# ASTROPHYSICS

## Decadal Survey Missions

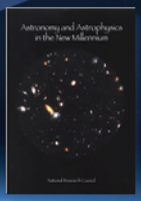
LRD: 2018

LRD: 2020s

2003

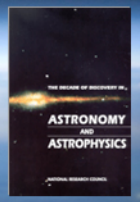
1999

1990

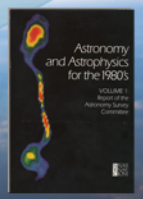



**2001**
Decadal Survey
*JWST*


**2010**
Decadal Survey
*WFIRST*



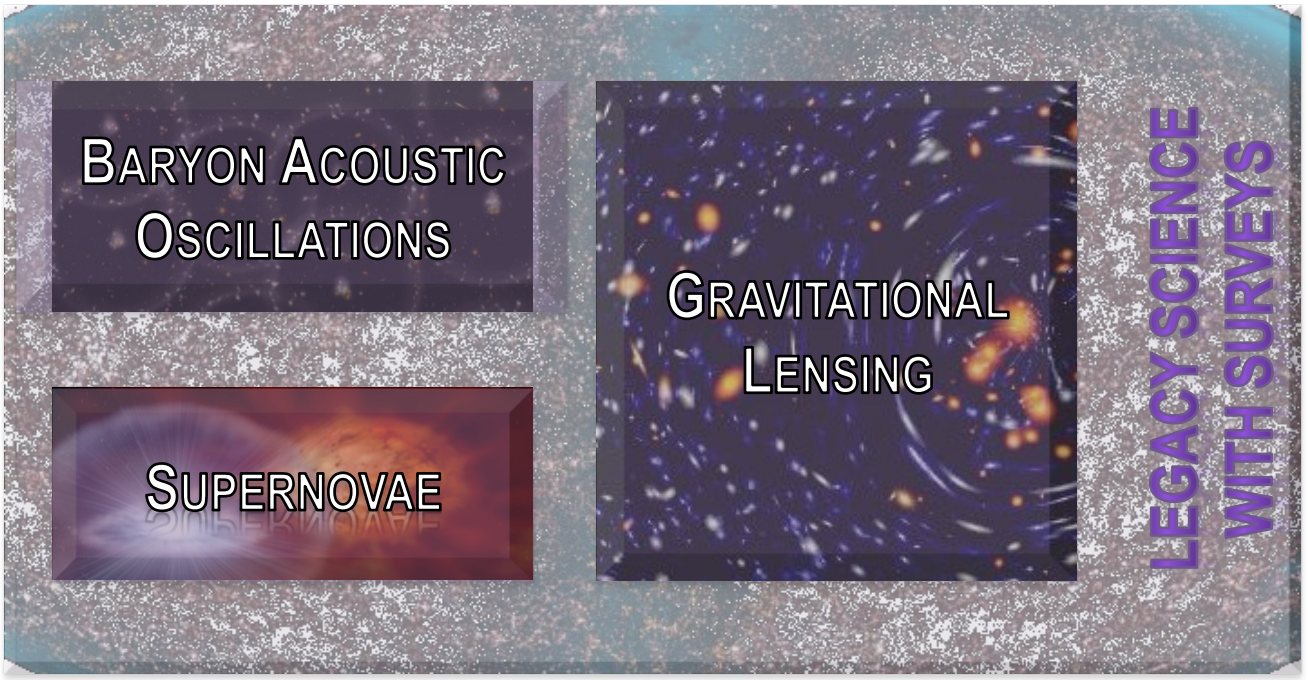

**1991**
Decadal Survey
*Spitzer, SOFIA*



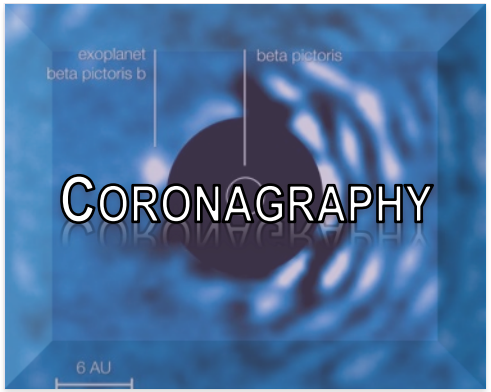

**1982**
Decadal Survey
*Chandra*


**1972**
Decadal Survey
*Hubble*

# WFIRST-AFTA Science





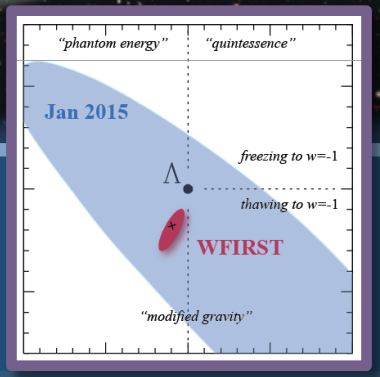



# Dark Energy Science

Wide & Deep Infrared Survey

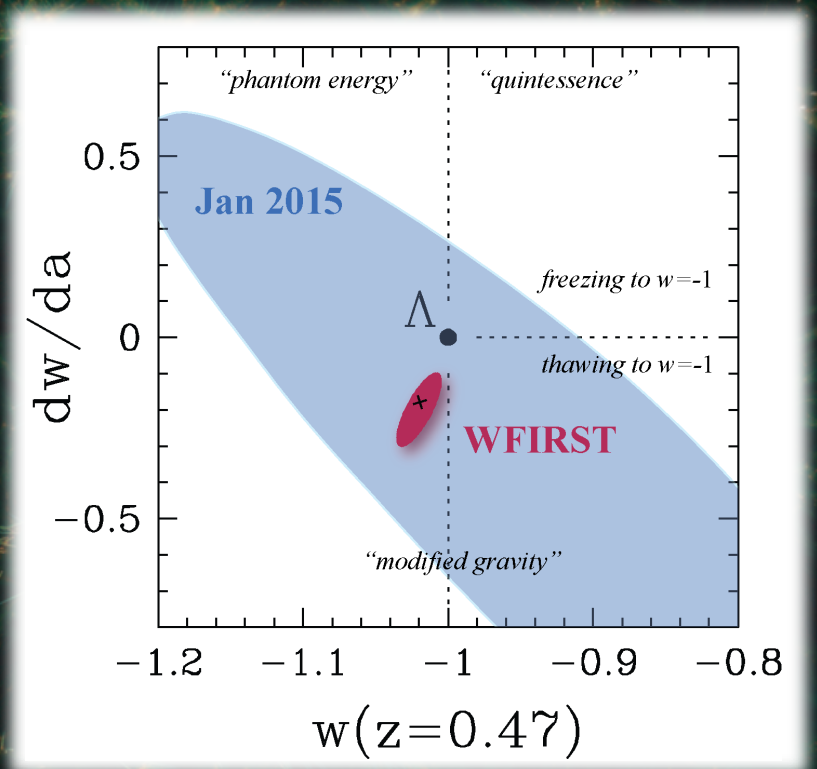
| Supernova Survey | Galaxy Redshift Survey | Weak Lensing Survey |
|---|---|---|
| ***Standard Candle*** *Distance measured to ~0.2% precision* | ***Standard Ruler*** *Distance measured to 0.5% precision, expansion rate to <1%* | ***Dark Matter Clustering*** *Weak lensing to 0.2% Galaxy Clusters to 0.3% Galaxy Infall to 1.2%* |

Definitive Measurements of:
dark energy physics,
growth of structure over cosmic time,
general relativity



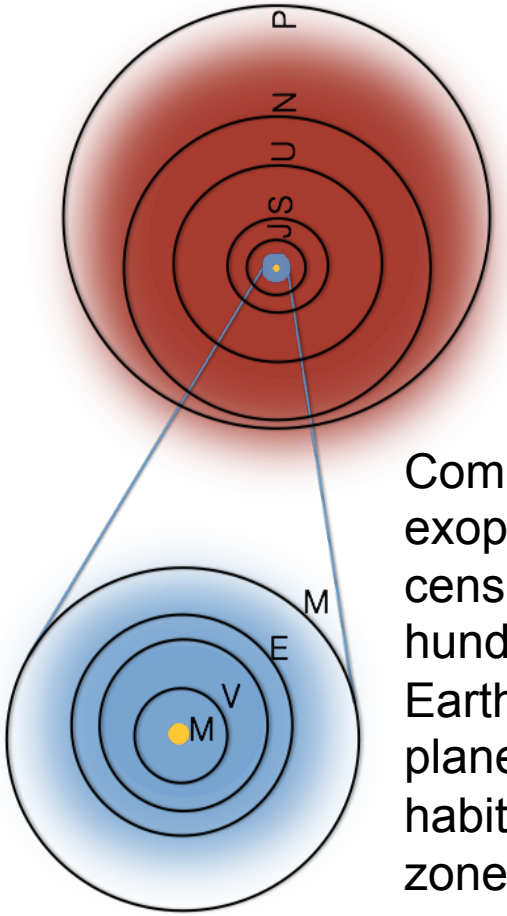

DJB

# WFIRST and Dark Energy



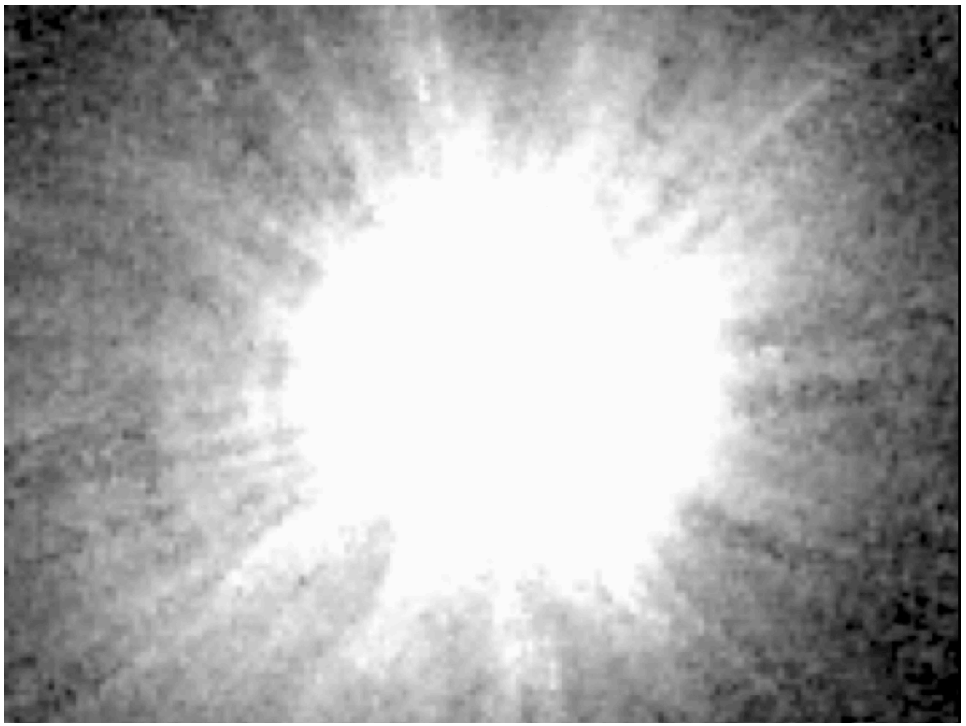
# Exoplanet Science

WFIRST Search Area




Kepler Search Area

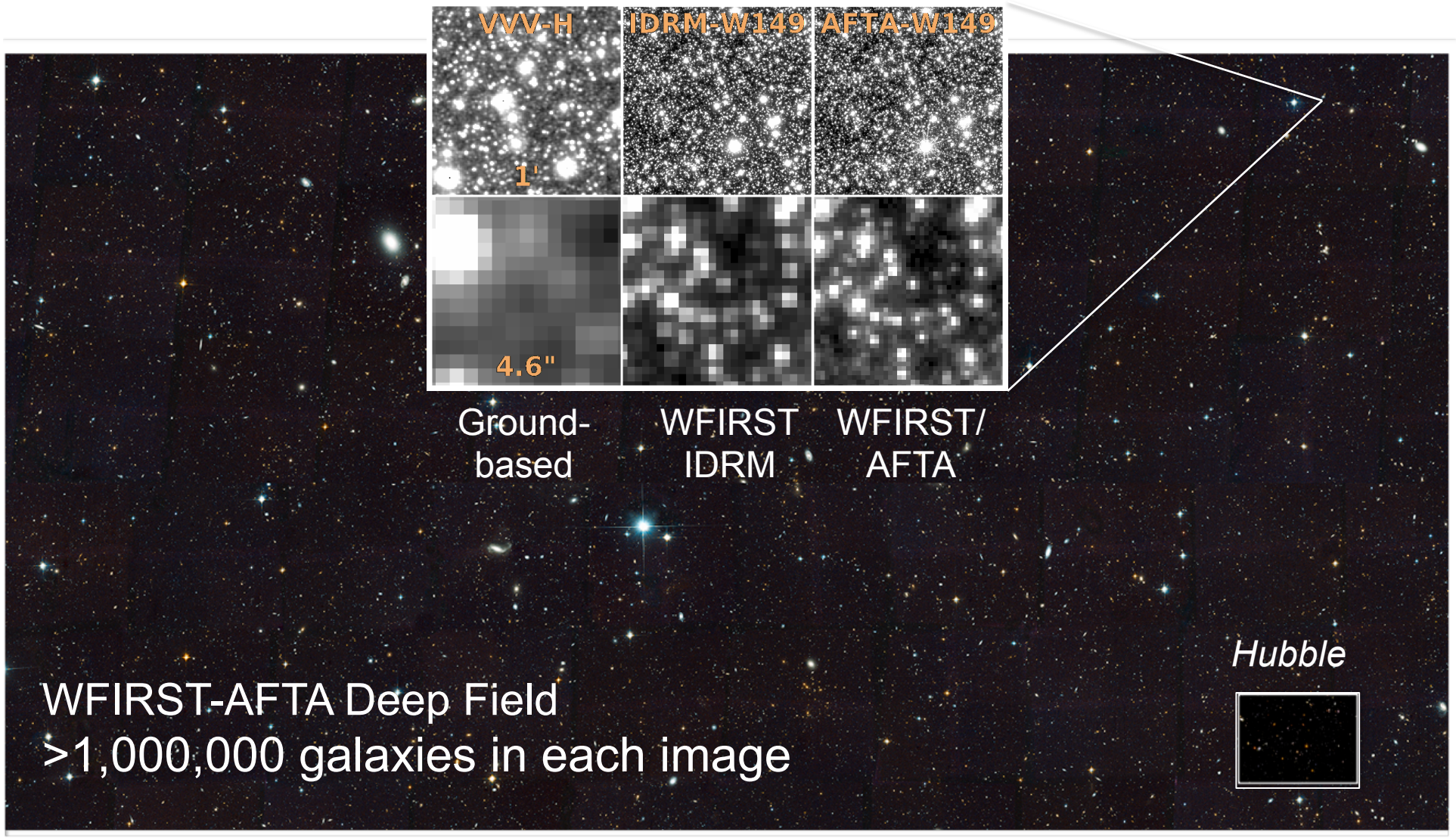
Complete the exoplanet census: find hundreds of Earth-mass planets in the habitable zone!



Direct imaging & spectroscopy via coronagraph: characterize exoplanets to study the variety of atmospheres and understand environment & habitability

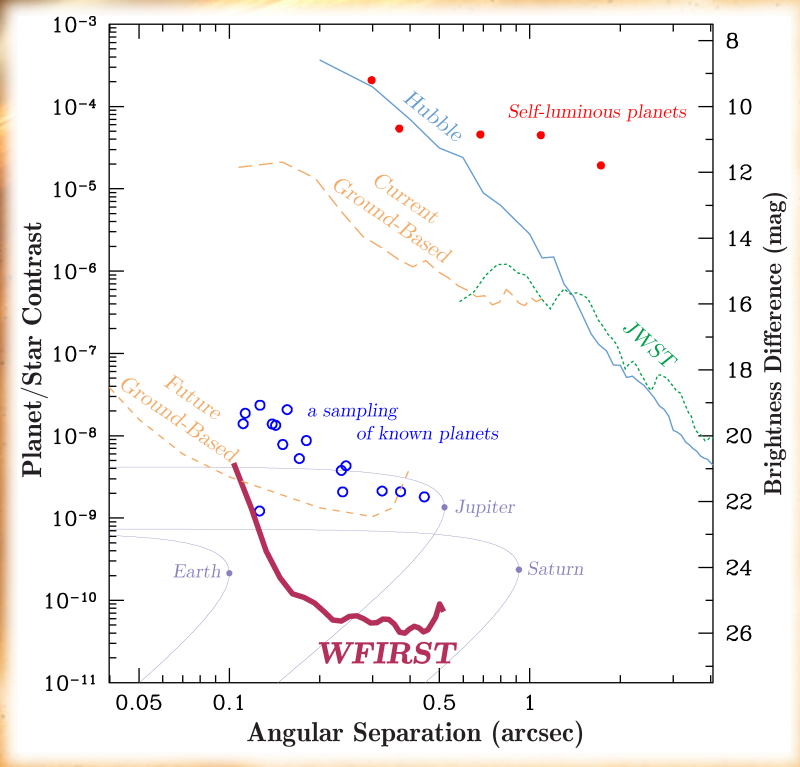
# WFIRST/AFTA Comparison

#BTH



# WFIRST/AFTA = Coronagraph

- NRC Committee: *"The 2.4-m WFIRST/AFTA telescope provides an opportunity to include a coronagraph with compelling capabilities that the WFIRST/IDRM 1.3-m does not."*



# Why Astronomers Want WFIRST