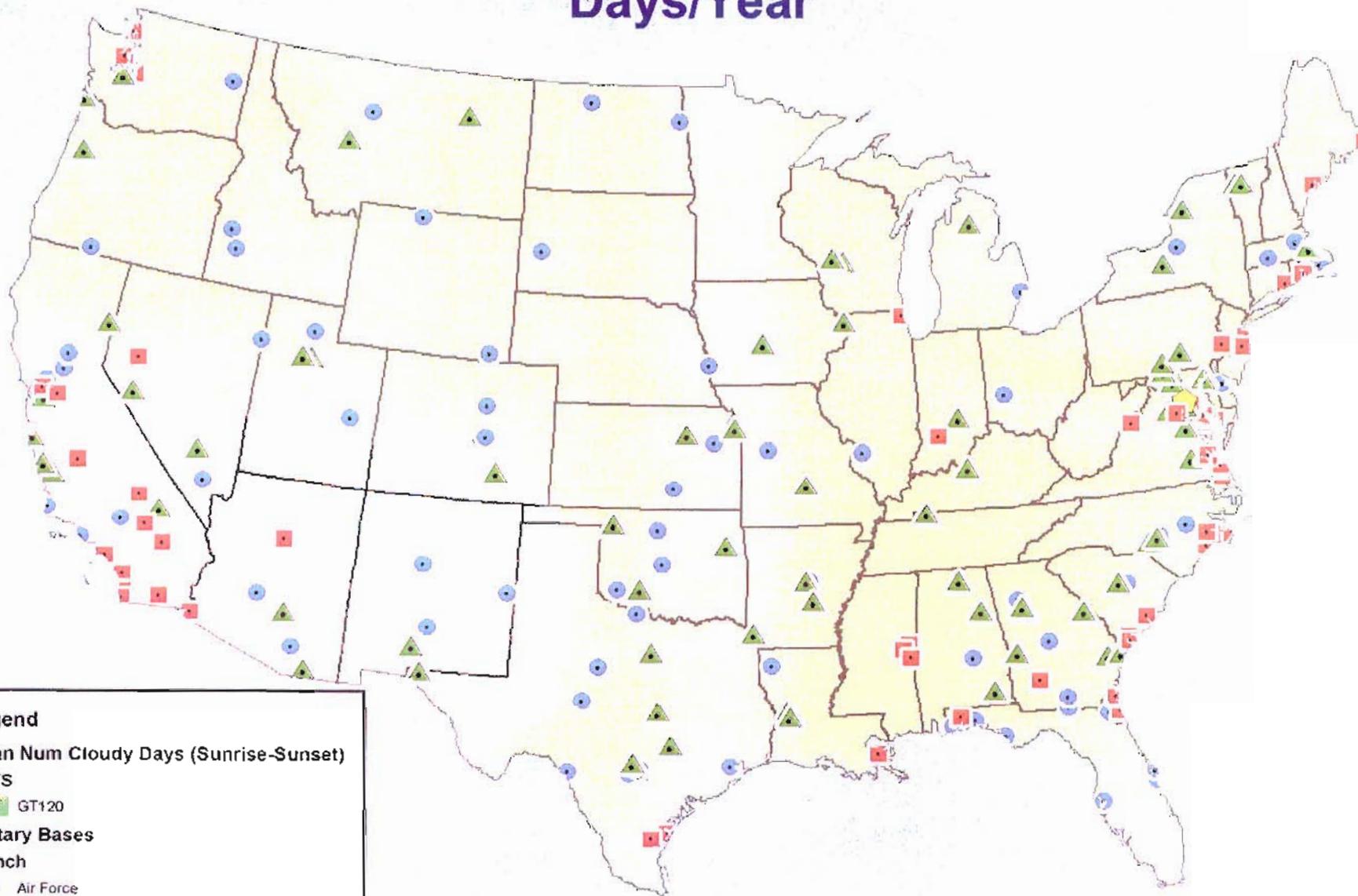
Branch

- Air Force
- ▲ Army
- Navy
- ⬠ Pentagon

Climate: Mean Extreme Minimum Temp

■ LT -20 Degrees

Annual Average Cloudy Days Equal To Or More Than 120 Days/Year



Legend

Mean Num Cloudy Days (Sunrise-Sunset)
DAYS

GT120

Military Bases

Branch

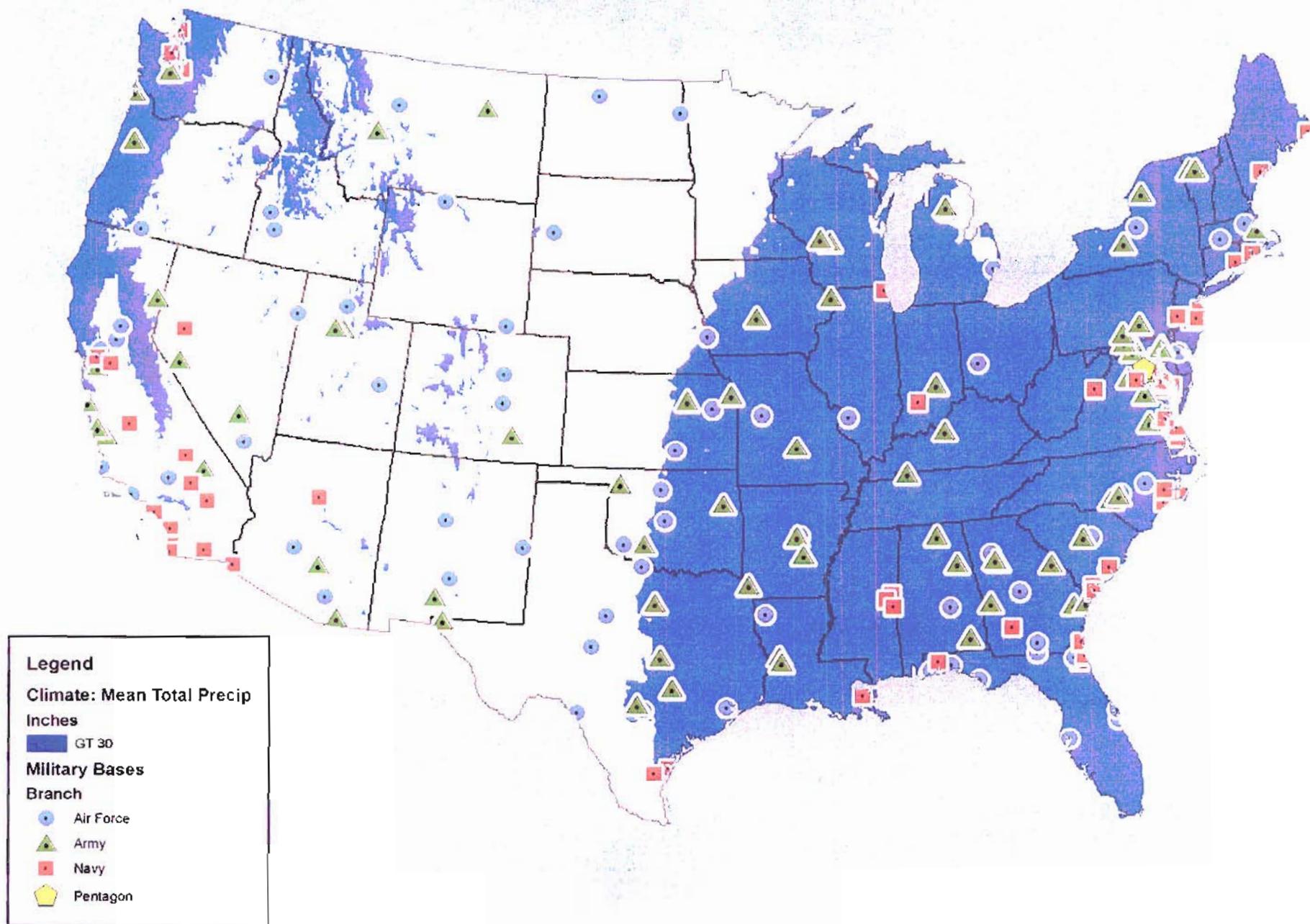
● Air Force

▲ Army

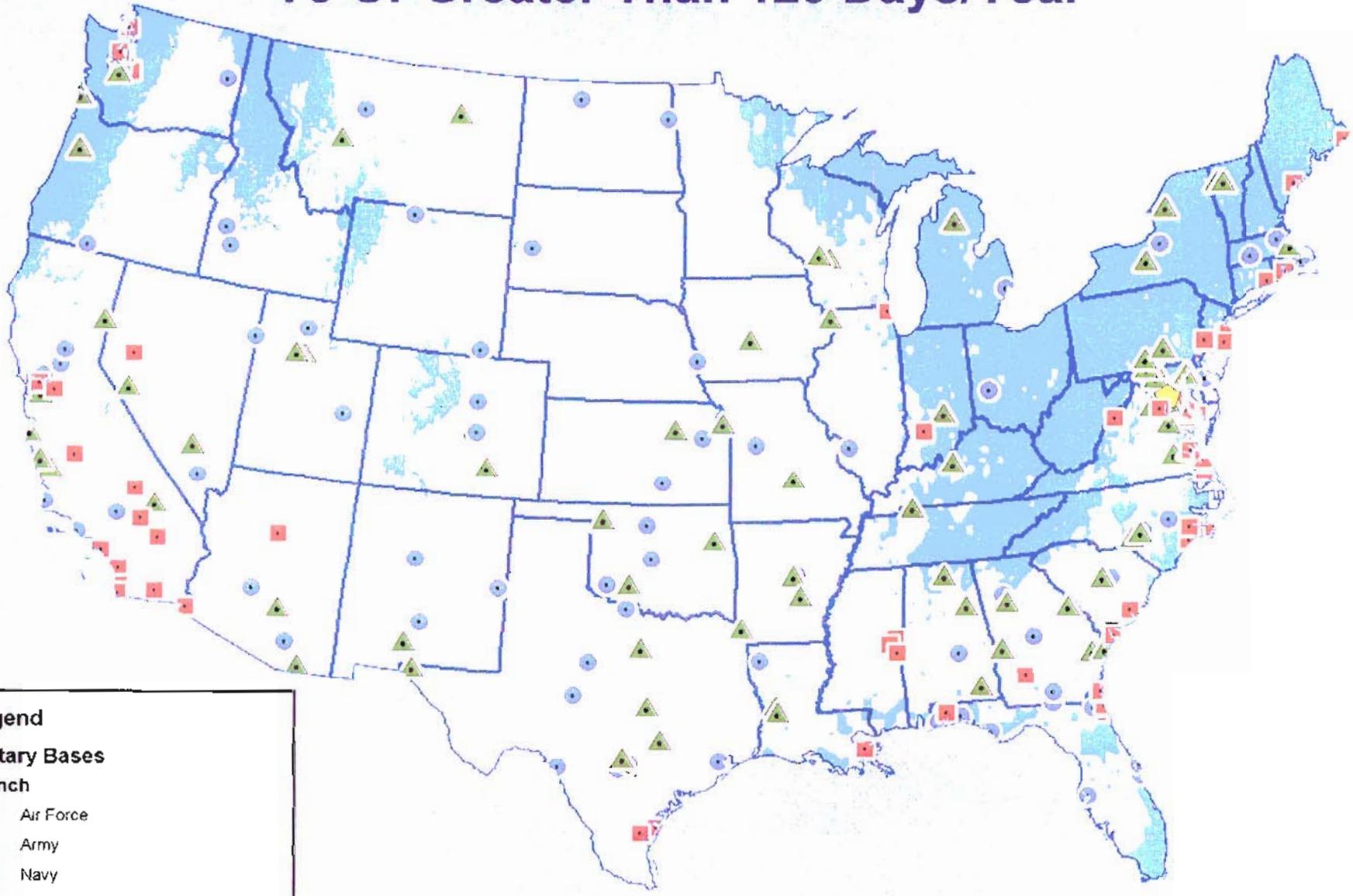
■ Navy

⬠ Pentagon

Annual Average Precipitation Greater Than 30 Inches/Year



Average Annual Days with Measurable Precipitation Equal To Or Greater Than 120 Days/Year



Legend

Military Bases

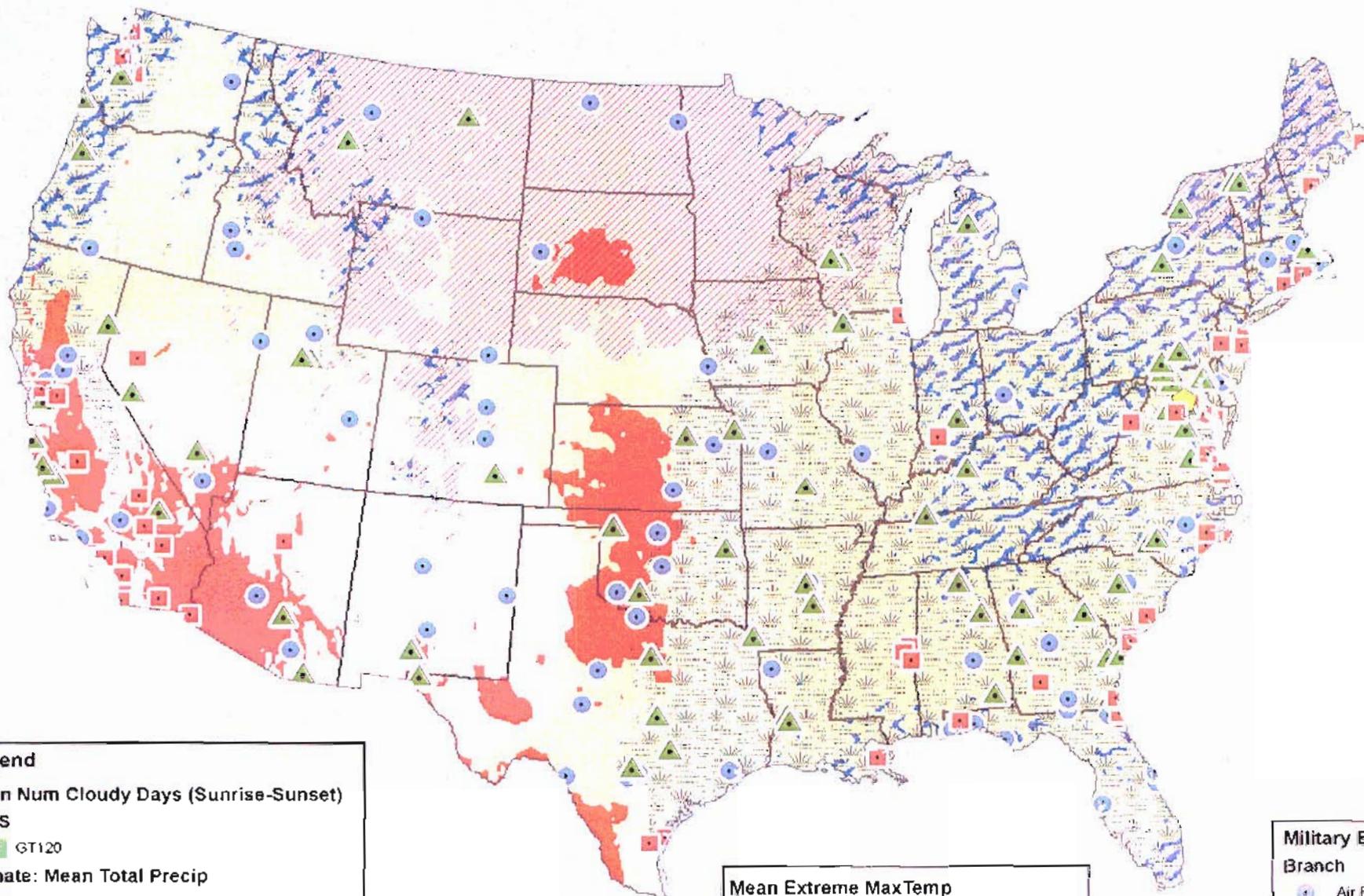
Branch

- Air Force
- ▲ Army
- Navy
- ⬠ Pentagon

Mean Days Measurable Precip

- GT 105 Days

Composite Map of Military Bases and Adverse Climate Features



Legend

Mean Num Cloudy Days (Sunrise-Sunset) DAYS

GT120

Climate: Mean Total Precip Inches

GT 30

Mean Days Measurable Precip

GT 105 Days

Mean Extreme MaxTemp Degree Fahrenheit

GT 105

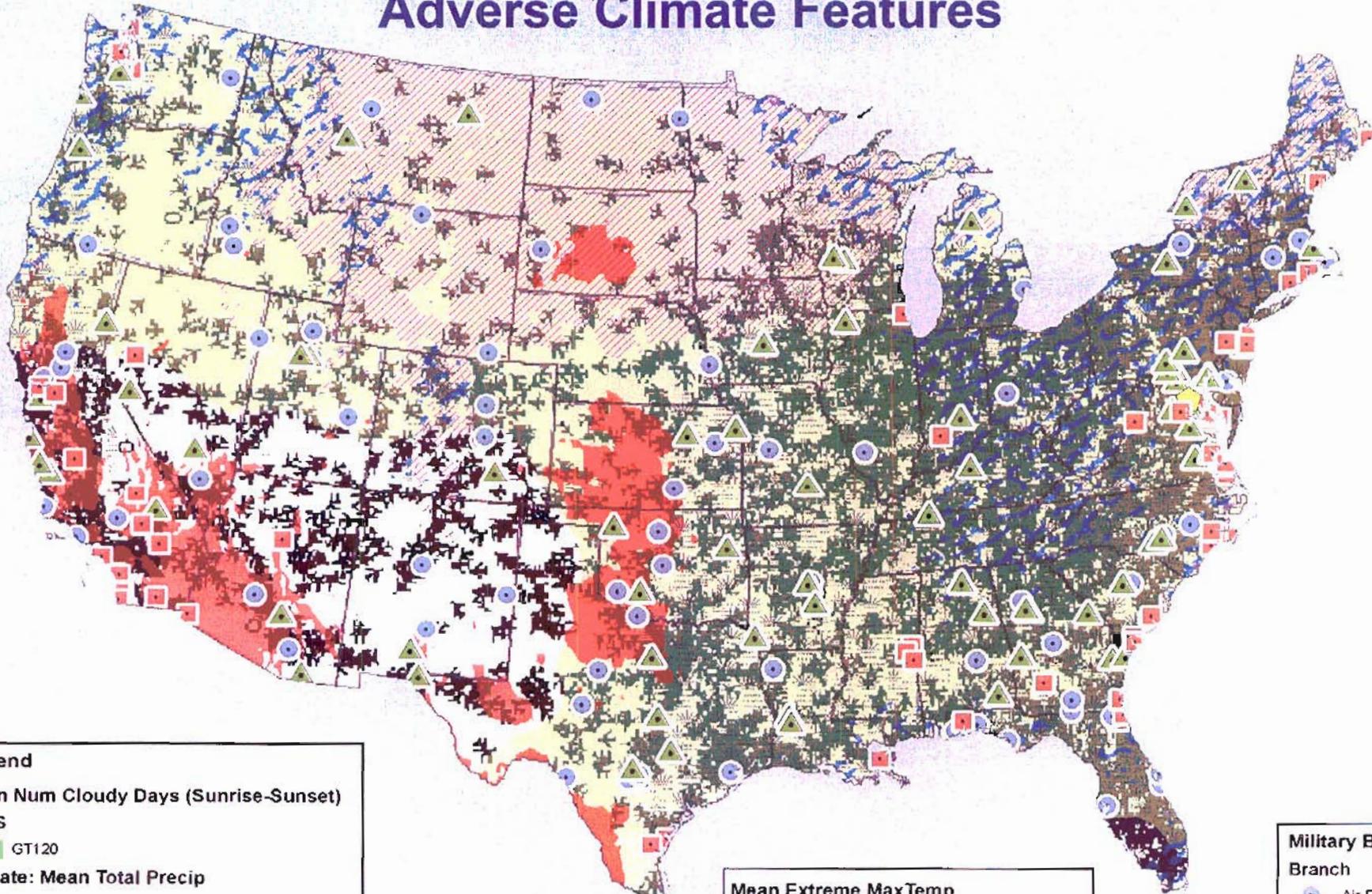
Climate: Mean Extreme Minimum Temp

LT -20 Degrees

Military Bases Branch

- Air Force
- Army
- Navy
- Pentagon

Composite Map Military Bases, Commercial Aircraft and Adverse Climate Features



Legend

Mean Num Cloudy Days (Sunrise-Sunset)
DAYS
 GT120

Climate: Mean Total Precip
Inches
 GT30

Mean Days Measurable Precip
~ GT105 Days

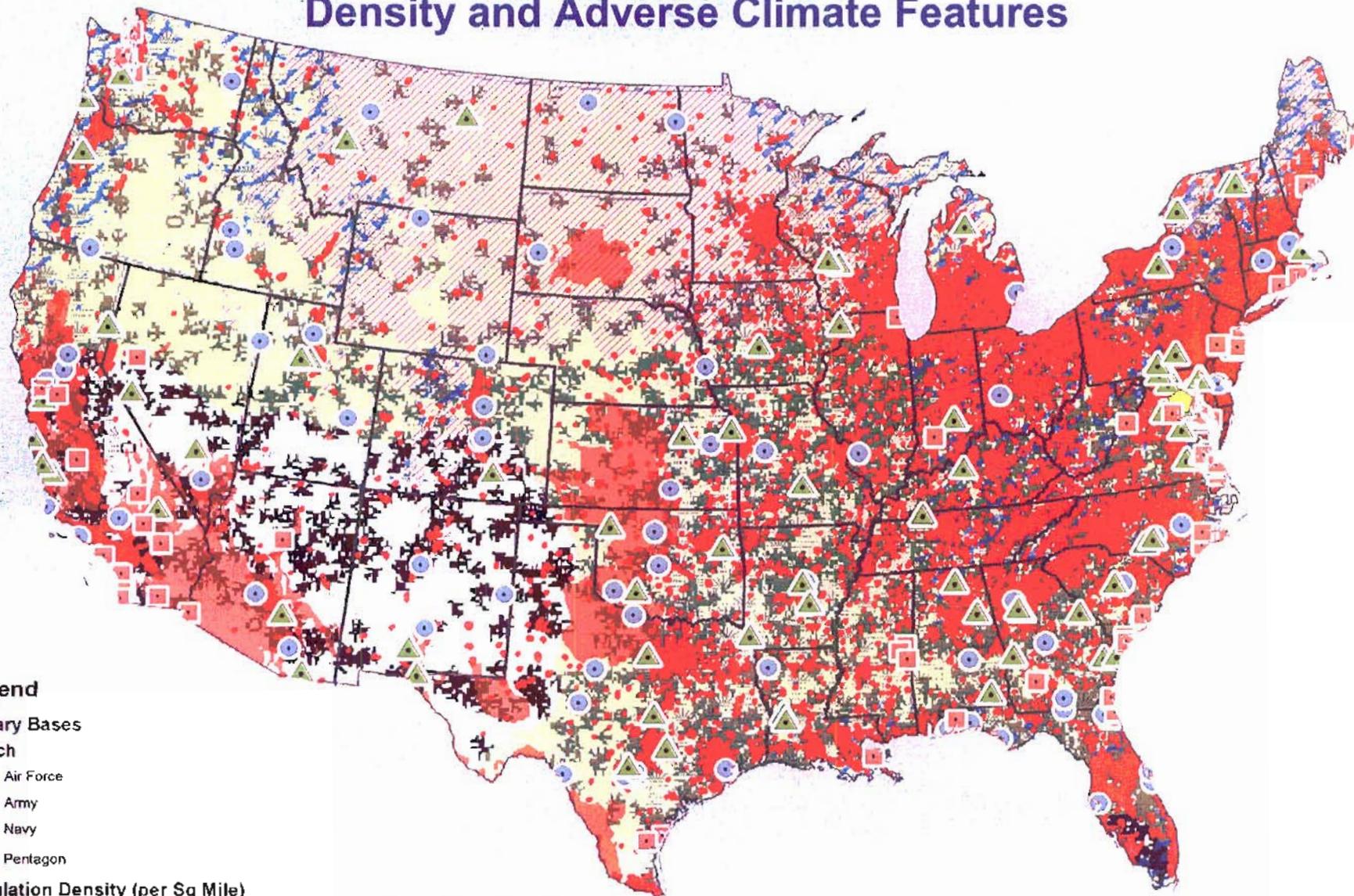
Mean Extreme MaxTemp
Degree Fahrenheit
 GT105

Climate: Mean Extreme Minimum Temp
 LT -20 Degrees

Military Bases
Branch

- Air Force
- ▲ Army
- Navy
- ⬠ Pentagon

Composite Map of Military Bases, Commercial Aircraft, Population Density and Adverse Climate Features



Legend

Military Bases

Branch

-  Air Force
-  Army
-  Navy
-  Pentagon

Population Density (per Sq Mile)

-  1 Dot = 100
-  Pop per Sq Mile

Climate: Mean Total Precip

-  GT 30

Climate: Mean Extreme Minimum Temp

-  LT -20 Degrees

Mean Num Cloudy Days (Sunrise-Sunset)

-  GT 120

Mean Days Measurable Precip

-  GT 105 Days

Mean Extreme MaxTemp

-  GT 105

Summary

- ④ **Airspace competition and encroachment is severe nationwide except in the Southwest and North Plains regions of the U.S.**
- ④ **Bases east of the Great Plains and on the west coast suffer or will in the near future suffer extensive encroachment in the air on the ground.**
- ④ **Climate features adversely affecting availability and utility of military bases and related airspace exist throughout much of the nation except for the Southwest. Major impact is on joint operations**
- ④ **The Southwest offers the best combination of minimal airspace competition, low current and future encroachment issues and climate characteristics conducive to year round military operations. Some bases in the Southwest offer very large volumes of controlled airspace, large DOD controlled ground areas and are very well situated for joint operations, especially large scale joint operations.**