NASA Engineering and Safety Center (NESC)  
Guidance Navigation and Control  

A series of GN&C technical developments “sea and space stories”  
(Lesson Learned)  

Six Decades Guns to Satellites  

1940’s  
• WWII Search Radar (SCR-270)  
• Mechanical Fuses  
• VT Fuses  
• Werner von Braun – wind tunnels from Peenemunde  

1950’s  
• Angled Arrow Projectile/Gun Launched Guided Missile (AAP/GLGM)  
• SUBROC Development Testing  
  • Proof of Concept  
  • Air Launched testing  
  • Underwater Tube-Launched Testing  
  • Final Sub-Launched Testing  
• Explorer I (1/31/58)  
• Holy Grail of Satellite Dynamics  
  • Conservation of Momentum Must Hold  

1960’s  
• Orbiting Geophysical Observatory (OGO-4) (7/28/67)  
• Orbiting Astronomical Observatory (OAO-2) (12/7/68)  

1970’s  
• Small Scientific Satellite (SSS) (11/15/71)  
• Radio Astronomy Explorer (RAE) – B (6/10/73)  
• International Ultraviolet Explorer (IUE) (1/26/78)  
• Solar Maximum Mission (SMM) (2/14/80)  

1980’s  
• Tracking and Data Relay Satellite (TDRS)-1 (4/5/83)  
• SMM Servicing (4/84)  
• COsmic Background Explorer (COBE) (11/18/89)  
• Ulysses (10/6/90)  

1990’s  
• Geostationary Operational Environmental Satellites (GOES) (4/13/94)  
• Solar and Heliospheric Observatory (SOHO) (12/2/95)