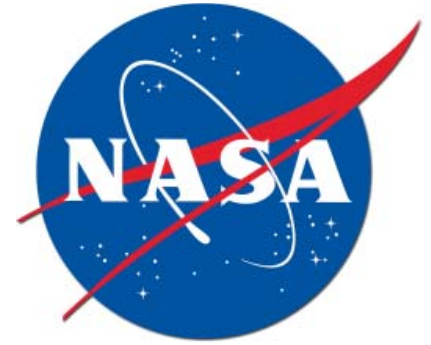




**PITT**<sup>TM</sup>



# Discovering Engineering

**Kate McMurtry**

**Engineer**

**NASA - Armstrong Flight Research Center**

# Growing up

- From: small town, NY
- Jr High/High School: 7<sup>th</sup> – 12<sup>th</sup> combined
  - No NASA, Boeing, Air Force, etc. nearby
  - No robotics teams
  - No STEM
- School sport: basketball
- Favorite subject: any science class
- Least favorite subject: math
- What I want to be when I grow up: uncertain, but.....



# Earned a Scholarship Opportunity



**R**eserve

**O**fficer

**T**raining

**C**orps

recruit, educate and train USAF *officer* candidates through college campus programs

First time I heard the term “engineering”

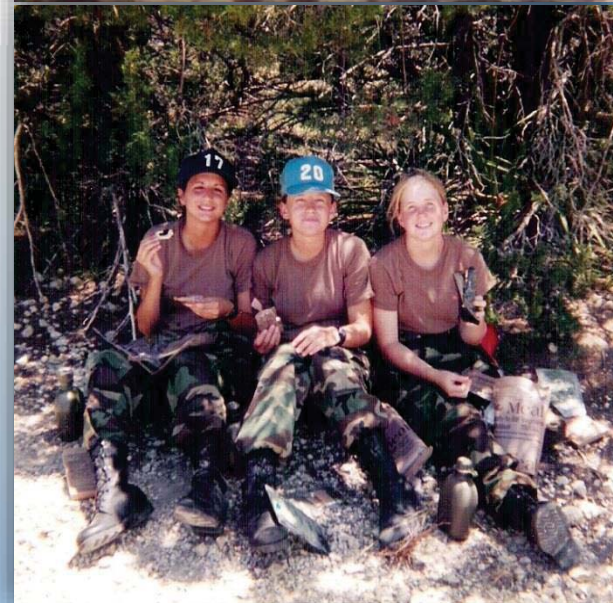
# Scientist vs. Engineer

“Scientists discover the world that exists; Engineers create the world that never was”

Theodore Von Karman, Aerospace Engineer

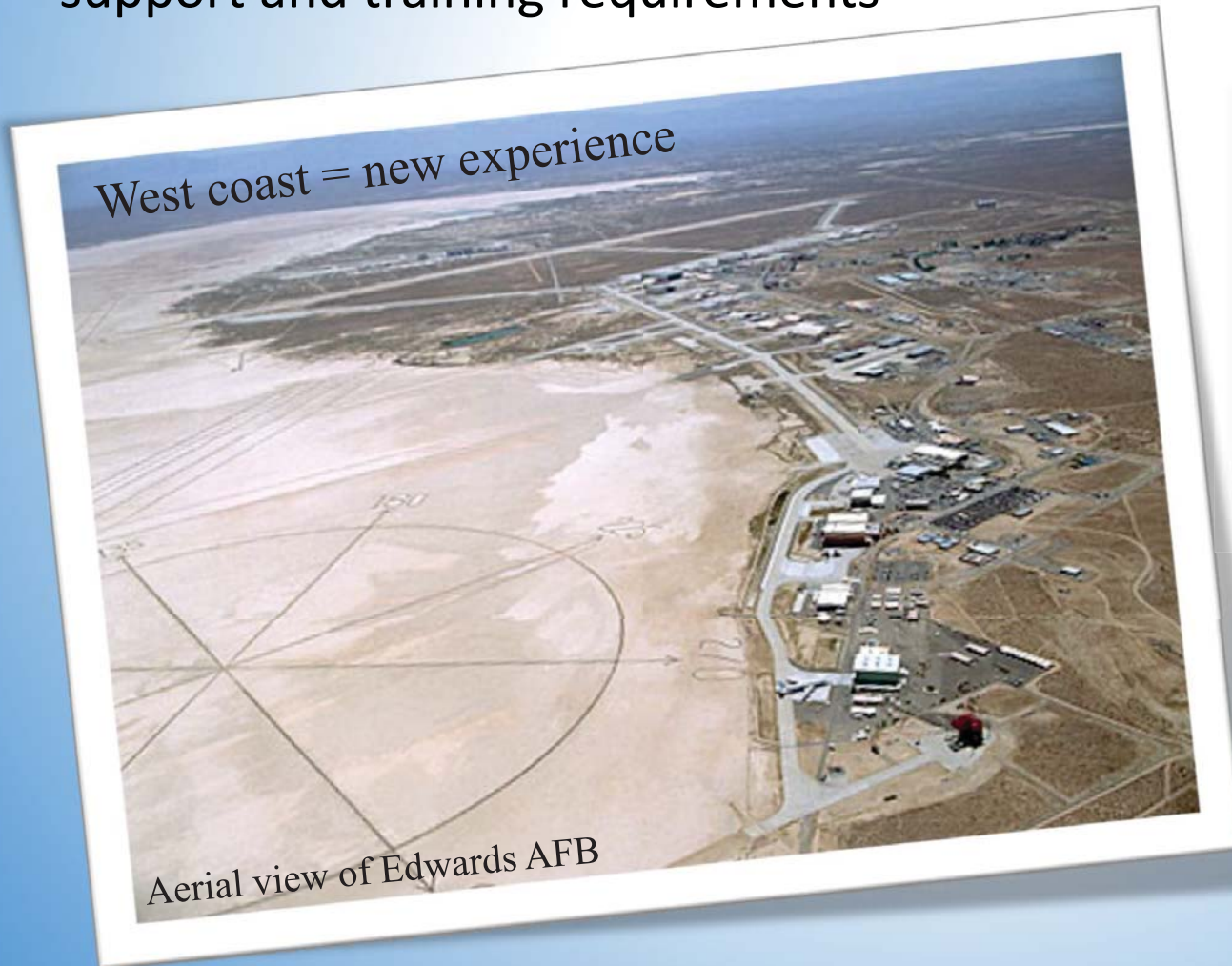
# Attended University of Pittsburgh

- Air Force ROTC program during college
- Studied Chemical & Petroleum Engineering
- Commissioned as a 2<sup>nd</sup> Lieutenant upon graduation



# Stationed at Edwards AFB

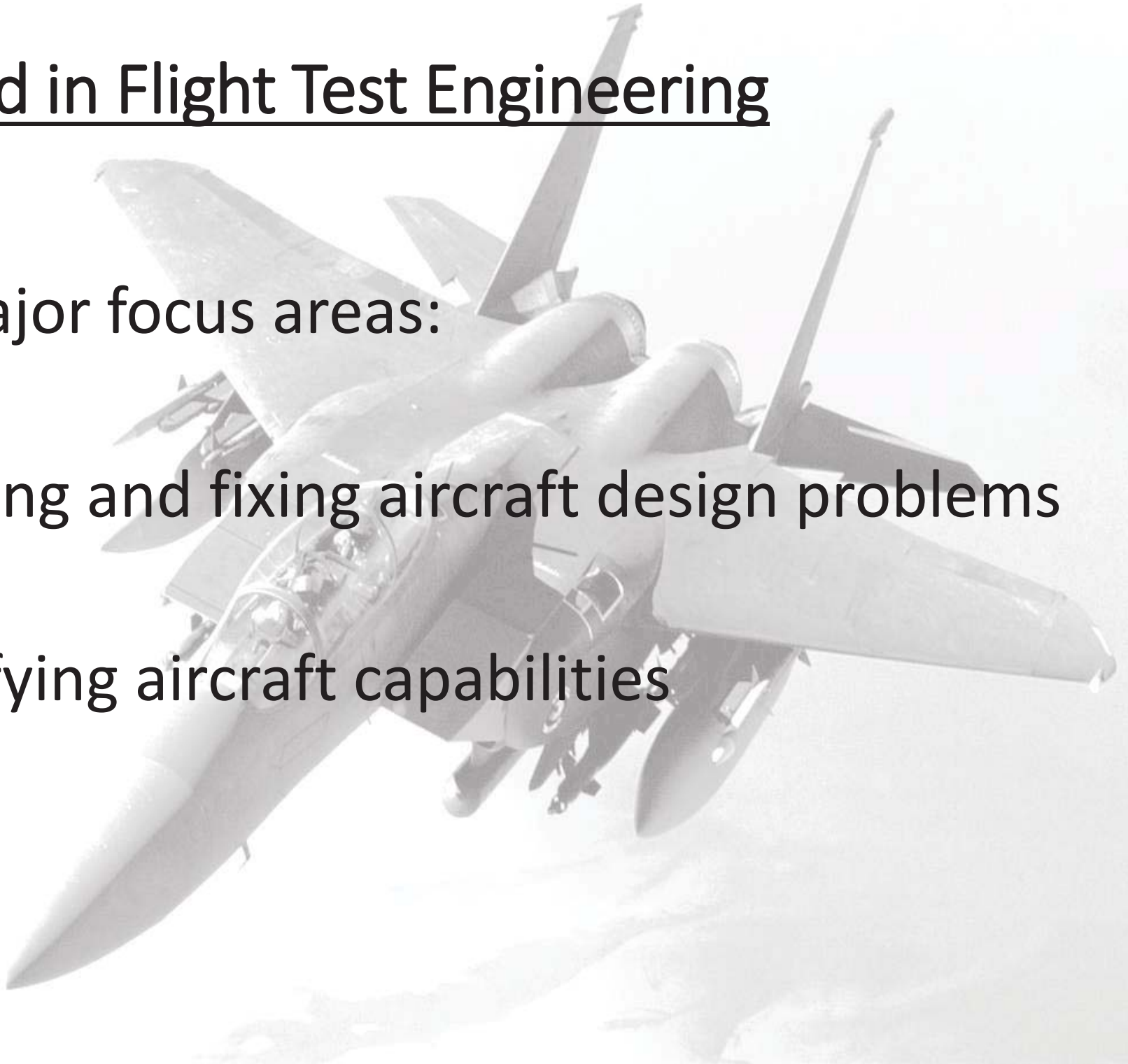
- Influence the design of weapons systems
- Ensure they meet operational warfighting, combat support and training requirements



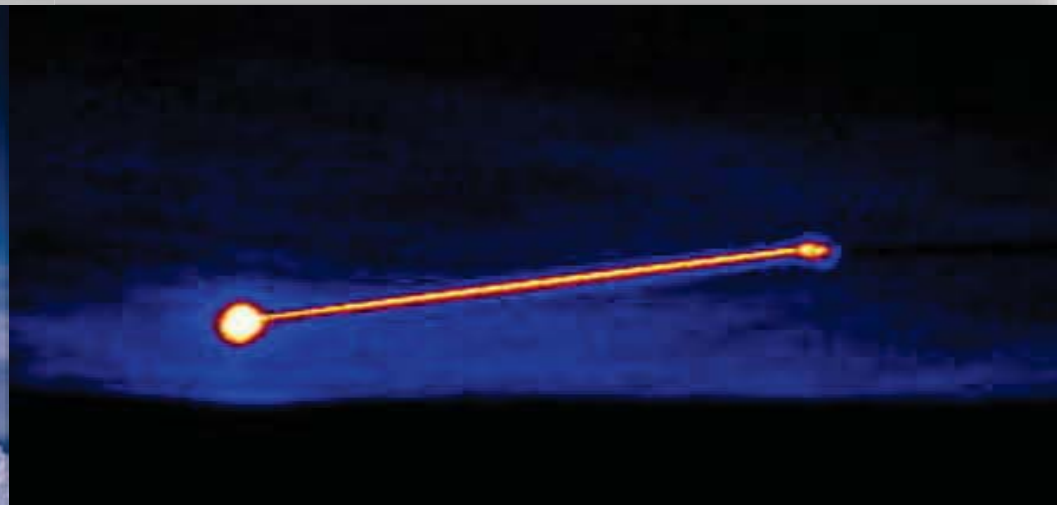
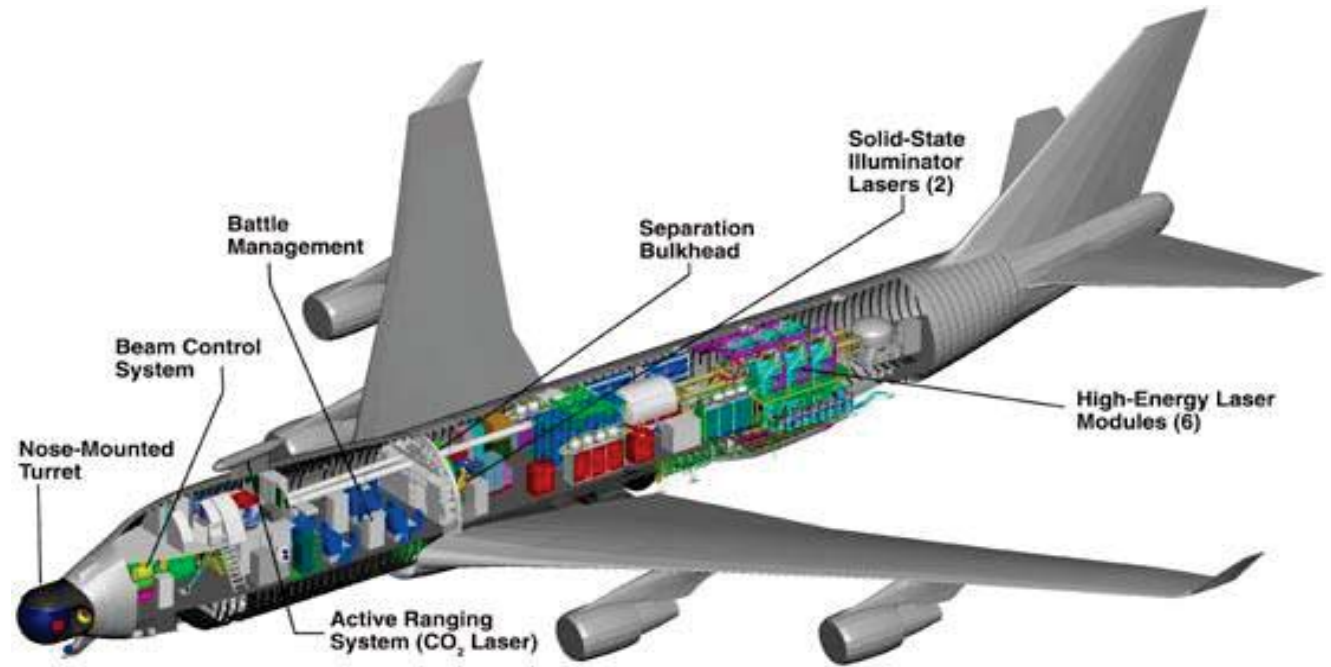
# Worked in Flight Test Engineering

Two major focus areas:

- 1) finding and fixing aircraft design problems
- 2) verifying aircraft capabilities



# Assigned to the Airborne Laser (ABL)





Transitioned from military to.....



**National Aeronautics  
and Space Administration**

# Aeronautics & Astronautics



**NASA**  
**Armstrong**



Navigation  
beyond Earth's  
atmosphere

# Armstrong Flight Research Center (AFRC)



# Armstrong – Video

<https://www.youtube.com/watch?v=pXrmJhSptck> 3:01



# Assigned to Operations Engineering



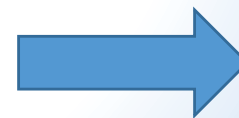
Operations engineers take concepts to flight!



We help develop  
research/experiments,



integrate them onto aircraft,



and conduct flight  
test/research

while ensuring safety & mission success!

# Worked research F-18s/F-15s projects



- Adaptive Control & Supersonic Research
- Eventually became lead of both aircraft



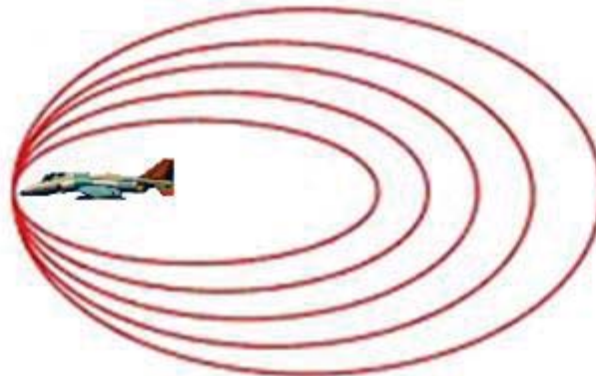
Operations Engineer – Aeronautics Research (~8min)

<https://www.youtube.com/watch?v=MM33ORifH84>

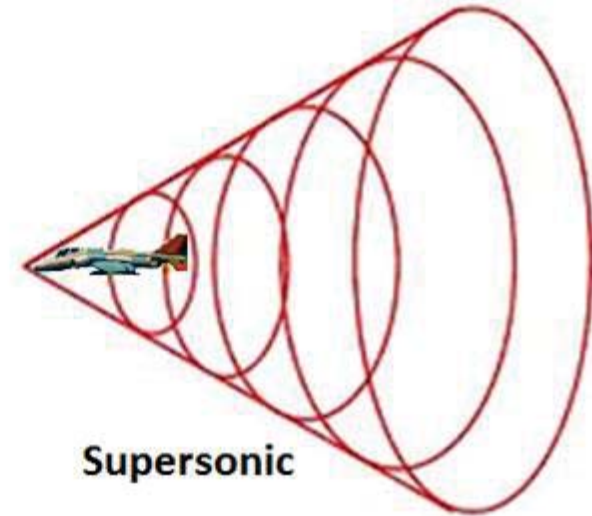
**Stationary wave**



**Subsonic**



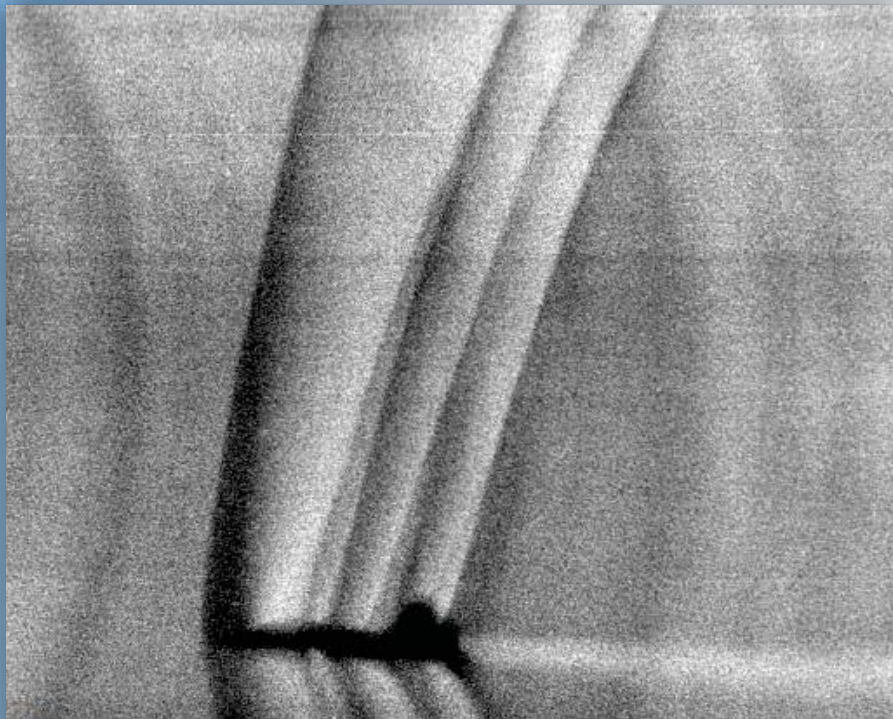
**Sonic**



**Supersonic**

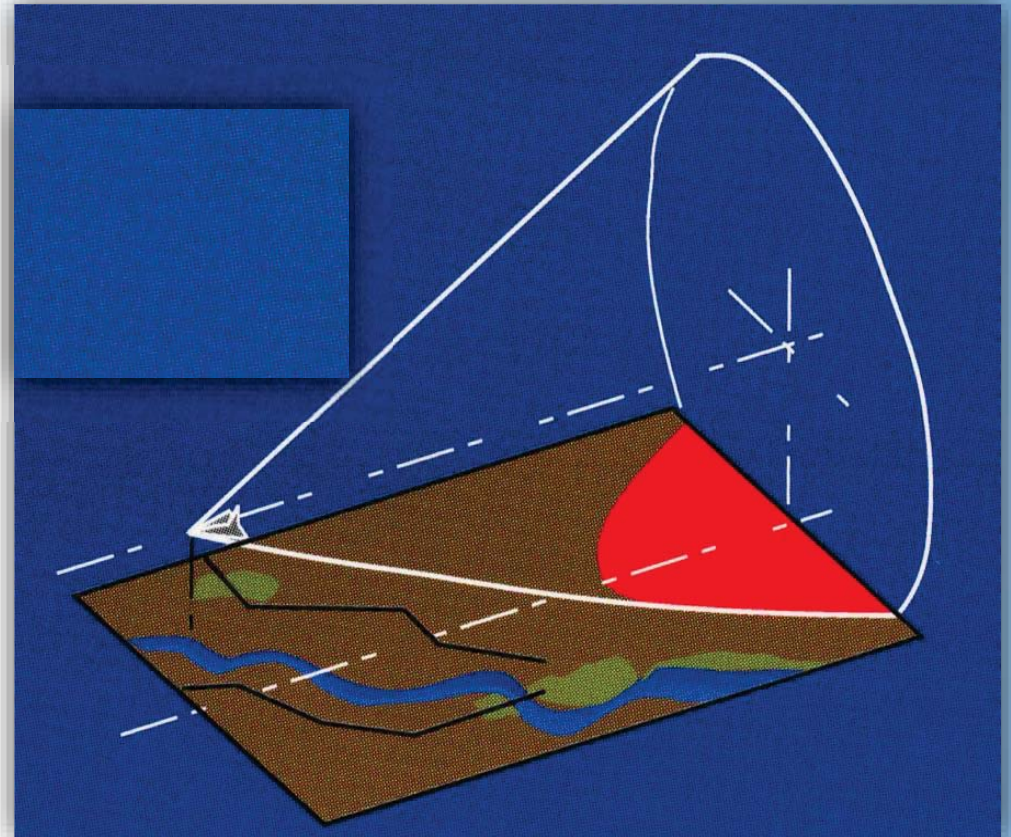
Science behind sound waves

# Sonic Boom Basics



NASA Dryden Flight Research Center Photo Collection  
<http://www.dfrc.nasa.gov/gallery/photo/index.html>  
NASA Photo: EC94-42528-1 Date: December 13, 1993 Photo by: Dr. Leonard Weinstein

Schlieren photograph of T-38 shock waves at Mach 1.1, 13,000 feet

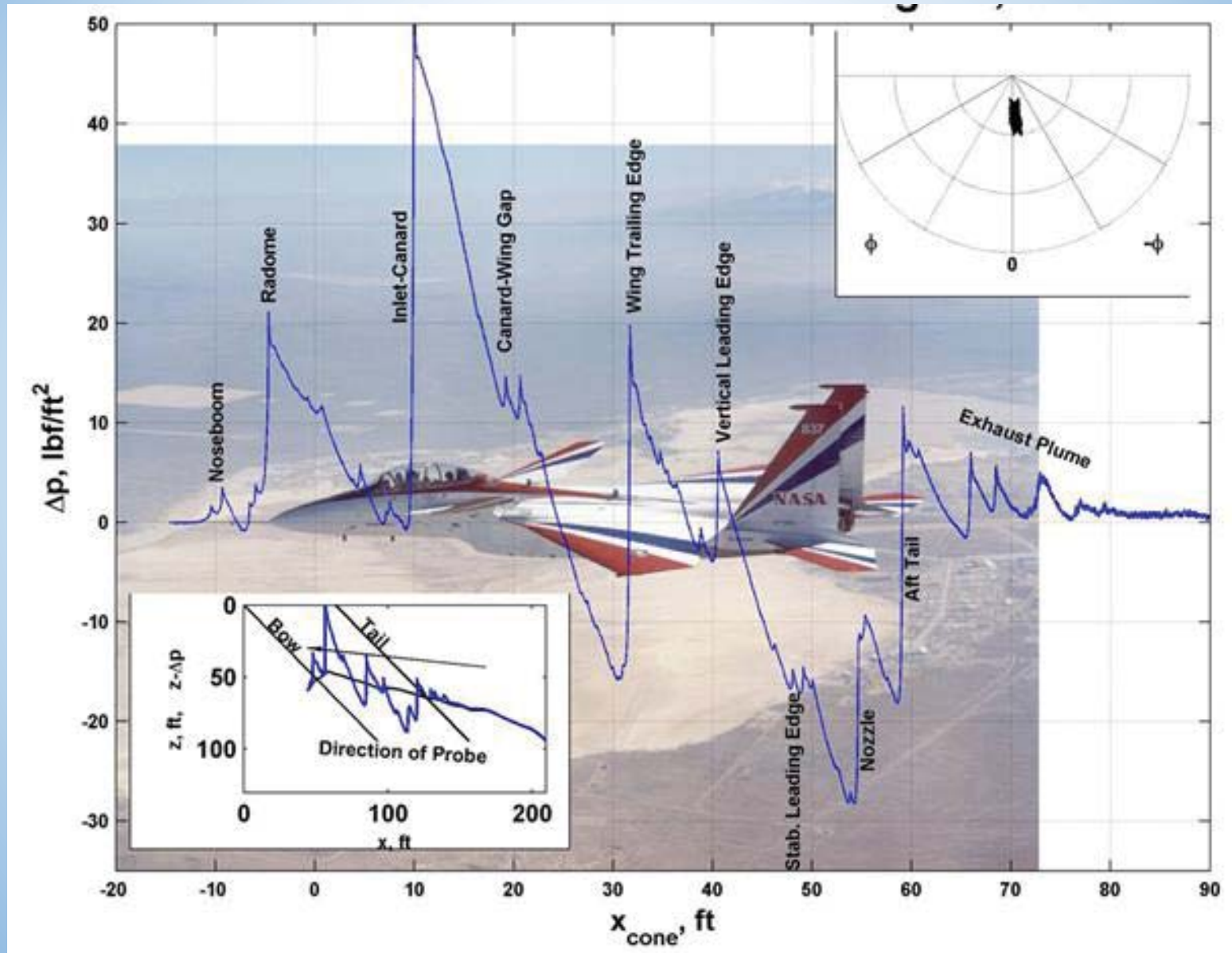


- Shock system travels in 3-Dimensions at speed of sound
- At the intersection with the ground, “sonic boom” is heard
- Boom is created over the entire length of the supersonic flight



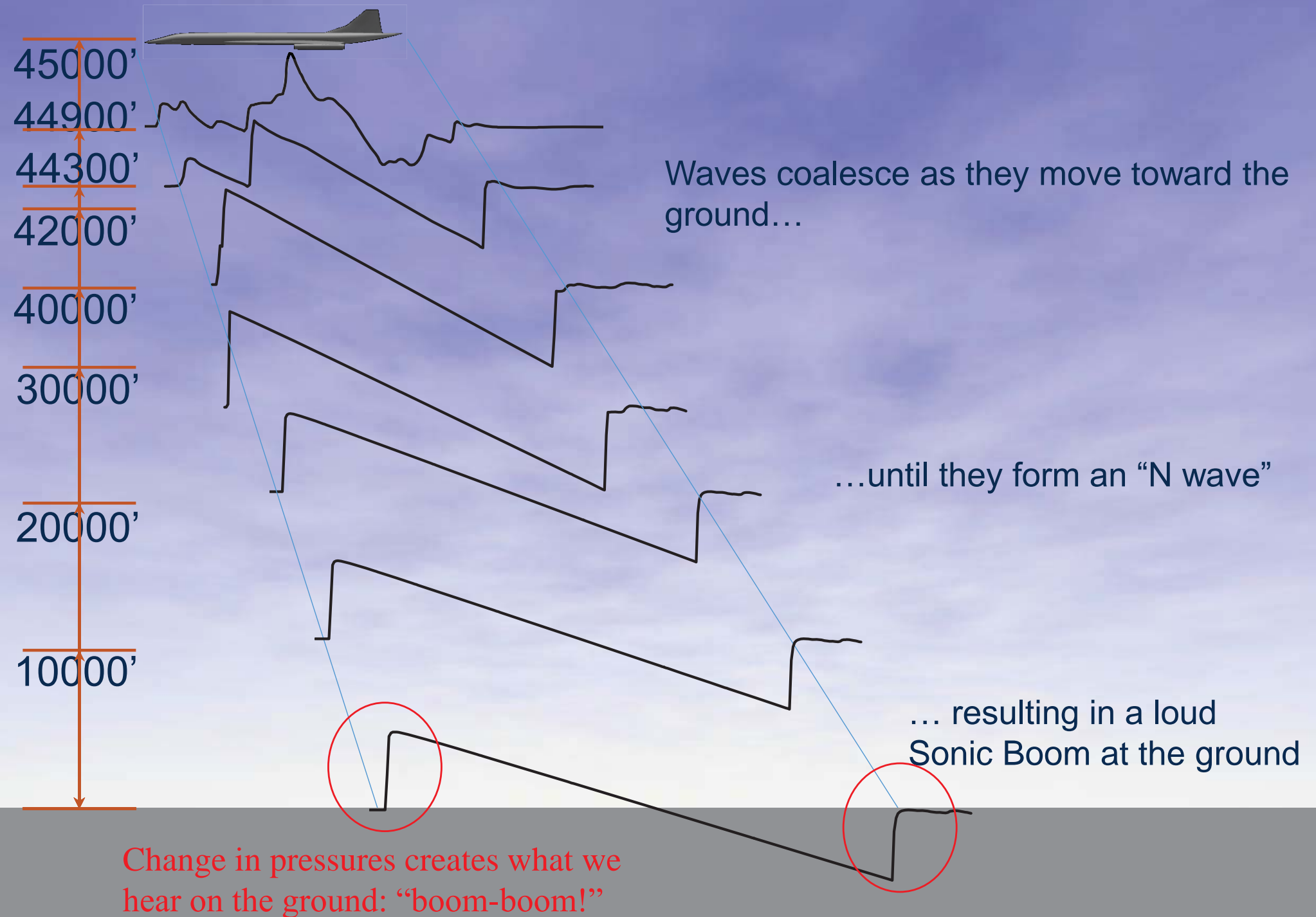
# Aircraft Shape Effects Sonic Boom Signature

Change in Air Pressure,

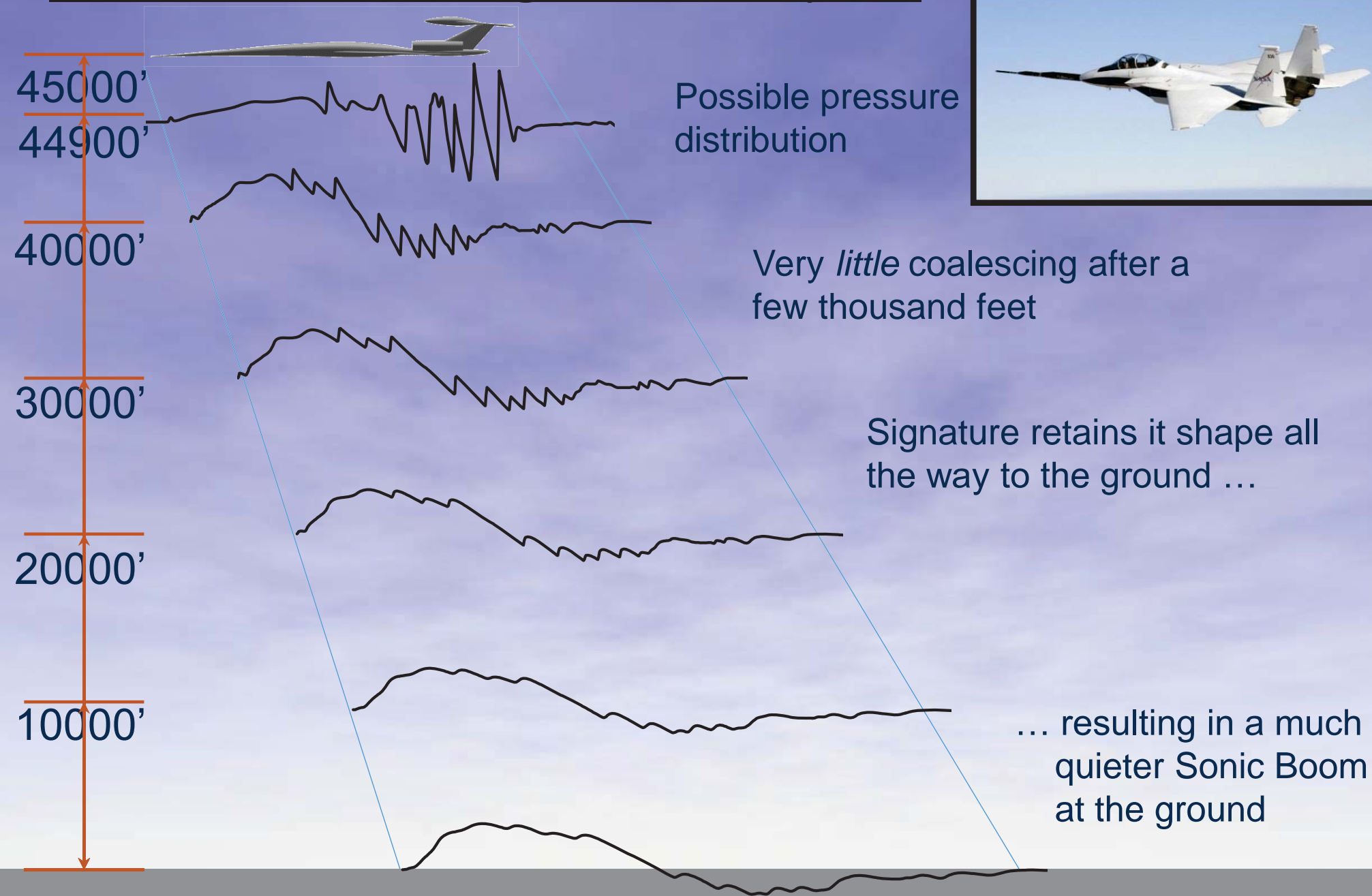
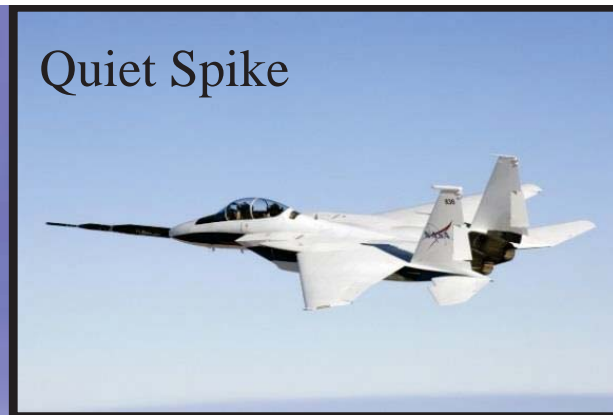


Distance along Length of Aircraft

# Sonic Boom Basics: N Wave Sonic Boom



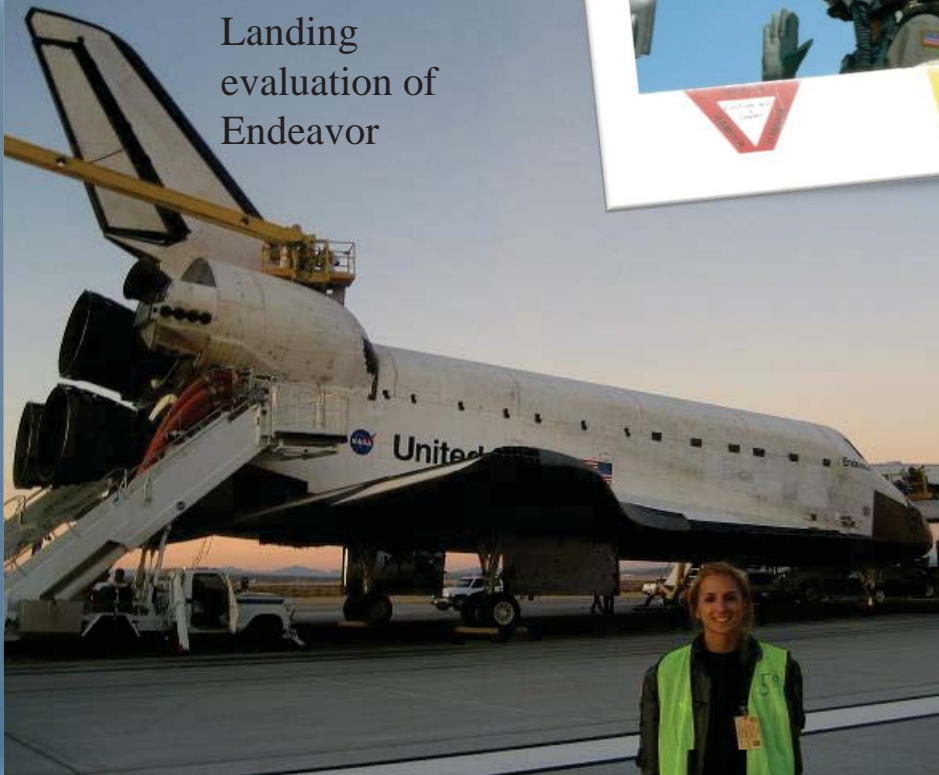
# What if we change the shape...



# Amazing Experiences

F-18 flights

Landing  
evaluation of  
Endeavor



# Continued learning remains important

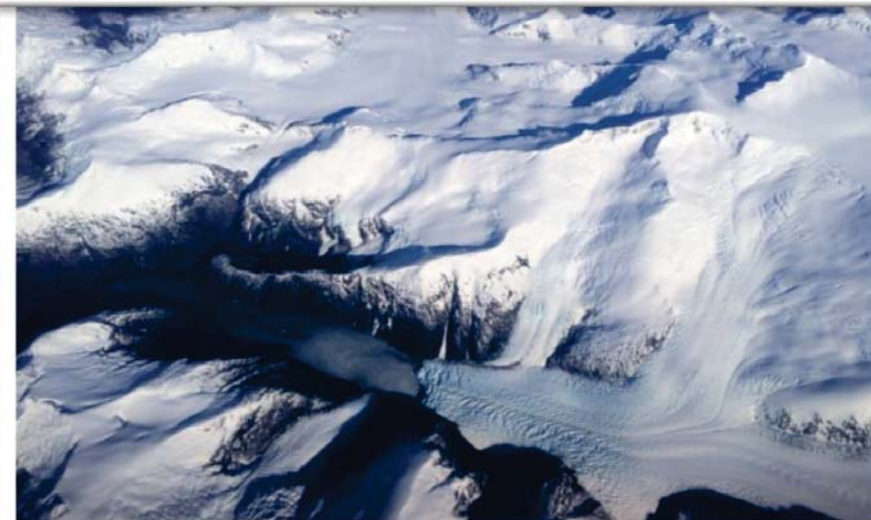
- Pursued higher education:
  - Master of Management and Leadership: Webster University
  - Master of Business Administration (MBA): Webster University
  - Aerospace Engineering courses from Cal State Fresno & Purdue
- Wrote technical papers and presented at conferences
- Developed skills:
  - Influential leadership
  - Communication
  - Teamwork
  - Building relationships
  - Anticipate issues and determine solutions/Vision
- Became a Private Pilot



# Career decision



- Why I choose management:
  - Grow my perspective (from my assigned project to all projects Center-wide)
  - Refine leadership skills and perspective
  - Learn more from more people
  - Help define future path of Armstrong
  - Help others succeed



# My career take away's so far.....

## **1. Always do your best**

- Opens doors while alleviating regret when some doors close

## **2. Not having an exact life plan isn't a bad thing**

## **3. The day we stop learning is the day we forfeit our potential**

## **4. Fear of failure will hold you back**

- Failure fosters growth (you can start again, smarter!)
- Failure separates strengths from weaknesses

# Questions?

