

# Great Observatories Workshop

*Thoughts from Meg Urry,  
Pontifex*

## **Pontifex**

*– a member of the council of  
priests in ancient Rome*

## **Pontificate**

*– to speak or express opinions  
in a pompous or dogmatic way*

***Pontifex?***

CMU:

- Planets & Stars
- Star formation & ISM
- AGN & QSOs

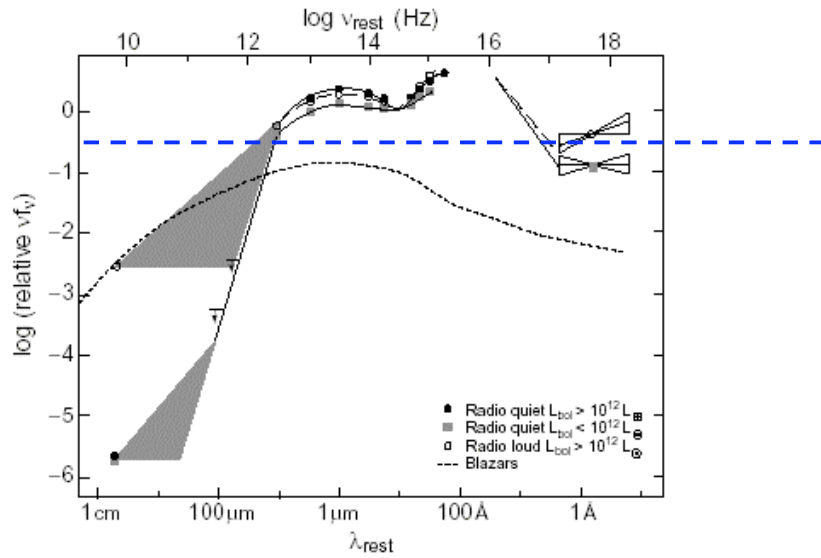
RE:

- Stellar populations
- Galaxies
- Clusters
- Cosmology

## Key features

- High spatial resolution
- Low background
- High sensitivity
- Excellent, uniform calibration

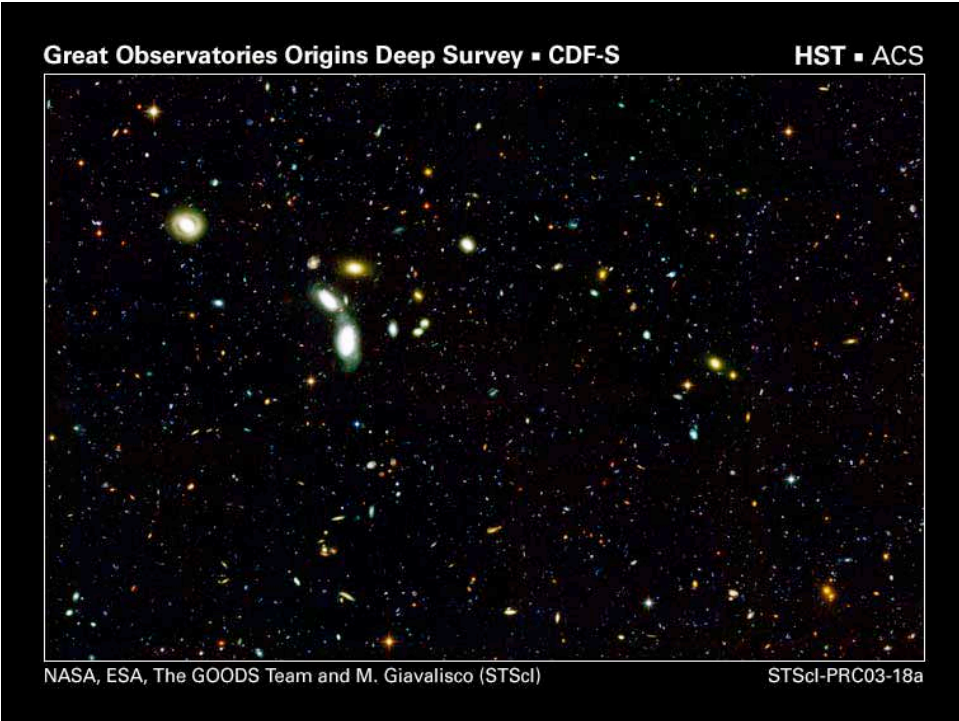
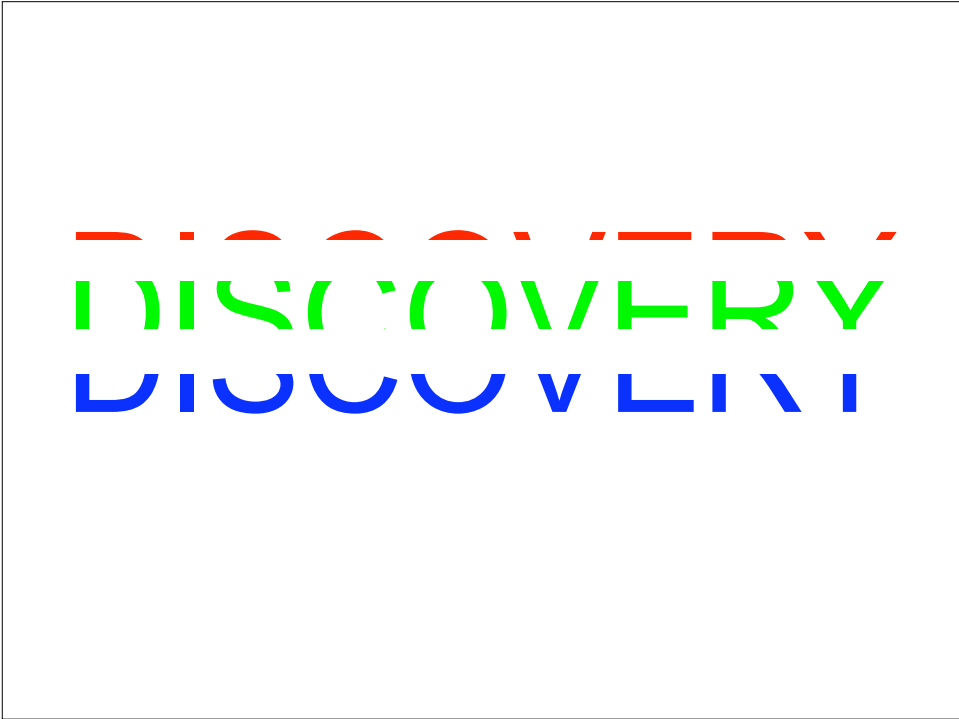
AGN emit roughly equally across  
>10 decades in energy



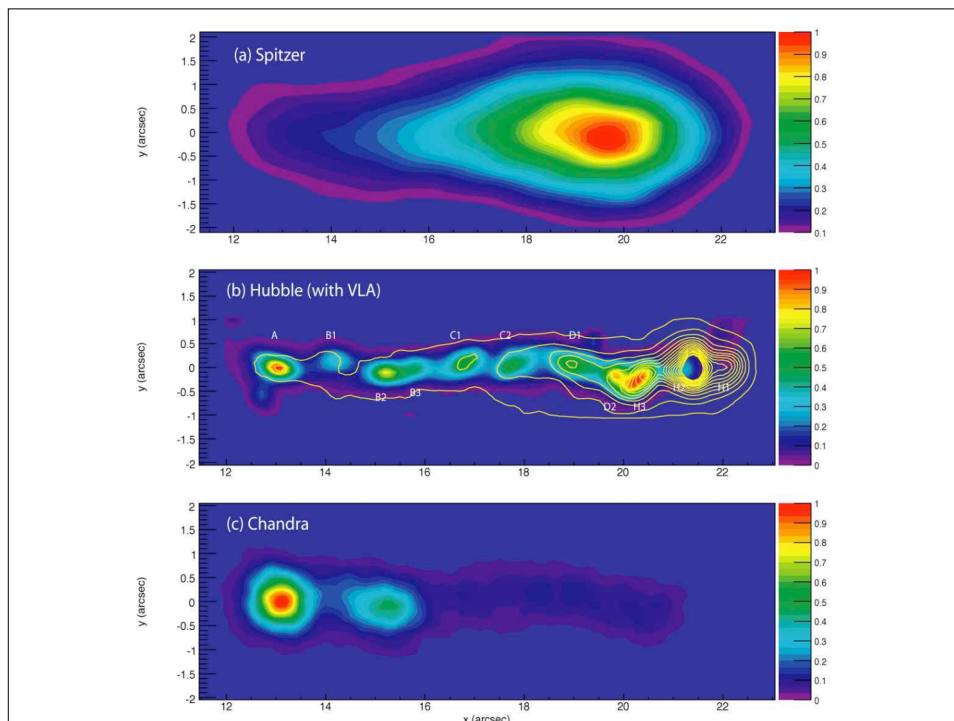
DISCOVER

DISCOVER

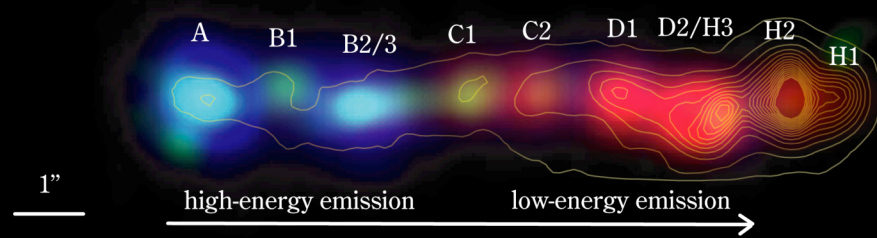
DISCOVER



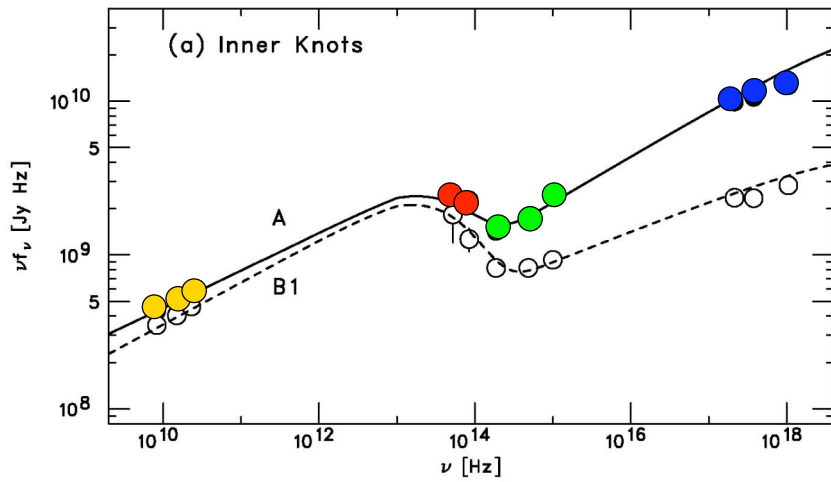
- Policies can drive science
- Other science
  - kpc-scale jets (BH power)



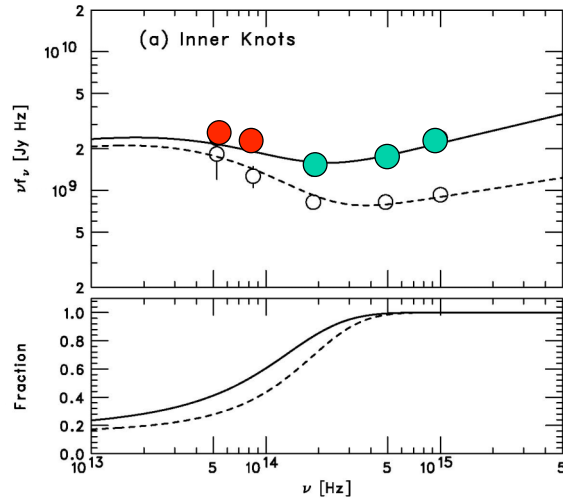
3C 273 jet VLA Spitzer\* Hubble Chandra (\* deconvolved)



Uchiyama et al. 2006

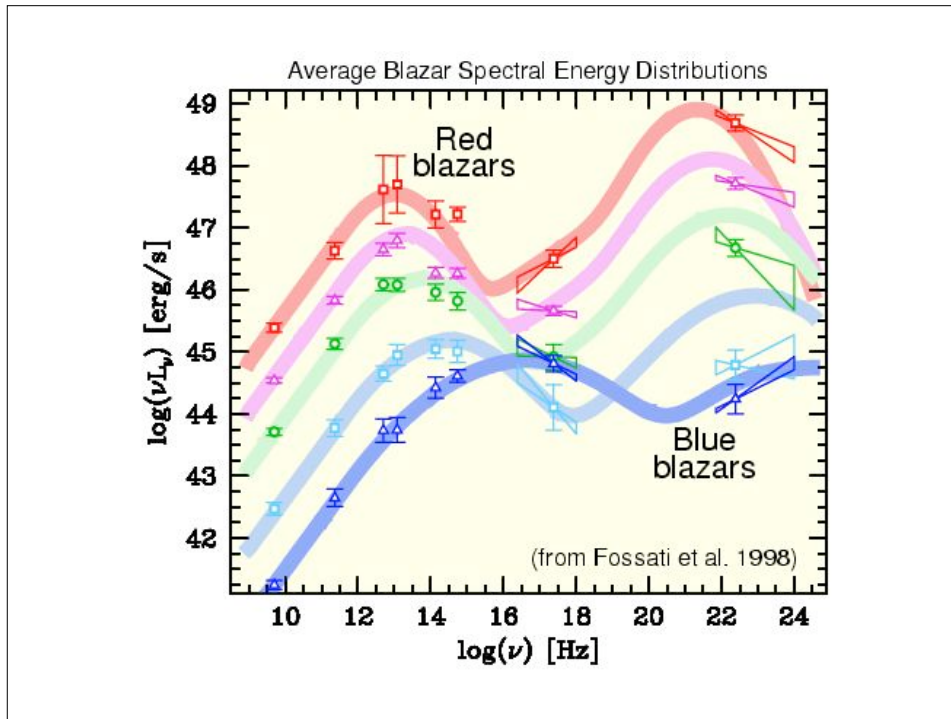


Uchiyama et al. 2006



Uchiyama et al. 2006

- Policies drive science
  - Other science
    - kpc-scale jets (BH power)
    - Inner relativistic jets (particle acceleration)
- GLAST-Spitzer coordination*



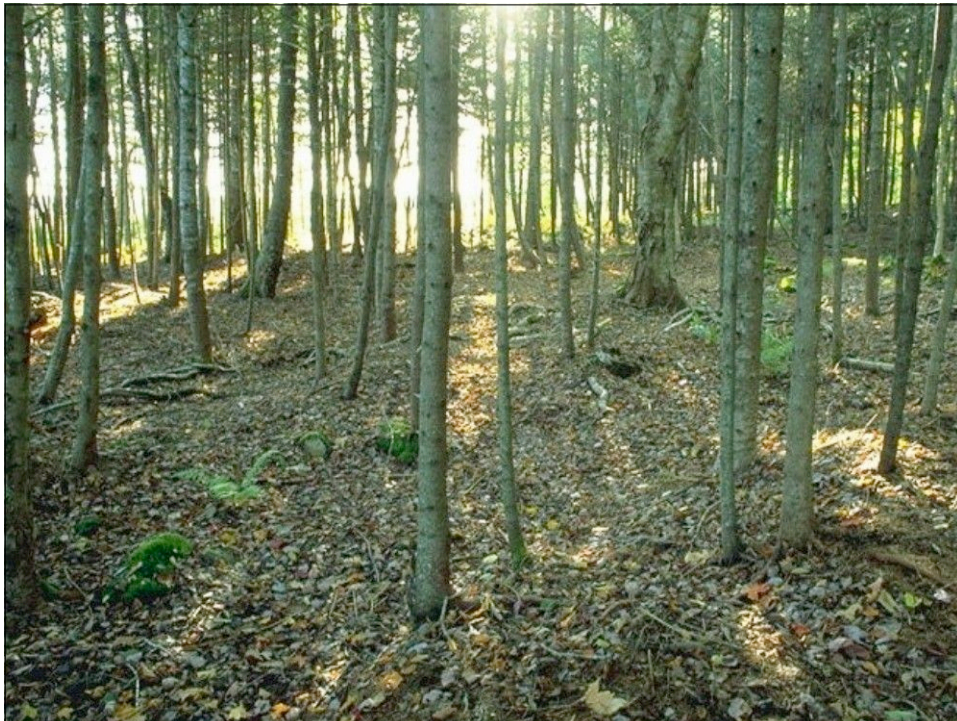
## Limited lifetimes

- Spitzer
- HST
- Chandra



# Uncertain future

- HST SM4: WFC3, COS
- JWST
- SOFIA
- WISE (NuSTAR, future Explorers)
- SIM
- Con X, LISA
- JDEM




# Great Observatory future


- Compelling questions


## Q2C Key Science Questions


 What is dark matter?

 What is dark energy?


 How did the universe begin?


 Was Einstein right about gravity?


 How have neutrinos shaped the universe?


 What are nature's most energetic particles?

 Are protons unstable?

 What are the new states of matter?

 Are there more space-time dimensions?

 How were elements from Fe to Uranium made?

 Is a new theory of light and matter needed?

## Great Observatory future

- Compelling questions
- Focused observing programs
- Innovative science
- Risk