Advanced Camera for Surveys vs HDF

Field ~ 2 x Ω_{HDF} ~ 11 sq arcmin

0.05" px

Orbits: N ~ 7 $(S_{lim} / S_{HDF})^{-2}$ per filter per frame

IR (z-band)

How much would not have been discovered from HDF if it had been 1^m, 2^m times brighter?

Special Interest Groups

- Galaxy Evolution
- Large Scale Structure
- Supernovae
- Clusters
- Weak Lensing
- AGN
- Stars

Galaxy Evolution

- Bean counting - 100BG (Eddington)
  - What are the faint galaxies and when are we observing them ?
  - Mergers seem to happen much less than we expect
- Growth of galactic structure
  - Protogalaxies at yet higher z
  - Spirals: disk, bar and grand design formation
  - Ellipticals: assembly from what and when?
  - LSB halos are likely to be inhomogeneous => missing light?
  - Importance of AGN, ULIRGs?
- Wide fields 1000 min^2 to ~ 1.3 mag brighter than HDF
  - N~2orbits x 4filters x 100frames~800 orbits/field
- Deep field to 2mag fainter: N~ 50 x 4x 1 =200 +flanking

Large Scale Structure

Cosmological stage has been set

- h=0.7, $\Omega_0 = 0.3$, $\Omega_\Lambda = 0.7$, $\Omega_b = 0.04$, adiabatic HZ

Test and refine this model

- Weak lensing measurement of dark matter distribution
  - Needs contiguous fields, rotations. N~ 2 x 3 x 100 ~ 600
- ~100Mpc structure related to acoustic peaks??

Discover empirical laws of galaxy formation and how light relates to mass distribution

- Allows sophisticated redshift surveys
  - LCRS, 2DF, SDSS =>DEEP etc => ACS/WF3
  - Needs > degree spacings

What is the relationship to SNAP?

Supernovae

SN case for dark energy good, but less compelling than CMB but vital to relate contemporary to ancient universe and measure Ω_0 from q_0

Need high z SNIa

- Many: z ~ 1-1.5
- Few: z > 1.5
- Need to quantify

Both wide and deep surveys

Limited by ground-based follow up?

Need to relate to SNAP

Clusters

- High z clusters are good probe of structure formation theory
  - Weak lensing-selected clusters may be particularly valuable
- Probably not a driver

AGN

- Current issues that need surveys:
  - Host galaxies
  - Obscured AGN
    - SCUBA (hi z)
    - HX (lo z)
  - Demography, masses, efficiencies
- Needs wide fields, repeat observations
- N ~ 2 x 3 x 100 ~ 600

Stars

- Halo survey
  - chemical evolution
  - MACHOS
  - Proper motions
    - Especially WD / subdwarfs
  - Probably not a driver
- Low latitude survey
  - Separate from extragalactic surveyneeds
  - N ~120 suggested

Deep vs Wide

- Can't do everything with one program

"Jordan River is Deep and Wide"

Deep field(s)

~2 mag deeper than HDF => ~200 orbits/field

- Director's Discretionary Time?

- Wide fields
  - Different needs ~ 100-800 orbits per field
  - => Large legacy projects
  - Join science where possible
    - eg AGN + wide faint galaxy survey
  - Include in call for proposals and TAC instructions

"Milk (Galaxies) and Honey (Dark Energy) on the Other Side"

Field, Filter, Exposure Selection

Integrate existing/planned ground-based surveys

- North **and** South

Joint proposals from communities needing similar data

Create fake data sets

- ACSdata simulation by orbit, filters
- Imprint LSS, weak/strong lensing, morphology, SN
- =>Test algorithms, understand confusion limits etc
- =>Refine observing procedures
  - Orientations, continguity, filters, PSF, stars, time spacing

Will having a 19^{m} quasar, outskirts of globular cluster etc in the field affect other observations?

"Sister, help to trim the sail"