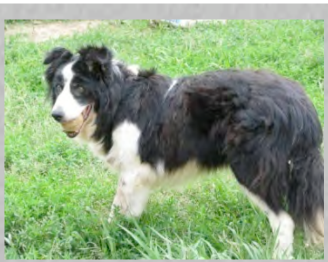
Community fields & HST
STUC
1 November 2010

The HST Legacy



HST observations have revolutionised many areas of scientific enquiry

..but HST has also had a significant impact on how astronomers do science

- Large-scale collaborations
  - HST key projects
- Hubble Fellowship Program
  - High-profile postdoctoral appointments without geographical restrictions
- Innovative use of Director's Discretionary time
  - Scientifically risky programs
  - Immediate data access for the broad astronomical community

Supplementing DD programs

- DD programs, notably the HDF and UDF programs, have provided kernels for large-scale follow-up programs with both ground- and space-based observatories.
- HDF → HDFS → CDF → GOODS N/S → COSMOS → CANDELS

Supporting community research

Building on the initial investment of DD time, certain fields have been observed so extensively that they have established themselves as community resources:

- Multi-wavelength, multi-mission datasets
- Supplementary spectroscopic and imaging data from a wide range of international telescope facilities

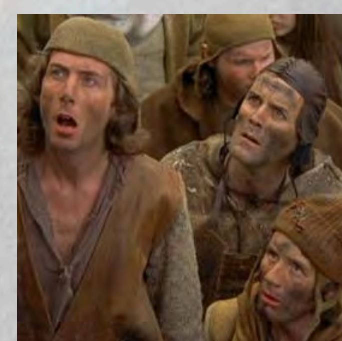
The past investment in these fields establishes a foundation that enables breakthrough science with new data from new missions. Given the value of such fields for research across a broad range of science areas, we ask the STUC to consider identifying “community fields”.

- Future observational programs, leveraging past investments, should provide rapid community access to data and data products to maximise the scientific returns.

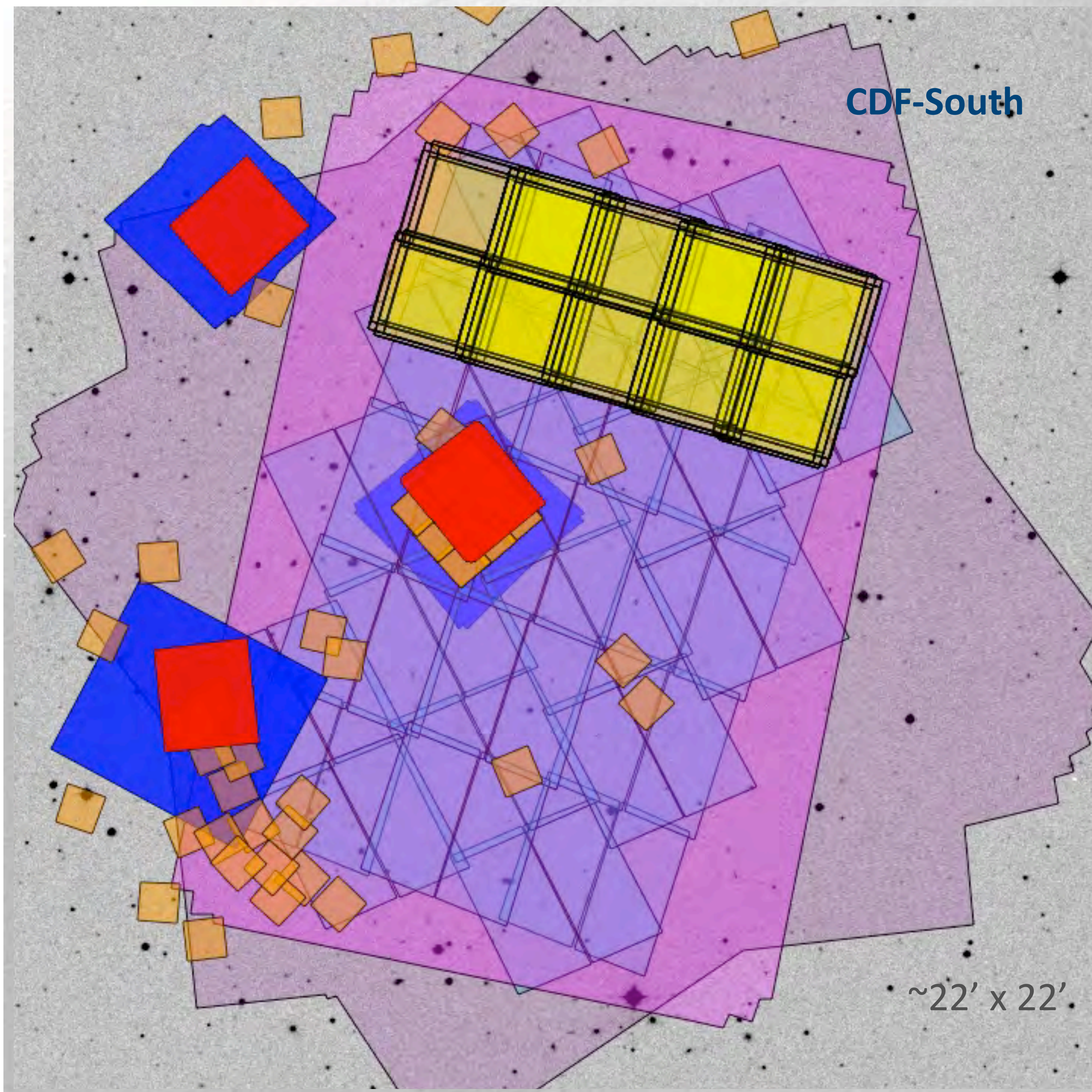
An analogy

"**Common land** is land owned collectively or by one person, but over which other people have certain traditional rights, such as to allow their livestock to graze upon it, to collect firewood, or to cut turf for fuel. By extension, the term "commons" has come to be applied to other resources which a community has rights or access."

➔ Resources that have no restrictions on use and are available to all, no matter their status.



An example of a potential community field



Chandra Deep Field South

1999-2000 Chandra CDF-S
2002-2003 HST ACS GOODS
2003 HST ACS UDF
2003 HST NIC UDF
2004 Spitzer GOODS
2003-2007 HST NICMOS
2005 HST ACS UDF
2009 HST WFC3 ERS
2009-2010 HST WFC3 UDF
2010-2011 Chandra 4Ms
2010-2012 HST CANDELS
2010-2011 HST WFC3 grism
2010-2011 Herschel

Overall, ~1,000 HST orbits
~5 Msec on Chandra
~325 hours on Spitzer

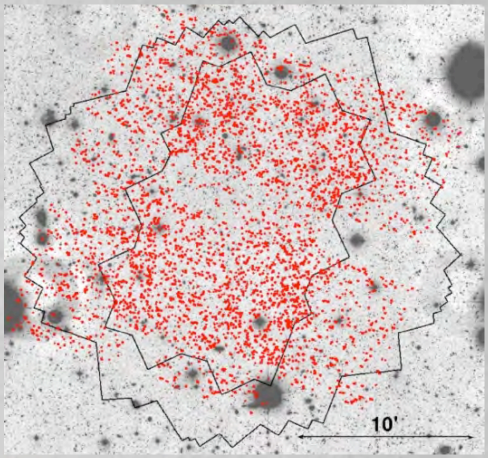
CDF-S: Ground-based observations

Extensive investment of resources for imaging and spectroscopic follow-up observations

e.g. ESO GOODS (S) VLT

Campaign	Instrument	Observing time
Near-IR	ISAAC JHK to ~25	476 hours
	ISAAC K to ~25.6	
U & R band	VIMOS	40 hours
Visual/red spectra	FORS2 5500A-1m	130 hours
Blue/Visual spectra	VIMOS 3500-6900A	~80 hours
B/V/R/I spectra	VIMOS 4000A-1m	~40 hours

All these datasets are public



Spectroscopic follow-up within CDF-S

SYNOPSIS OF HST DEEP SURVEYS

Date	Survey	Facility	Field/ Location	Chandra	HST				Spitzer, Herschel	Area (arcmin^2)	Epochs	No. of Opt/IR Spectra	Primary Results / Discovery Space
				Xray	V	I	Z	NIR	MIR/FIR				
1995-97	HDF(-N)	HST/ WFPC2	CVZ 12h +54°		28.2	28.2		27.5		4.3	1	130	•With Keck spectroscopy validated concept of photometric redshifts •Star formation rates for 1<z<3 •Quantitative morphologies
1998	HDF-S	HST/ WFPC2	23h -60°		28.2	28.2		27.0		4.3	1		•Account for cosmic variance •IGM metallicities
2000	CDF-N	Chandra	HDF (-N)	3.0×10^{-17}						450	1	~300	•Resolved X-ray background •Probed faint AGN up to z~6 •Spectroscopic redshifts for large homogeneous AGN samples
2000	CDF-S	Chandra	03h -27°	1.9×10^{-17}						450	1	~300	
2002	GOODS-N ACS	HST/ ACS	HDF-N		27.7	27.2	27.1			150	10	~500	•Galaxy LF to z~5 (i-dropouts) •SN / Dark Energy tp z~1.5 •Galaxy size evolution •SFR evolution z~0 - 1 •Red sequence evolution to z~1.5
2002	GOODS-S / GEMS ACS	HST/ ACS	CDF-S		27.7	27.2	27.1			150	10	1500 + COMBO-17	
2003	GOODS Spitzer	Spitzer	HDF-N CDF-S		27.7	27.2	27.1		24.0 (3 μm) 3-160 μm	600	1	2000 + COMBO-17	•Dusty star formation / SFR-Σ relation at high z •Obscured AGN at the peak of galaxy evolution (z~2-3)
2004	UDF	HST/ ACS	CDF-S		29.3	28.7	29.2	27.0	24.0 (3 μm)	10	1	106 (ACS grism)	•Galaxy LF to z~6 (z-dropouts) •Detection of galaxies at z~7 •"Clump" morphological class
2005	UDF05	HST/ ACS	CDF-S		29.0	28.4	28.9	27.5	24.0 (3 μm)	20	1		•Account for cosmic variance •Galaxy LF to z~6 •Detection of galaxies at z~7
2005	AEGIS/EGS	HST/ ACS	14h +53°	5.3×10^{-17}	27.4	27.0				700	1	~20,000 (DEEP2)	•Galaxy mass / metallicity / morphology relations to z~1.5 •Blue/red sequence, AGN quenching
2005	COSMOS	HST/ ACS	10h +02°	1.9×10^{-16}		26.7				7200	1	~20,000 (VIMOS)	•Dark matter map (from weak lensing)
2009	UDF09	HST/ WFC3	CDF-S		29.3	28.7	29.2	28.8	24.0 (3 μm)	15	1	106 (ACS grism)	•Galaxy LF to z~7 •Detection of galaxies at z~8
2010-13	CANDELS (+ WFC3 ERS2)	HST/ WFC3	HDF-N, CDF-S, AEGIS, COSMOS, UKIDSS/ UDS		27.4 – 27.7	26.7 – 27.2	27.1	27.0		770	10	~4000 + HST grism	•Galaxy evolution z~1.5-8 •Tracing the merger sequence •SN / equation of state to z~2.5
2010	GOODS-H	Herschel							100–500 μm				•Cold dust / SFR at all redshifts

The JWST context

The STScI Director has established the JWST Advisory Committee (JSTAC) [analagous to the HST STAC]

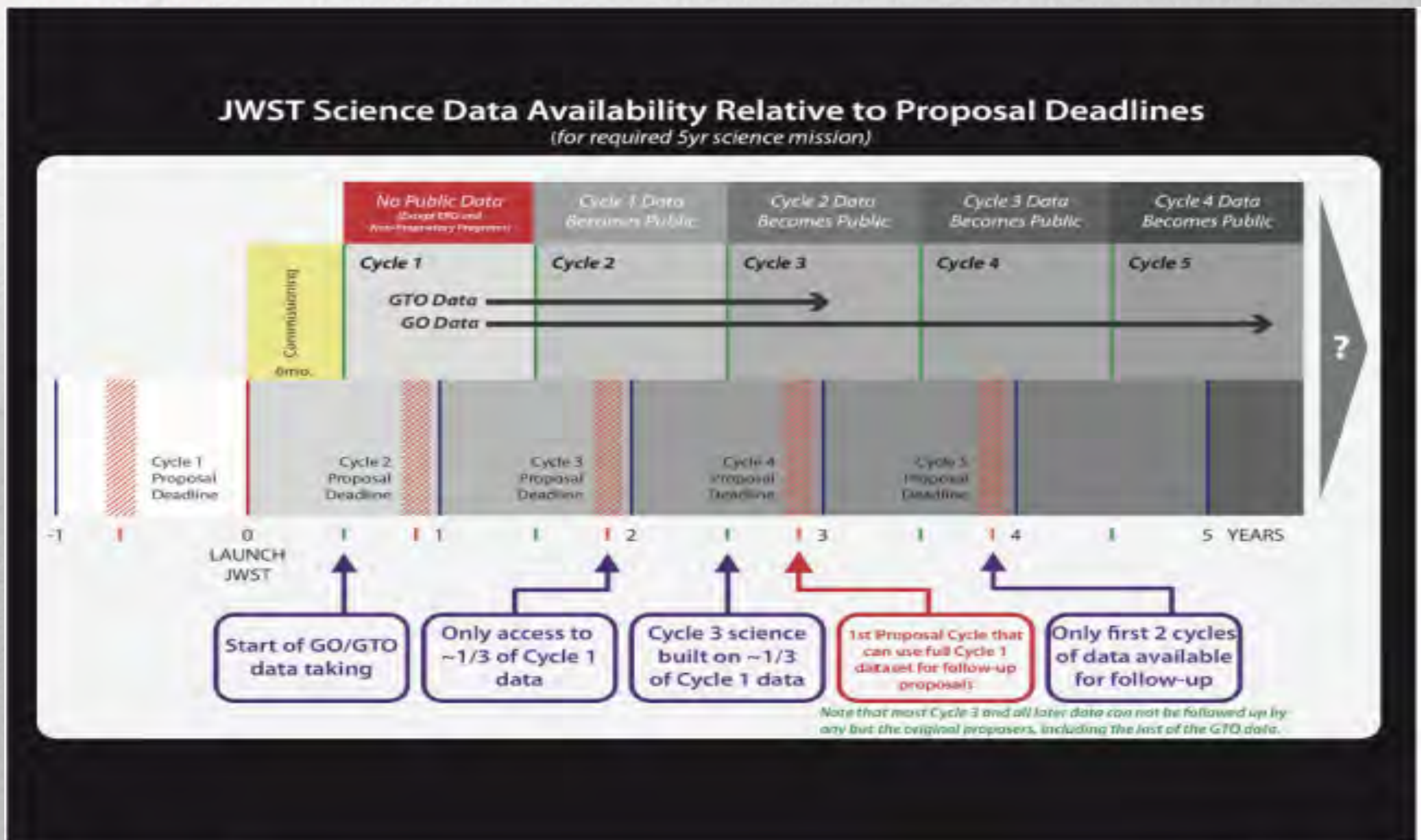
- Chair: Garth Illingworth
- Members: Roberto Abraham, Neta Bahcall, Steffi Baum, Roger Brissenden, Tim Heckman, Malcolm Longair, Christopher McKee, Bradley Peterson, Joe Rothenberg, Sara Seagar, Lisa Storrie-Lombardi, Monica Tosi
- Ex-officio representatives: Luc Brule (CSA), John Mather (GSFC), Mark McCaughrean (ESA), Eric Smith (NASA HQ)

"The committee is charged with advising the STScI Director on the optimum strategies and priorities, consistent with NASA policy and international agreements, for the operations of the James Webb Space Telescope in order to maximize its scientific productivity."

The JSTAC recommendations are published on the STSCI JWST web-site.

The JWST data release timeline

The JSTAC has expressed concerns regarding the timeliness of community access to JWST observations.



GDI – 11/04/09 JSTAC
(with 7-8 months between proposal deadline and start of science observations)

From
JSTAC Letter #2

JSTAC recommendations

JWST has a limited lifetime, so it is essential that the community has rapid access to data to enable proposers to maximise the scientific return of individual observing programs.

The JSTAC recently made three recommendations regarding community access to JWST observations:

- *The default option for Large programs should be no period of exclusive access*
- *STScI should work with the community to define a First Look/Earl Release Science Program*
- *STScI should convene a committee to define community fields where all JWST data will have no period of exclusive access (zero proprietary period)*

Questions for the STUC

- Does the STUC endorse establishing community fields/targets for future HST proposal cycles?
- If so, what criteria should be used to choose the fields/targets?
  - Is this concept limited to deep extragalactic fields or are there galactic fields that are also candidates?
    - *Orion Nebula Cluster, 30 Doradus, M31 deep fields, Galactic Bulge fields, 47 Tucanae?*
  - Are there individual targets (solar system planets?) that might be considered?
- If community fields are established, should all data be treated equally?
  - Should one discriminate between imaging and spectroscopy?
  - Should one discriminate based on program scale? Program participants?
- What guidelines on proprietary time should be set?
  - Alternative suggestions for optimising science return?
- Are there specific targets/fields that the STUC feel are clear candidates for community fields?