

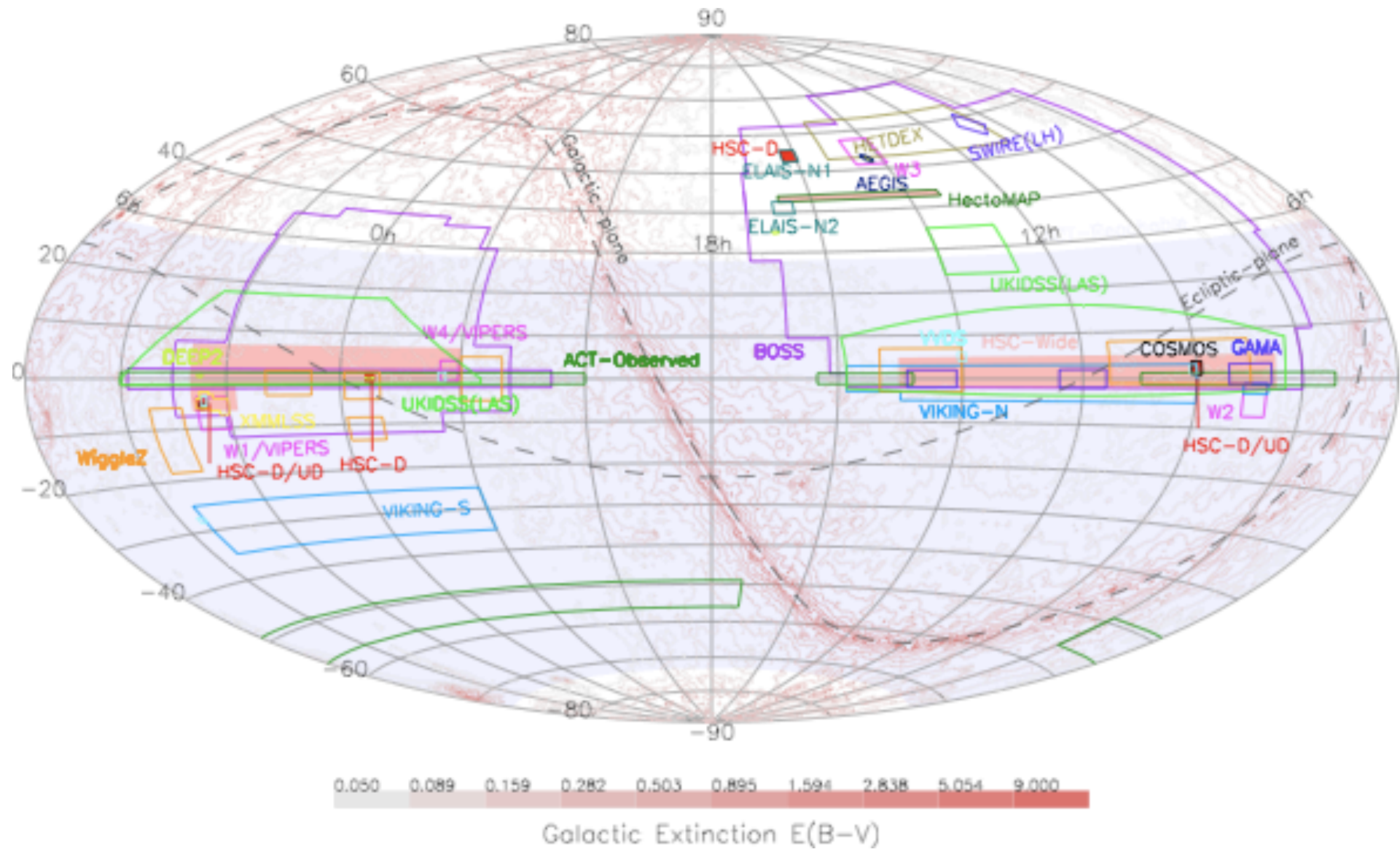


# *Status of the NIR, MIR and u-band data in the HSC Wide, Deep and UDeep*

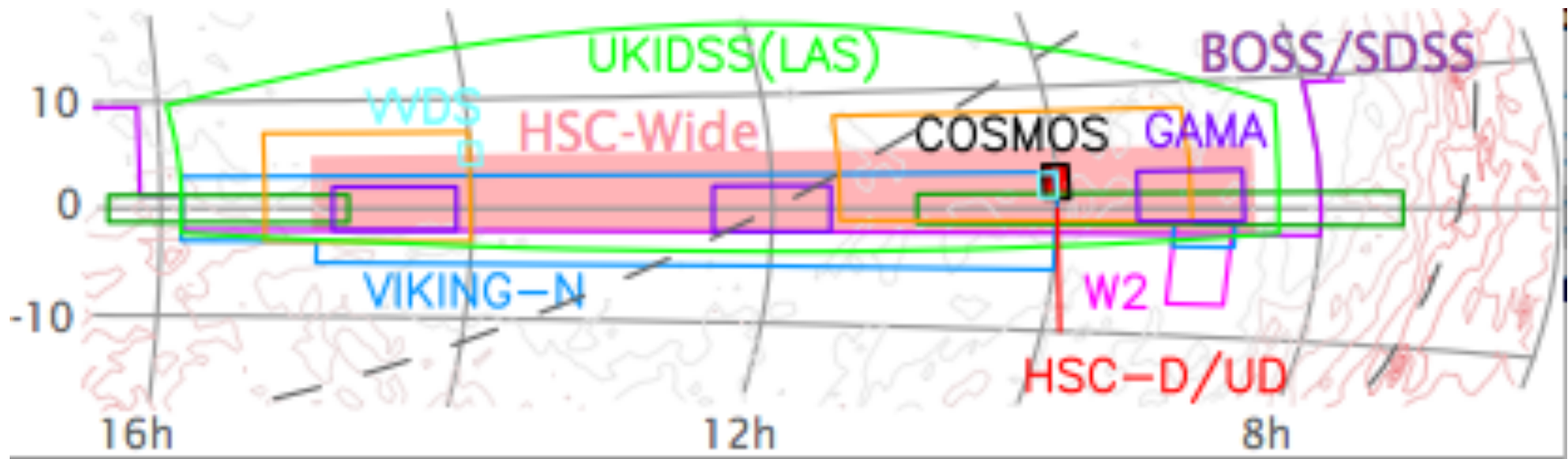
**Seb Foucaud  
NTNU**

SWANS Meeting @ Ehime – 18-20 December 2012

# HSC footprint

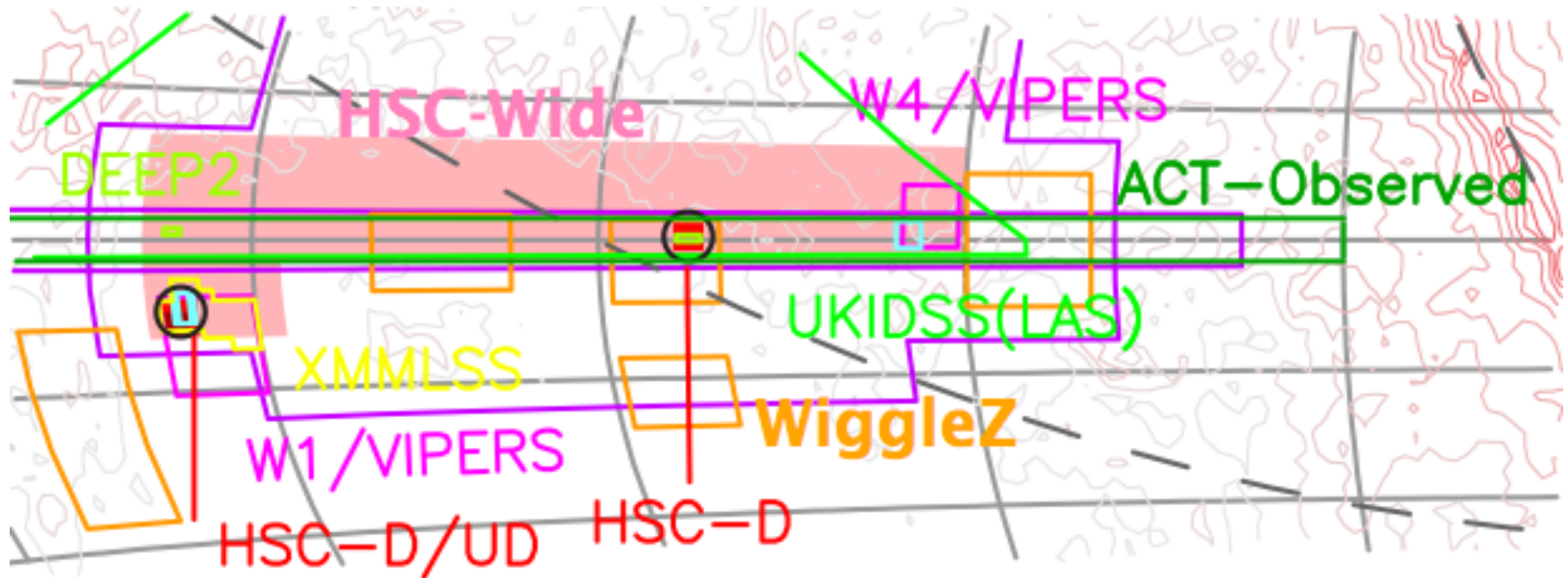


# HSC footprint: Fall



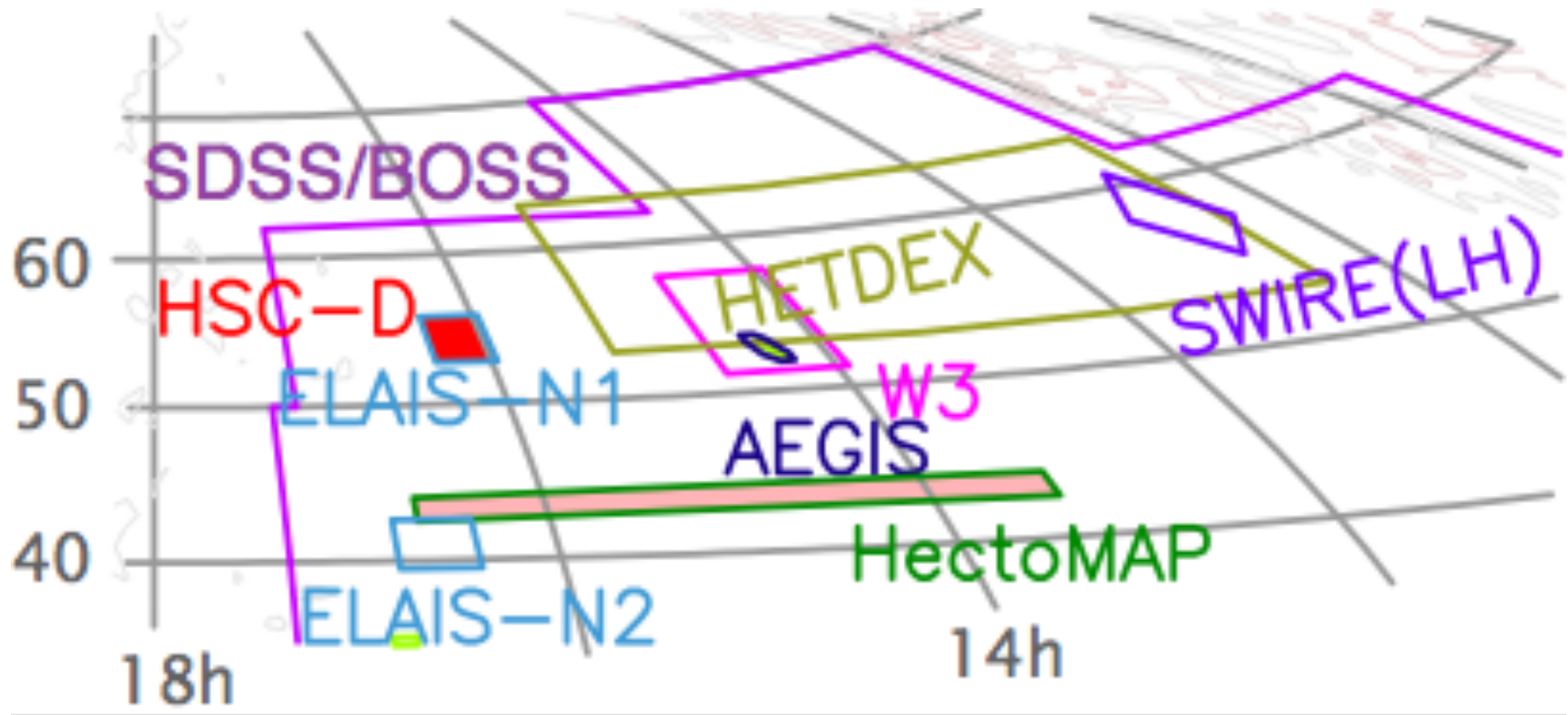


# HSC footprint: Spring





# HSC footprint: North



# (U)Deep: SXDS

- Ultra-Deep:

original 02:18:00.0 -05:00:00.0

**new 02:18:15.6 -04:51:00.0**

- Deep:

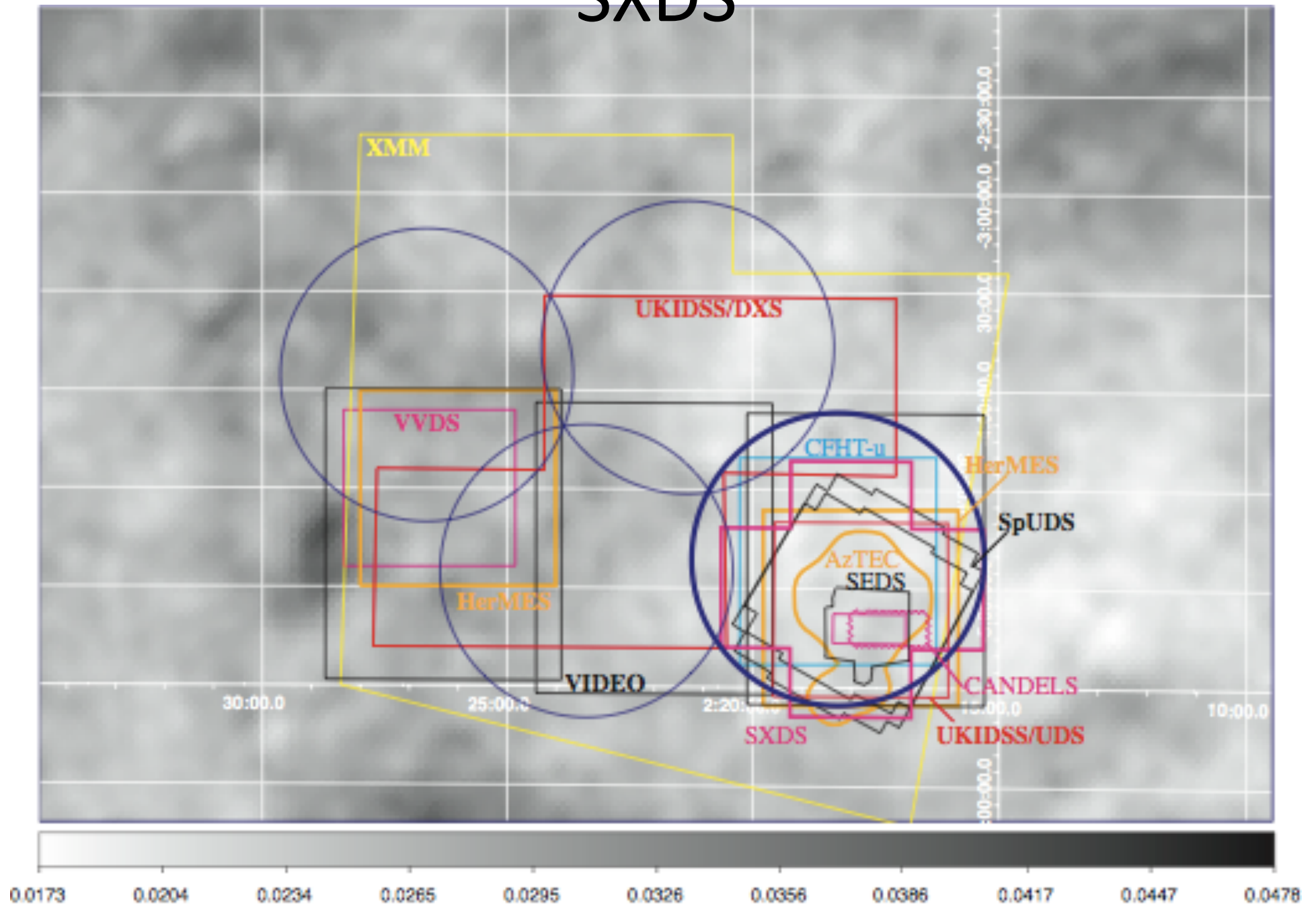
- P1: UD

- P2: ??

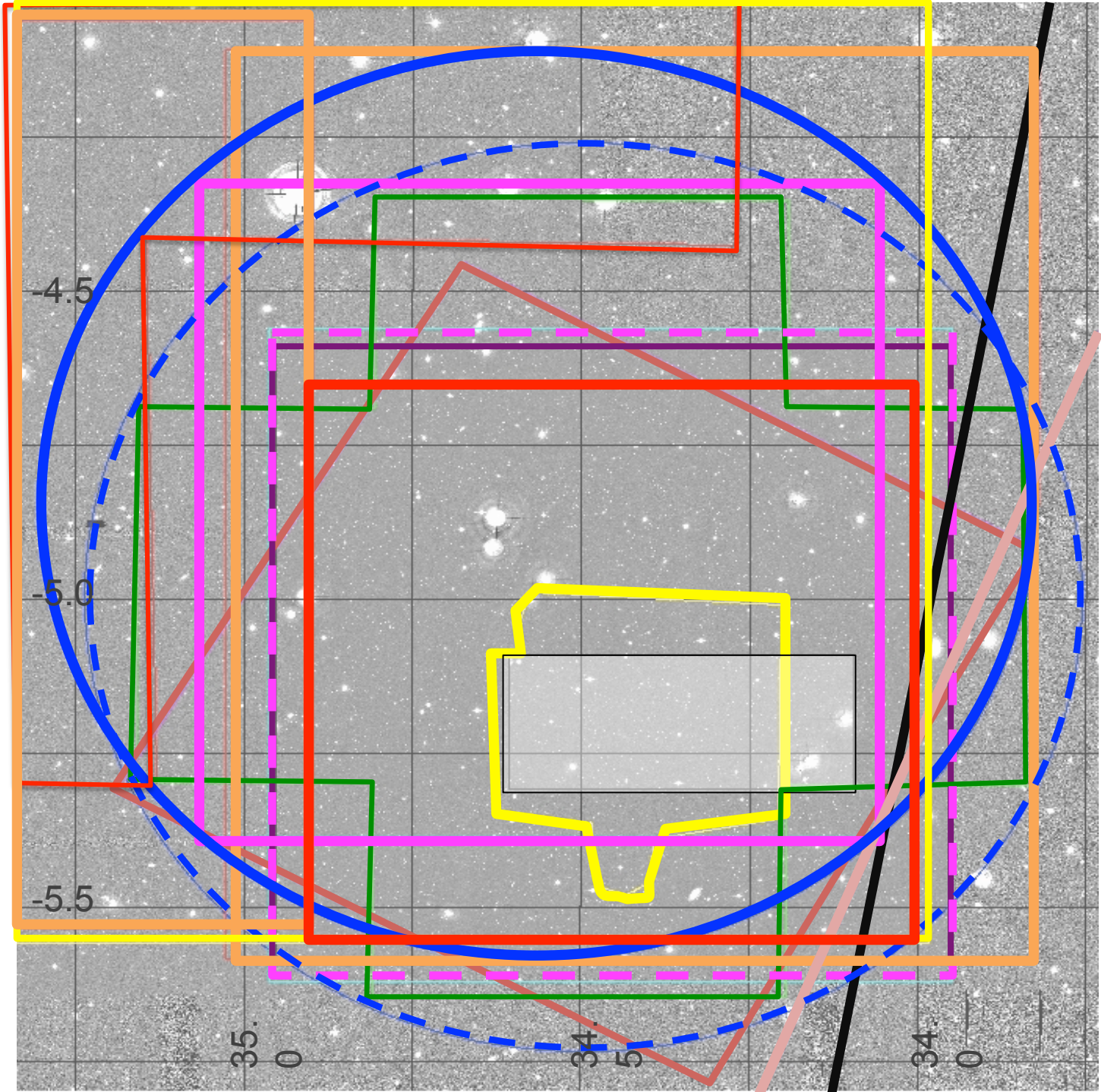
- P3: ??

- P4: ??

# SXDS

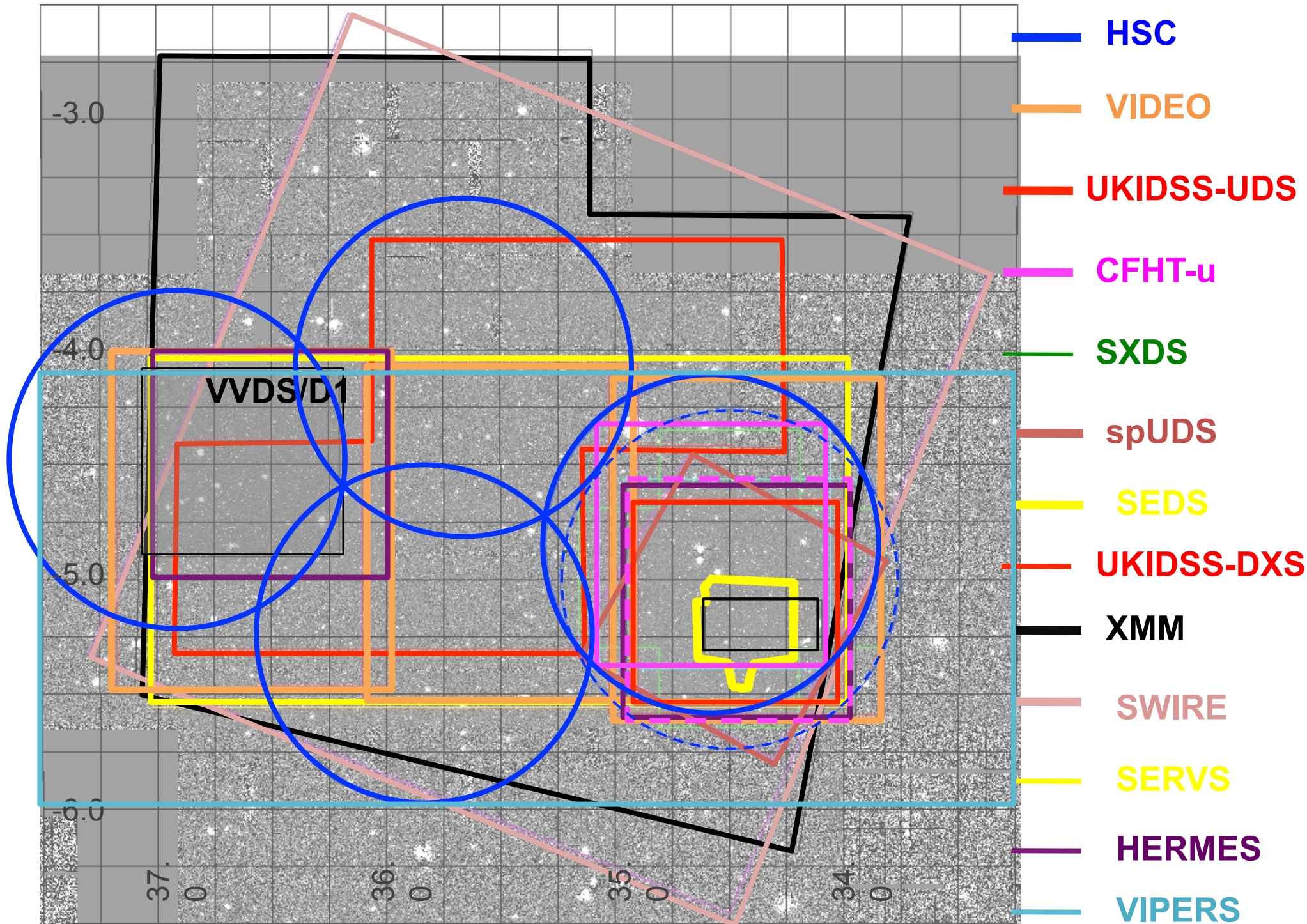






- HSC**
- VIDEO**
- UKIDSS-UDS**
- CFHT-u Deep**
- SXDS**
- spUDS**
- CANDELS**
- SEDS**
- UKIDSS-DXS**
- XMM**
- SWIRE**
- SERVS**
- HERMES**





# SXDS: more...

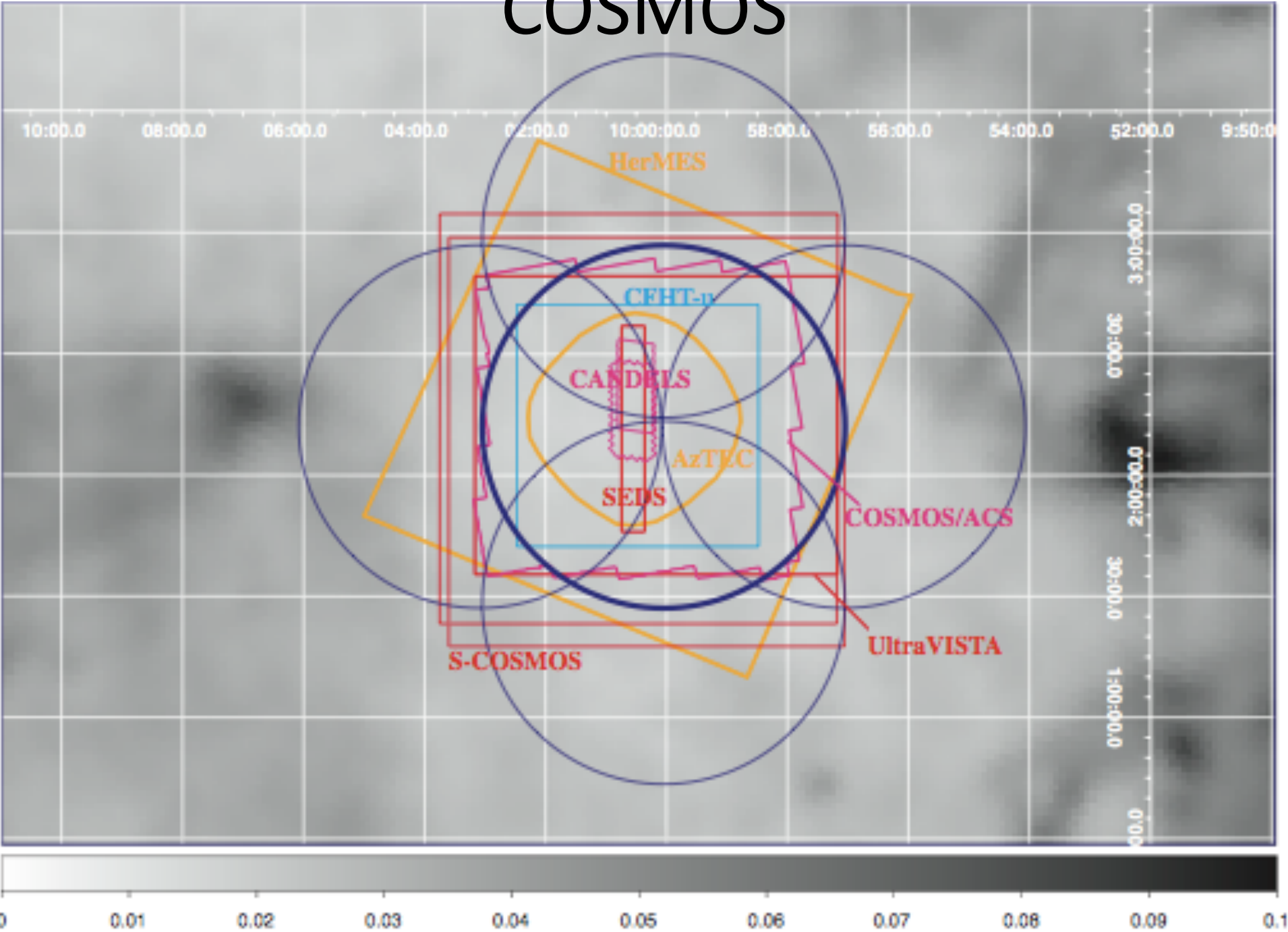
- PRIMUS
- WIRDS
- VLA
- SCUBA (SHADES/SCUBA2)
- GALEX

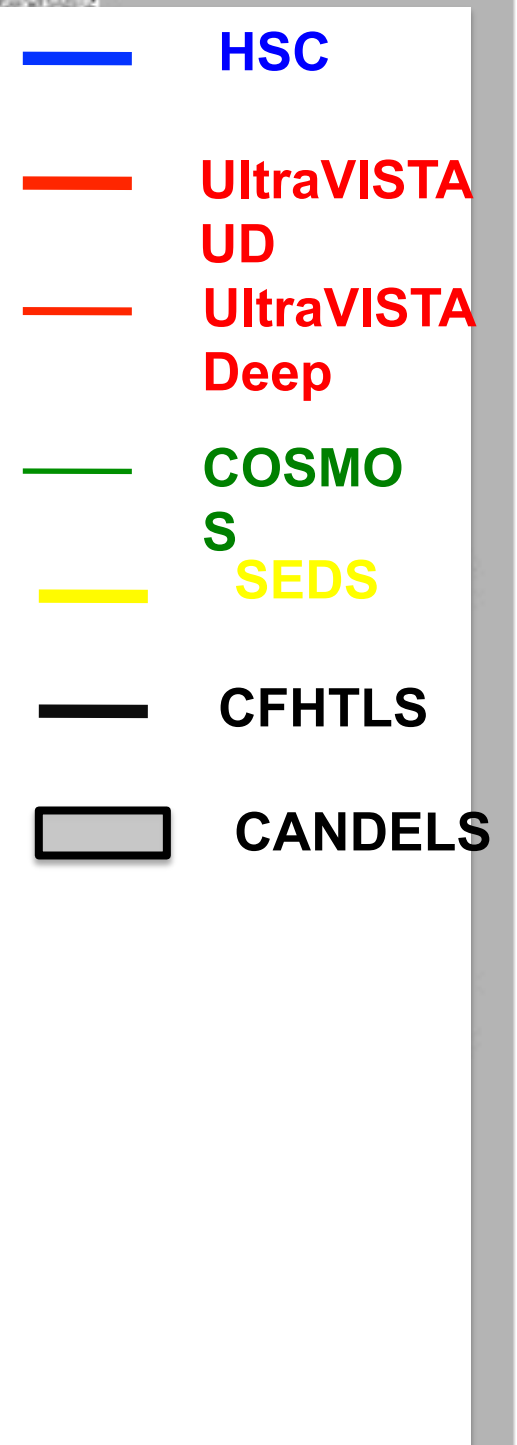
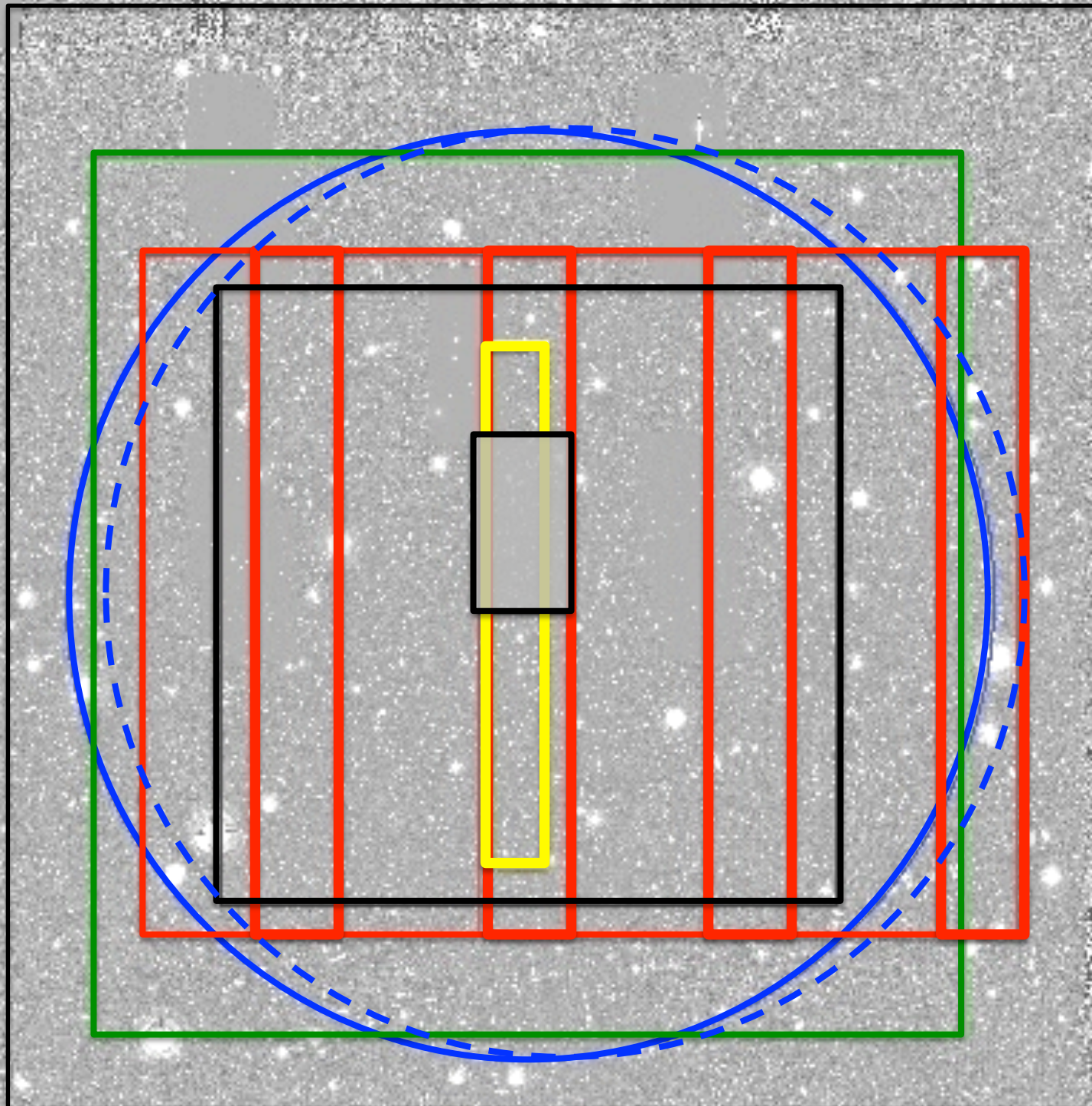


# (U)Deep: COSMOS

- Ultra-Deep:  
10:00:28.6 +02:12:21.0
- Deep:
  - P1: ??
  - P2: ??
  - P3: ??
  - P4: ??

# COSMOS





**HSC**

**UltraVISTA  
UD**

**UltraVISTA  
Deep**

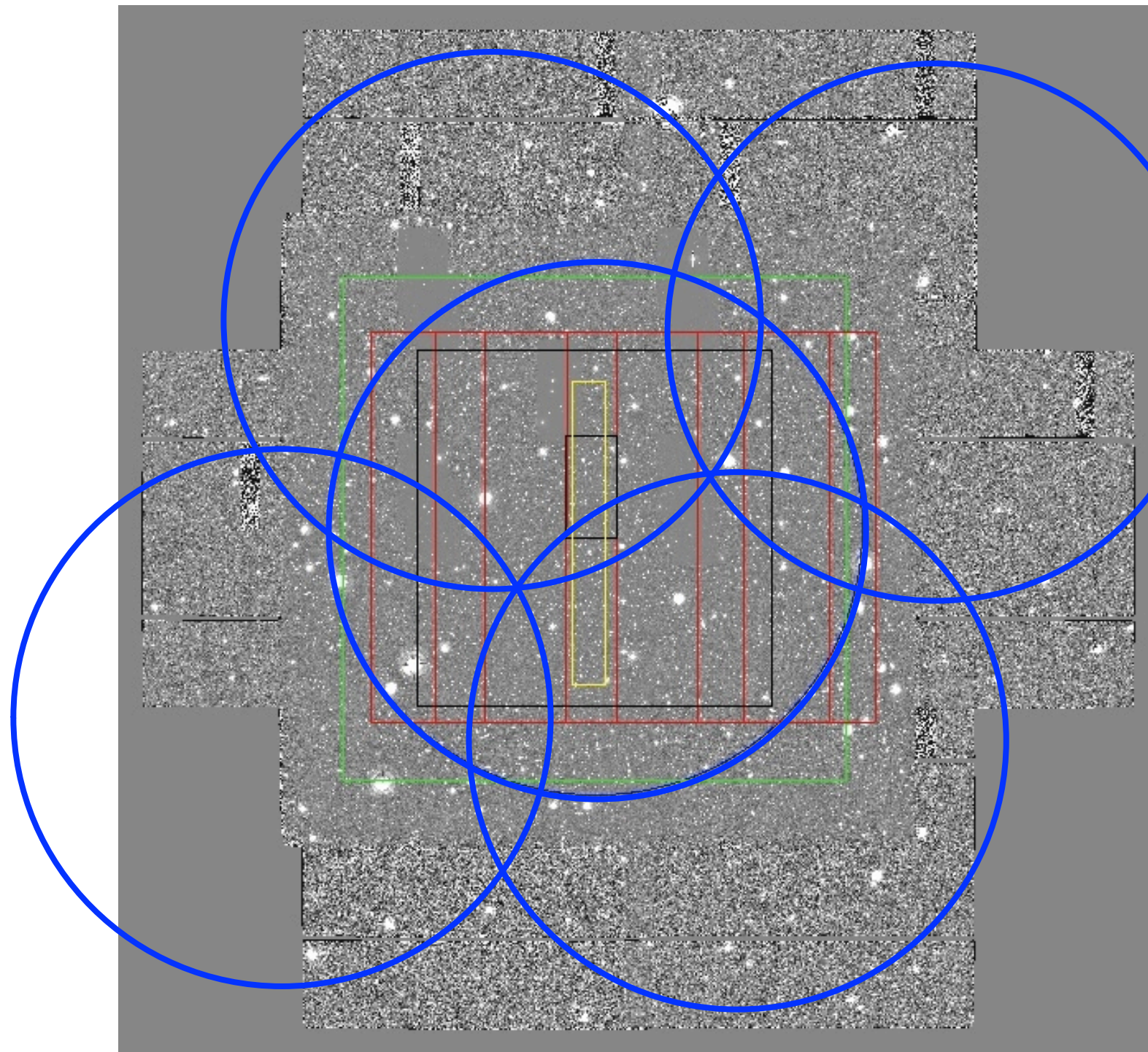
**COSMOS  
S**

**SEDS**

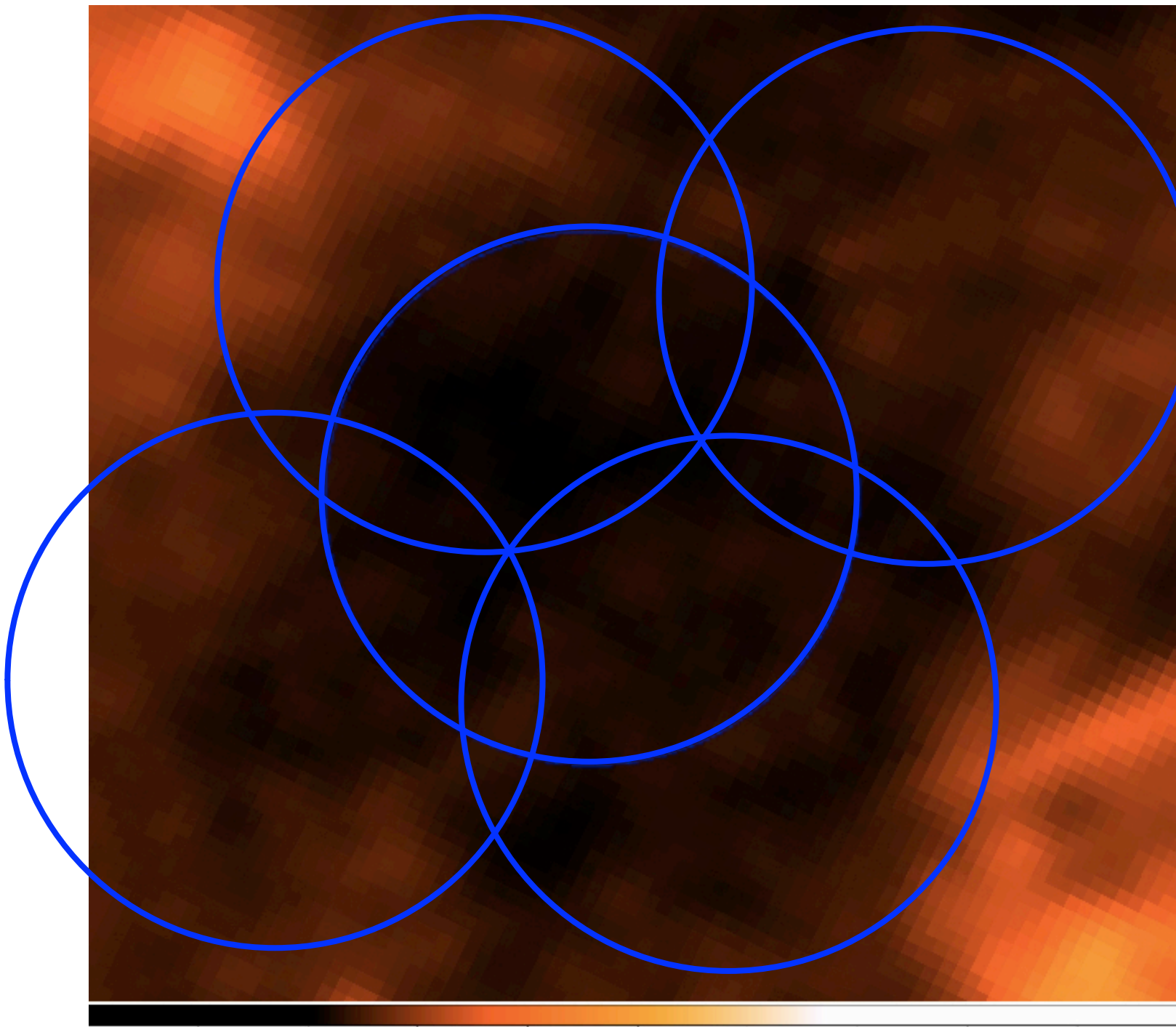
**CFHTLS**

**CANDELS**











- HSC**
- UltraVISTA UD**
- UltraVISTA D**
- COSMO S**
- SEDS**
- CFHTLS**



0.04 0.08 0.12 0.16 0.20 0.24 0.28 0.32

-  **HSC**
-  **UltraVISTA**  
**UD**
-  **UltraVISTA**  
**D**
-  **COSMO**  
**S**
-  **SEDS**
-  **CFHTLS**

# Cosmos: more...

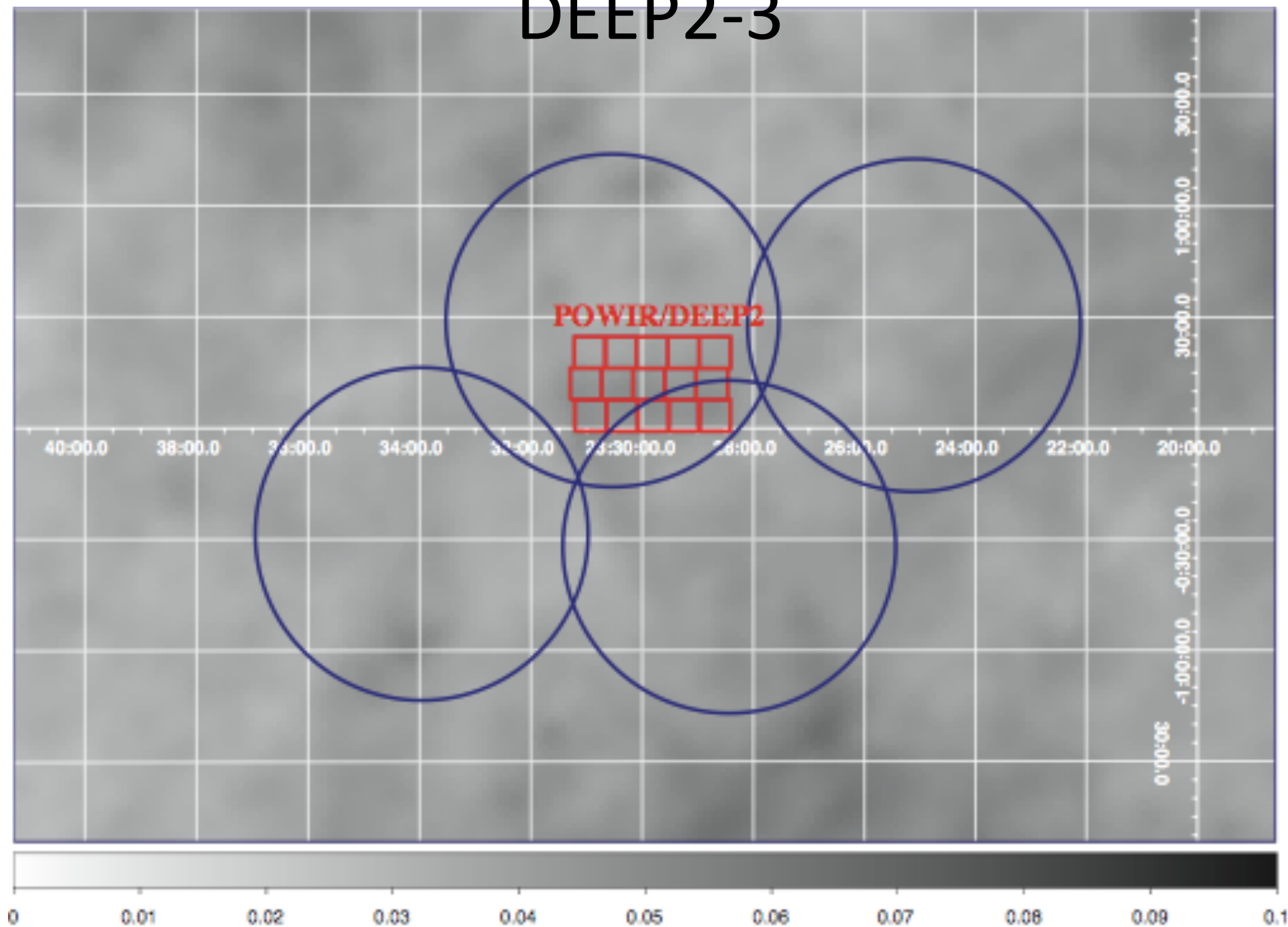
- PRIMUS
- WIRDS
- VLA
- GALEX
- HERMES
- XMM
- Chandra
- **SPLASH!**

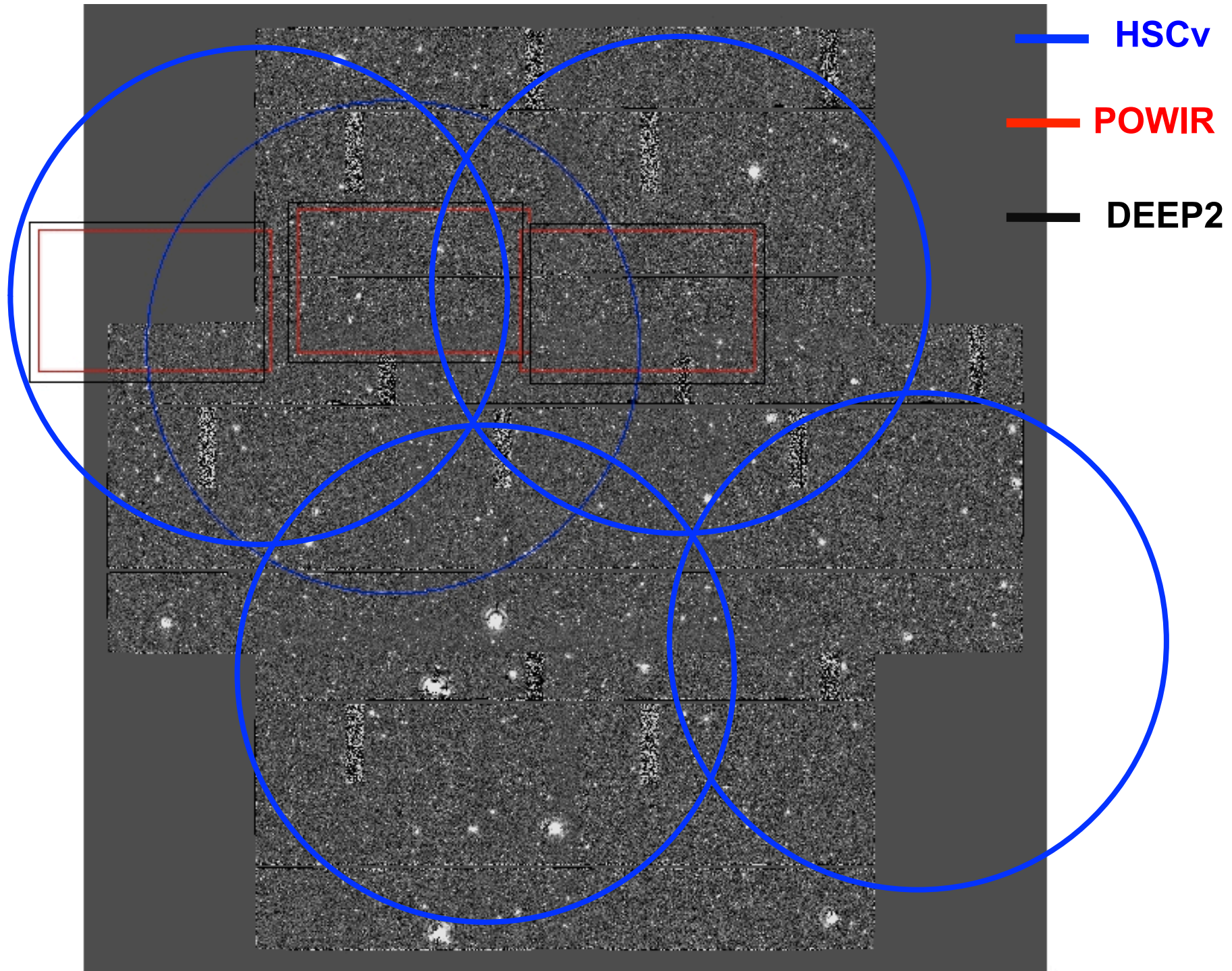


# Deep: DEEP2-3

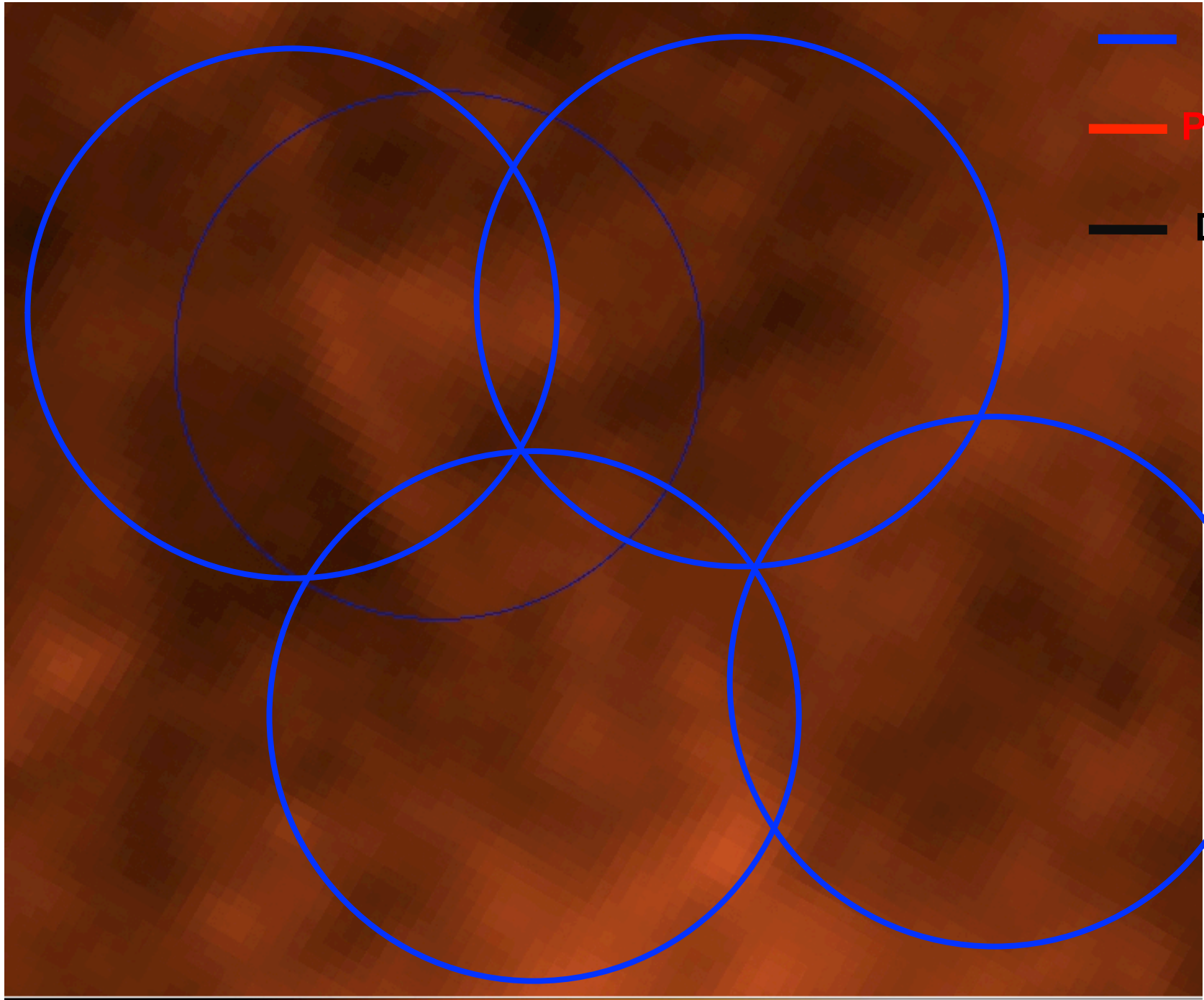
- Deep:
  - P1: 23 30 00 +00 00 00
  - P2: ??
  - P3: ??
  - P4: ??

# DEEP2-3









 HSC

 POWIR

 DEEP2

0.005 0.019 0.049 0.087 0.14 0.2 0.27 0.35 0.44

# DEEP2-3: more...

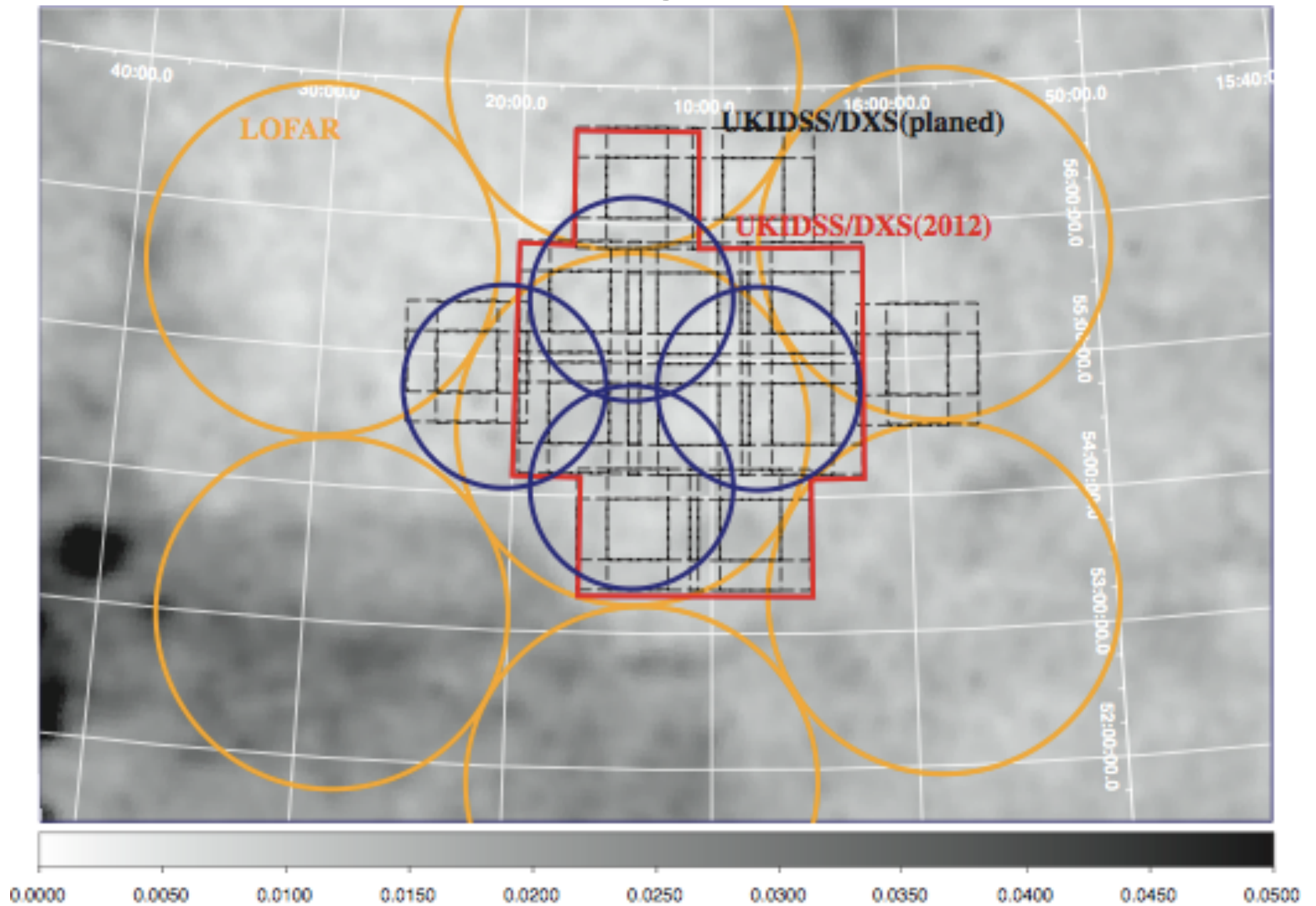
- PRIMUS
- XMM
- GALEX

# Deep: ELAIS-N1

- Deep:
  - P1: 16 10 00 +54 00 00
  - P2: ??
  - P3: ??
  - P4: ??



# ELAIS-N1



# ELAIS-N1: more...

- XMM
- GALEX
- MIR: Spitzer/SERVS
- Submm: SCUBA2/S2CLS

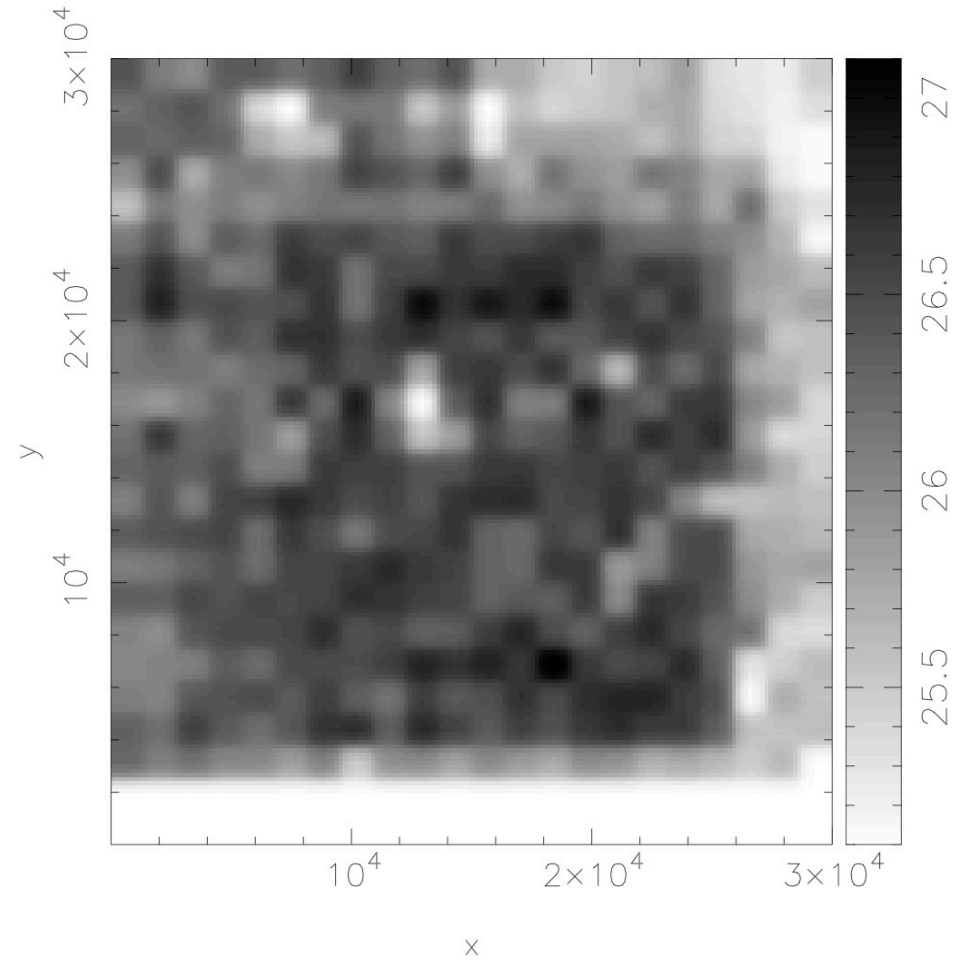
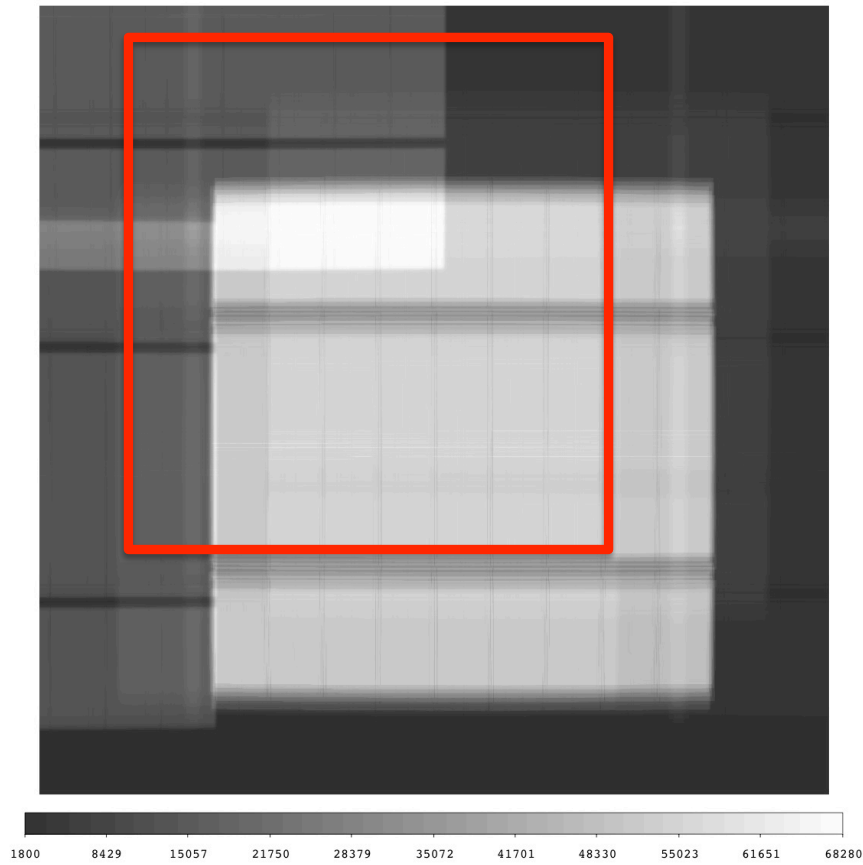
# (U)Deep CFHT $u^*$ -band

- Our four Deep fields are PanSTARRs fields
- All covered in CFHT  $u^*$ -band down to  $u_{AB}^*=25-25.5$
- Taiwan (Seb) leading efforts to push central 1 deg<sup>2</sup> of UDeep down to  $u_{AB}^*=27.5-28$ 
  - Successful proposals in 12B (13h - SXDS) and 13A (15h - COSMOS)
  - One more in 13B (13h – SXDS)
- All stacks made by Seb and available to the collaboration (no FTP yet, ask me directly for now)
- Princeton (Paul Price) reduction with the HSC pipeline??
- Extending Deep depth to  $u_{AB}^*=26.5$ : 60 nights required
- Covering Wide (don't ask!)

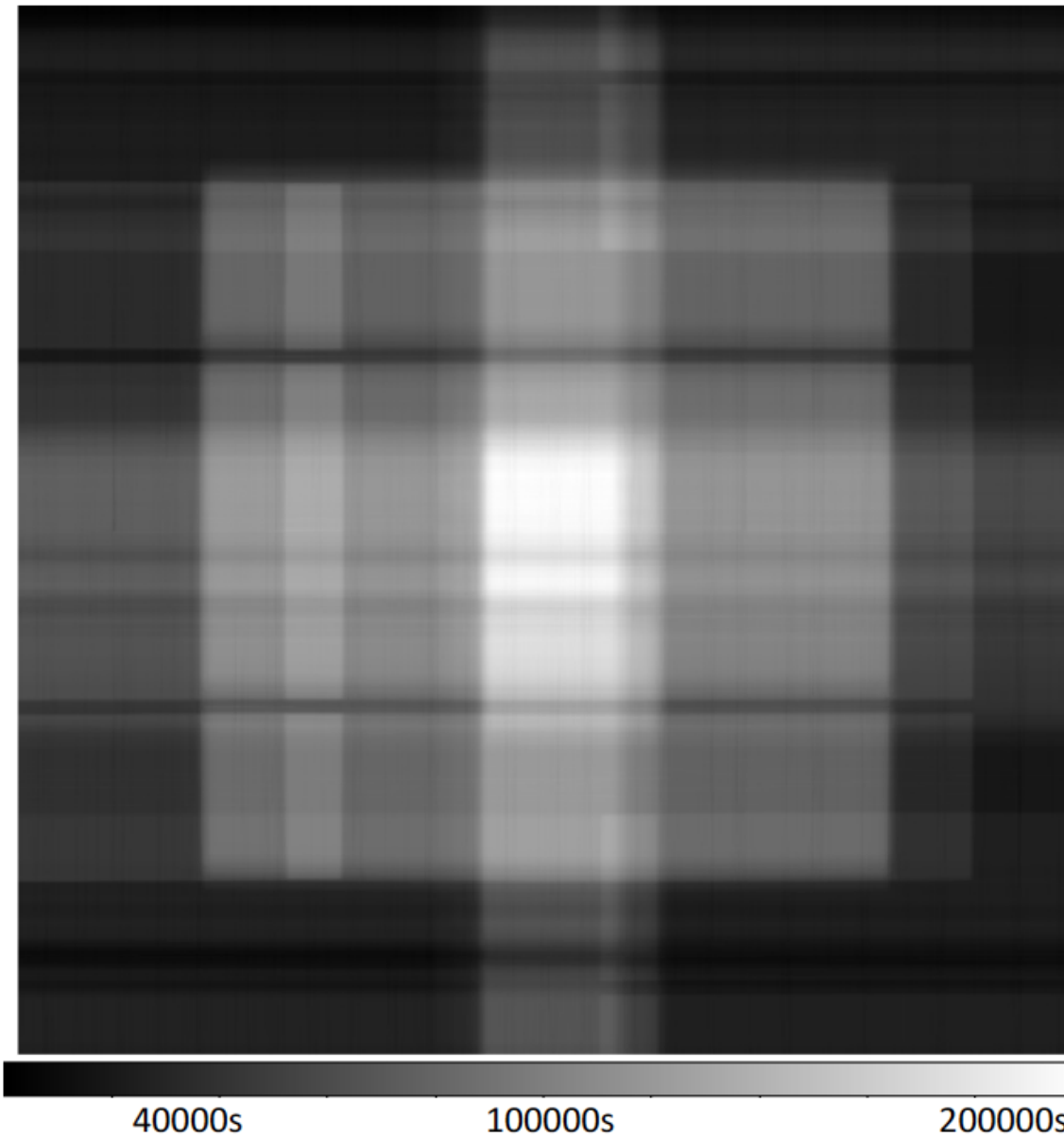


# Udeep u\*-band

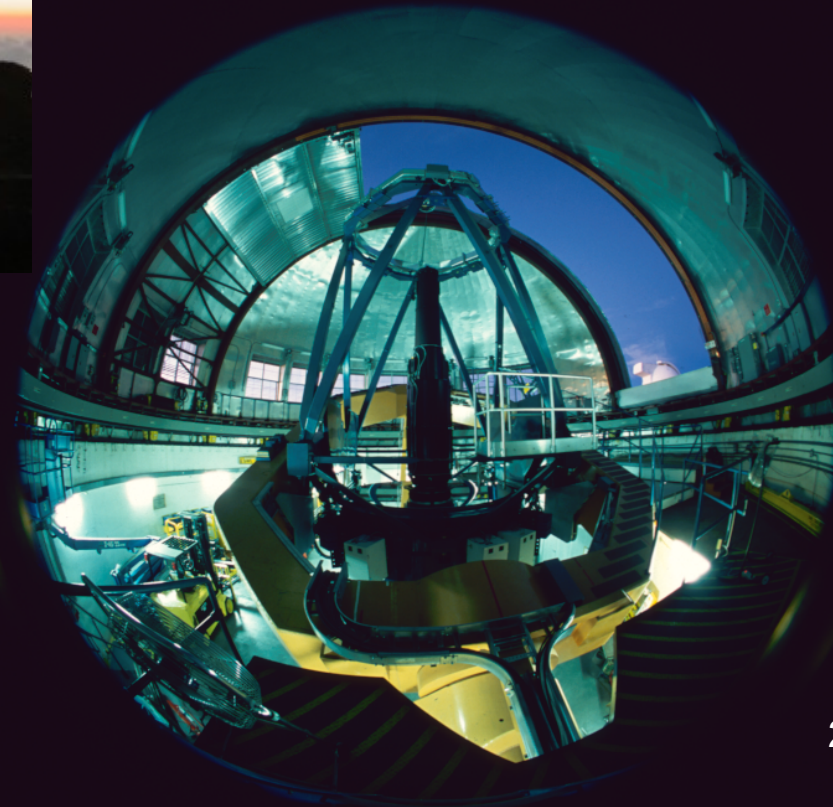
SXDS u



# Udeep u\*-band



# The UKIRT Wide-Field CAMera



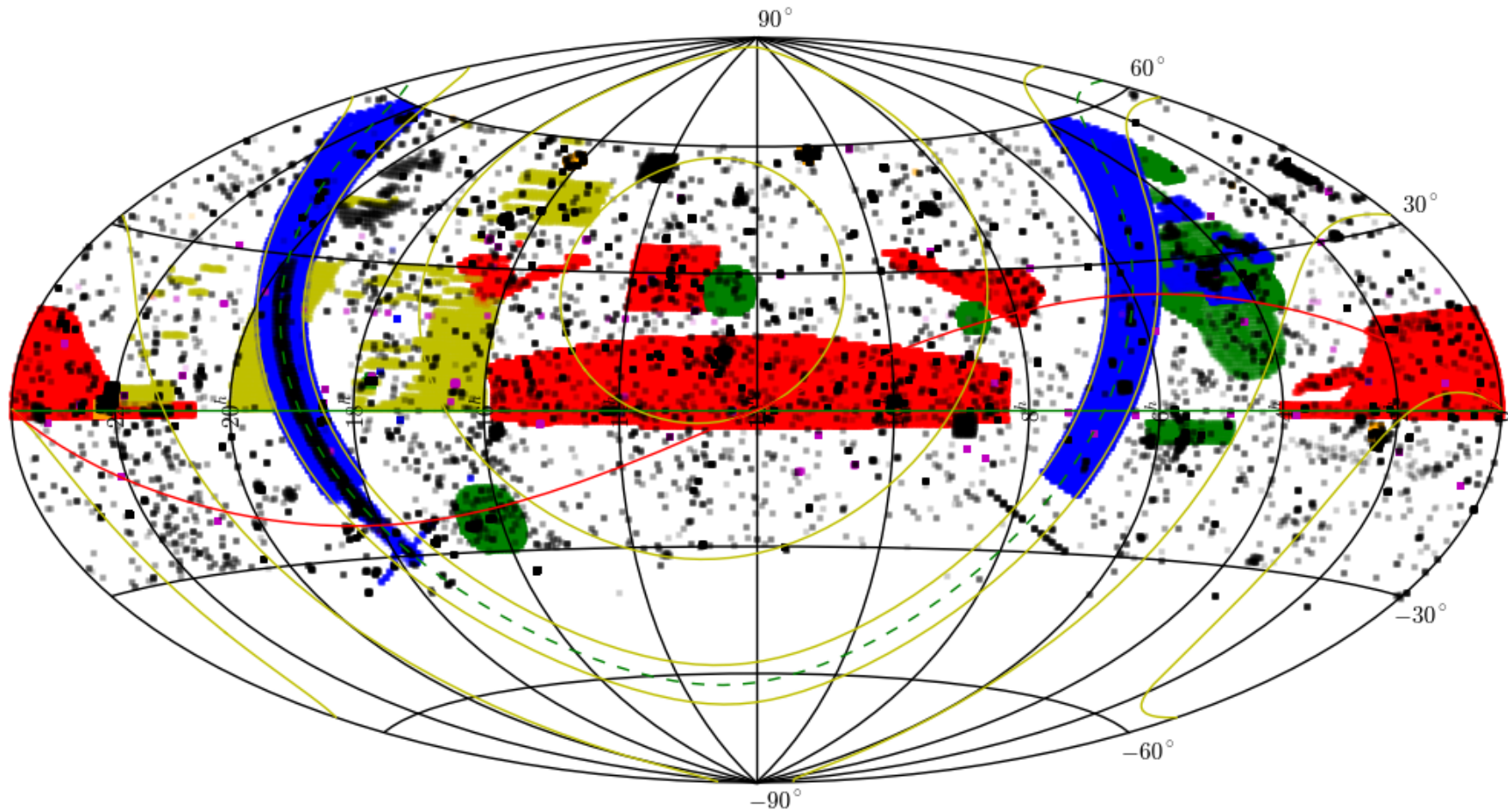
Casali et al., 2007

- 60% of all UKIRT time dedicated to UKIDSS
- 5 sub-surveys
- Processed data public (images, stacks, catalogues)
- Started in spring 2005, ended in Dec. 2012
- Next release (DR10) World public in 2013

<http://www.ukidss.org>



# UKIDSS Final Status

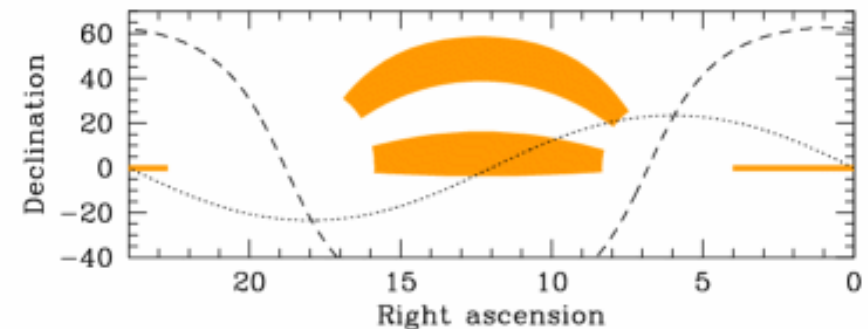


Date Range: 20050401 - 20120730

Last Updated: 20120927

# Large Area Survey (LAS)

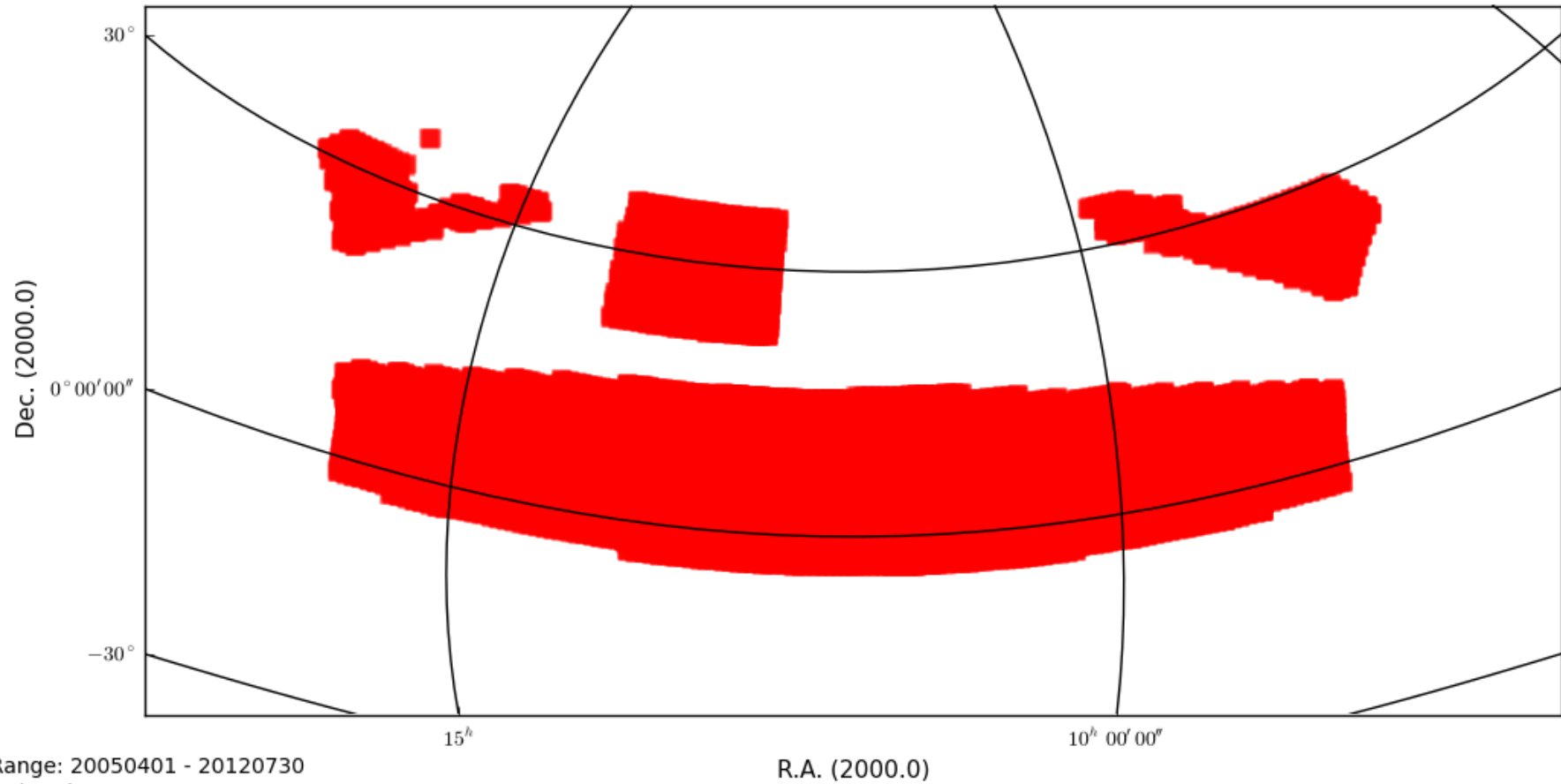
Filter	Area	Mag Limit (AB)	$t_{\text{exp}}$ (s)
Y	4000 deg <sup>2</sup>	20.8	40
J		20.8	40
H		20.0	40
K		20.0	40



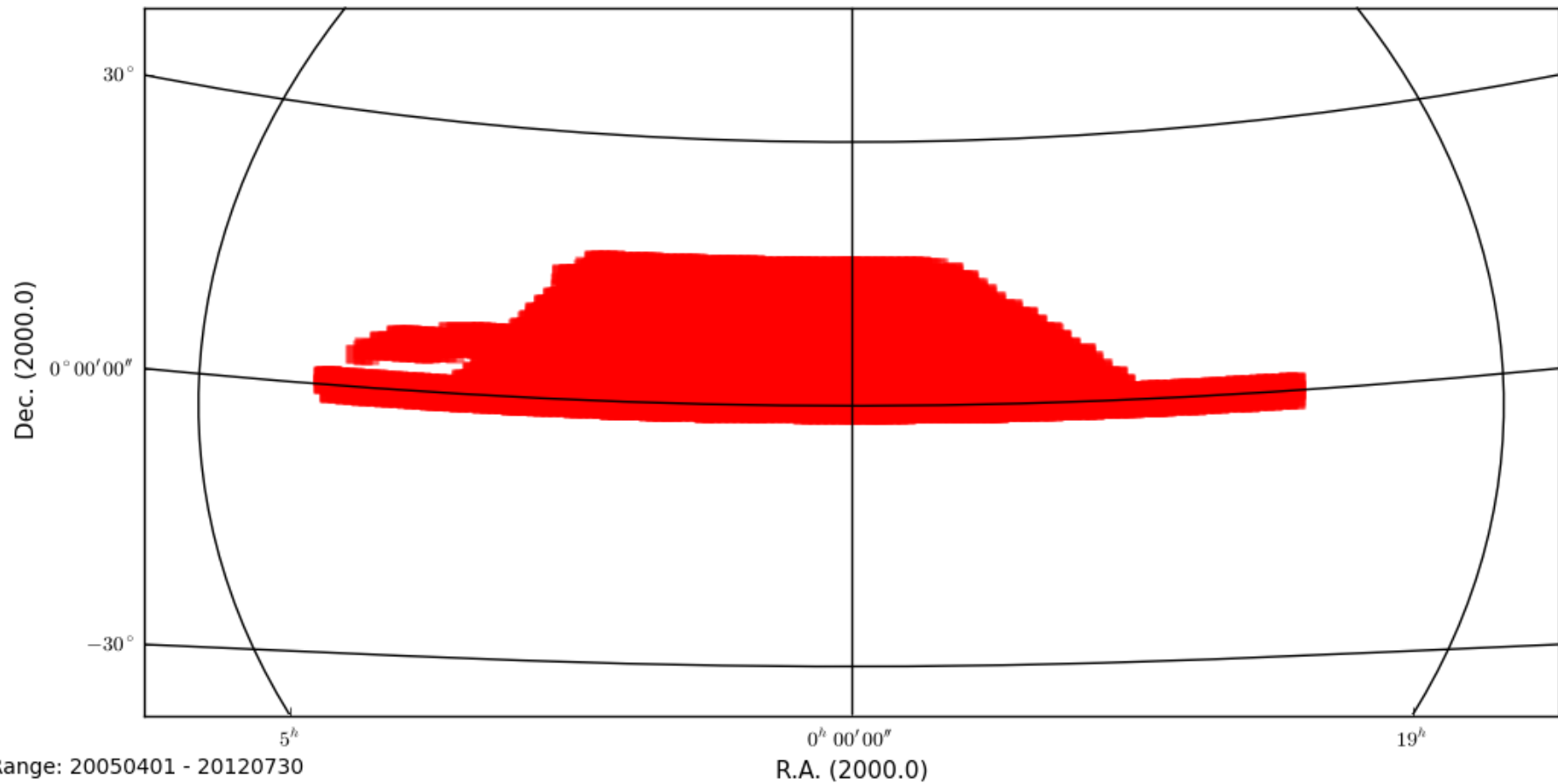
LAS sky coverage

- Compare to K~15 with 2MASS
- NOTE: multiple passes in a band to provide proper motions

# LAS final status: spring



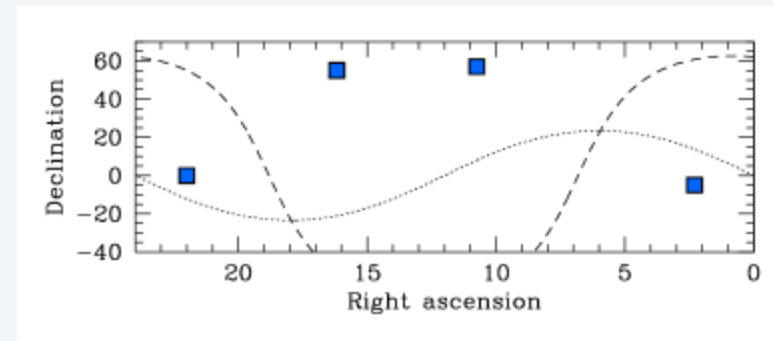
# LAS final status: fall





# Deep Extragalactic Survey (DXS)

Filter	Area	Mag Limit (AB)
J	35 deg <sup>2</sup>	23.5
(H)		23.4
K		23.0

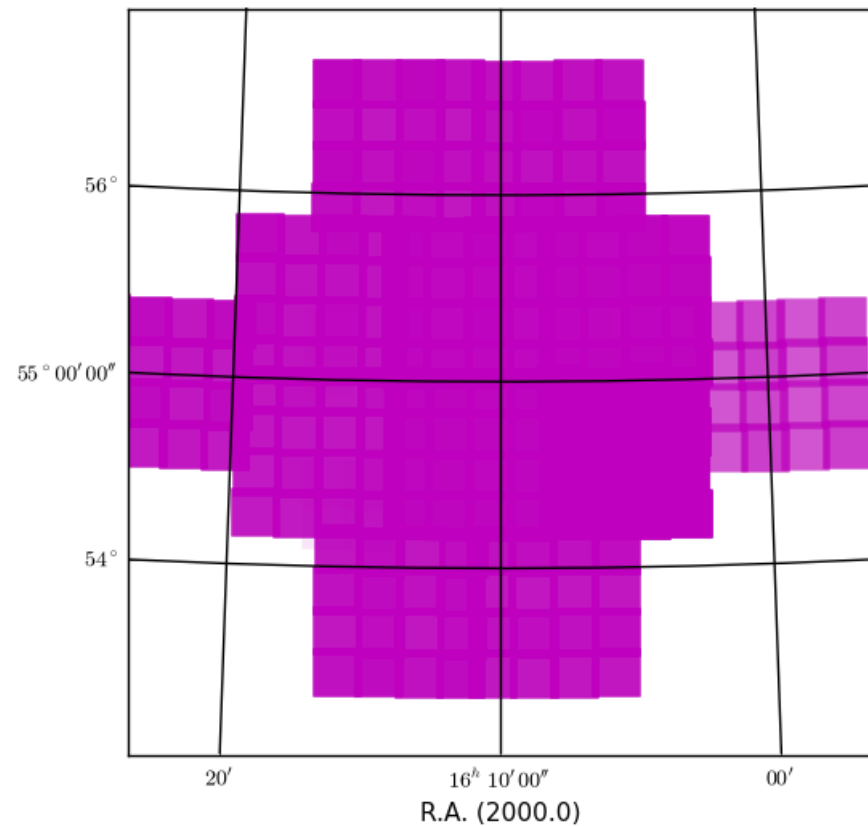


DXS sky coverage

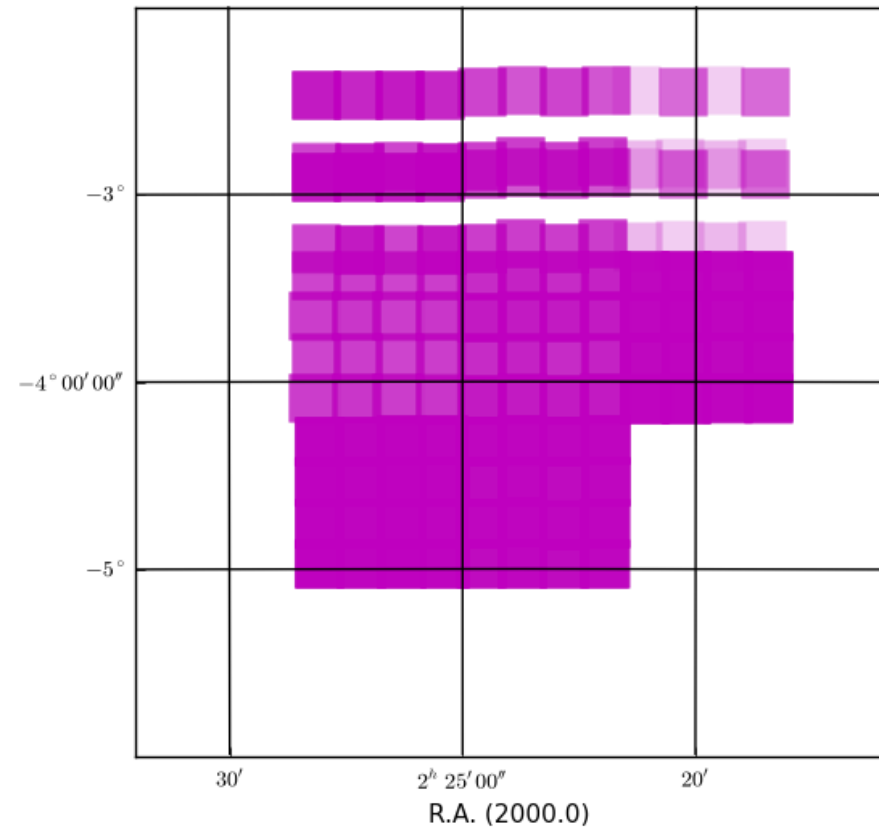
- XMM-LSS, Lockman Hole, Elias N1, VIMOS 4
- Target galaxy clusters at  $1 < z < 1.5$

# DXS current status

EN1



XMM-LSS

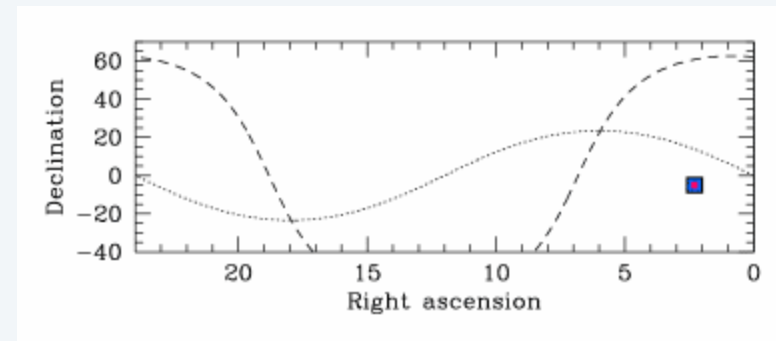


# DXS final release

- DXS PI: Alastair Edge (Durham)
- Desire to have a final high-quality final product (better than currently available)
- Full mosaics, masks, catalogs, etc.
- Alastair contacted Seb to contribute to this final release (Seb QC consultant for DXS!)

# Ultra Deep Survey (UDS)

Filter	Area	Mag Limit (Vega)
J	0.77 deg <sup>2</sup>	26.0
H		25.4
K		24.9



UDS sky coverage

- Subaru/XMM-Newton Deep Survey (SXDS) field
- Target  $z=3$  galaxies

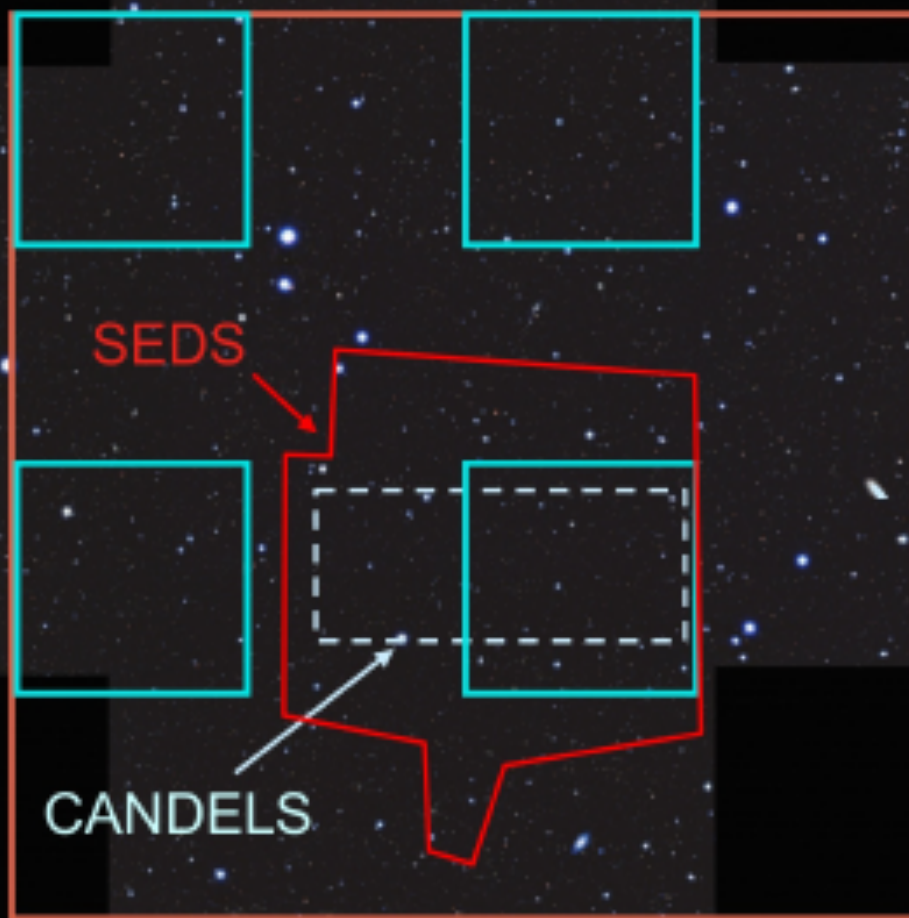


# UKIDSS Ultra deep Survey

DR8:  $K_{AB}=24.6$ ,  $H_{AB}=24.2$ ,  $J_{AB}=24.9$   
seeing : J~0.90" H~0.90" K~0.75"

UDS+

UDS JHK

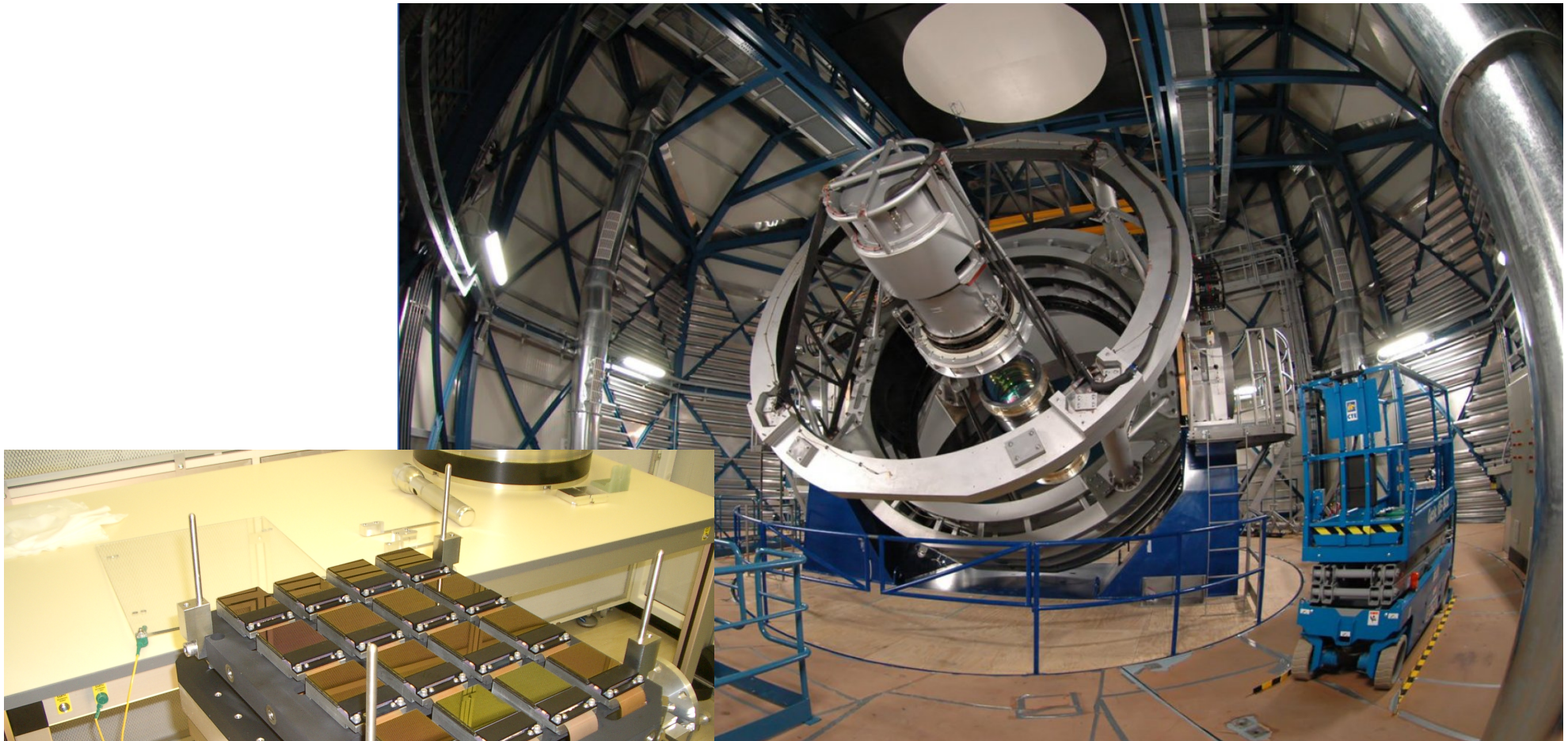


DR10: final release  
world-wide public very  
very soon!

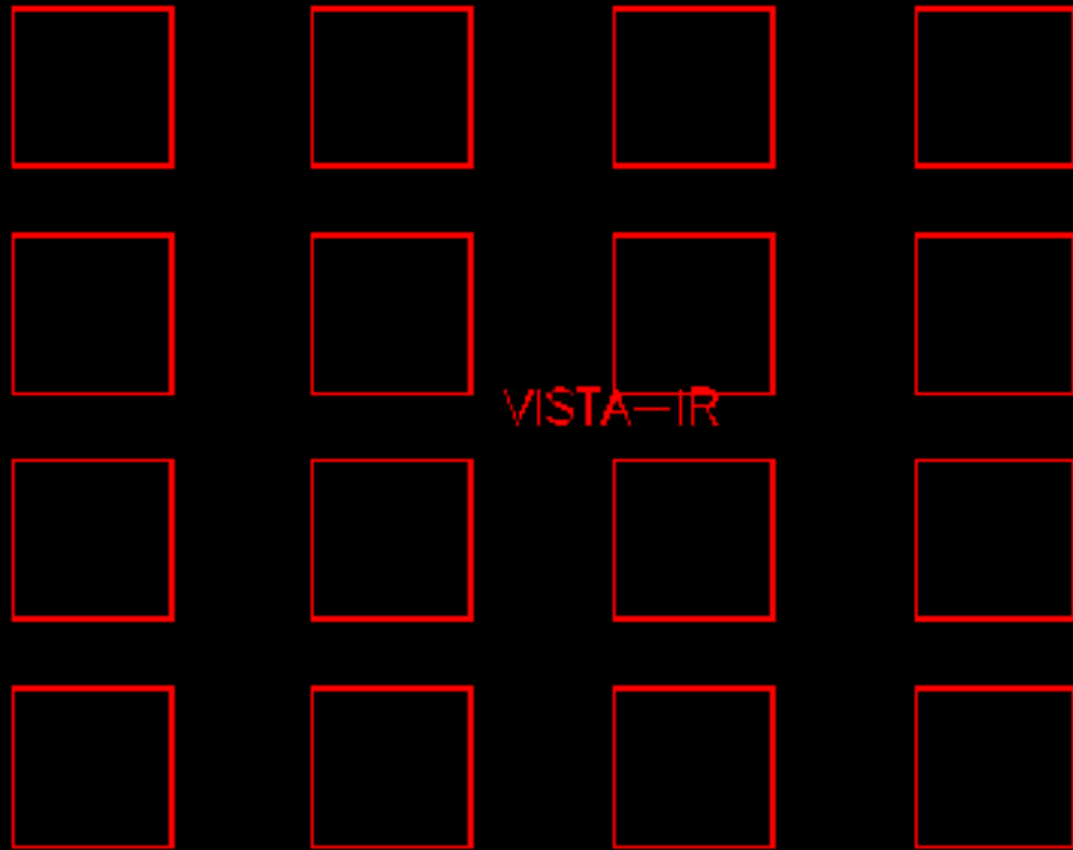
UDS+: 170h extension  
to drill to  $K_{AB}=25.7$   
over  $0.2 \text{ deg}^2$

# VISTA:

## Visible and Infrared Survey Telescope for Astronomy



# VIRCAM

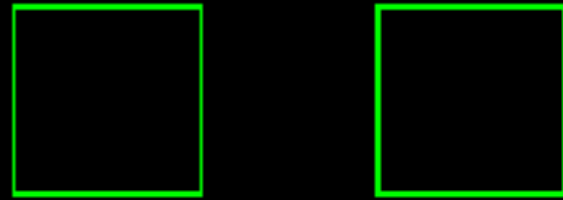


VISTA-IR

■ NICMOS

□ ISAAC

□ HAWK-I

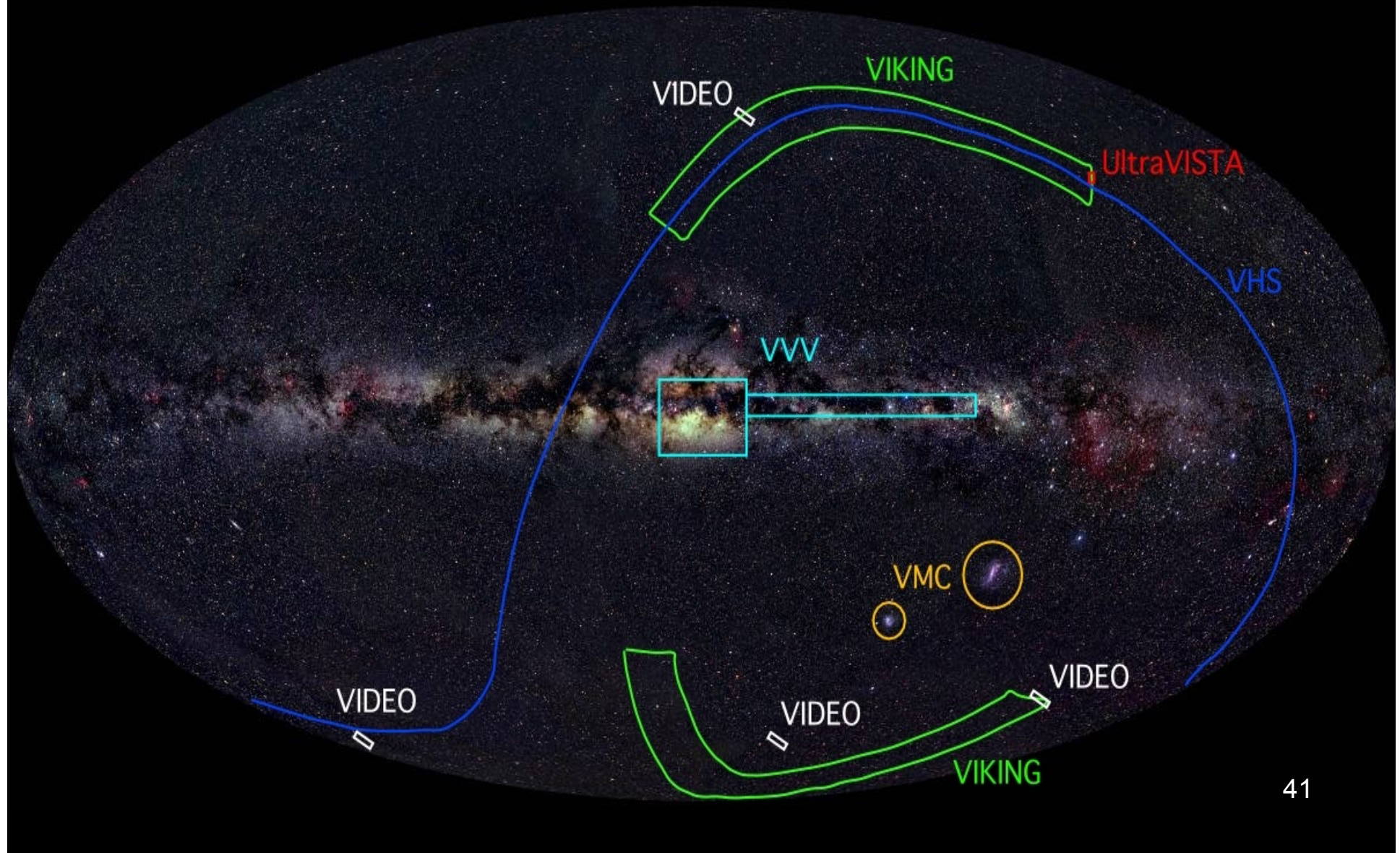


WFCAM





# VISTA Public Surveys





# VISTA Public Surveys

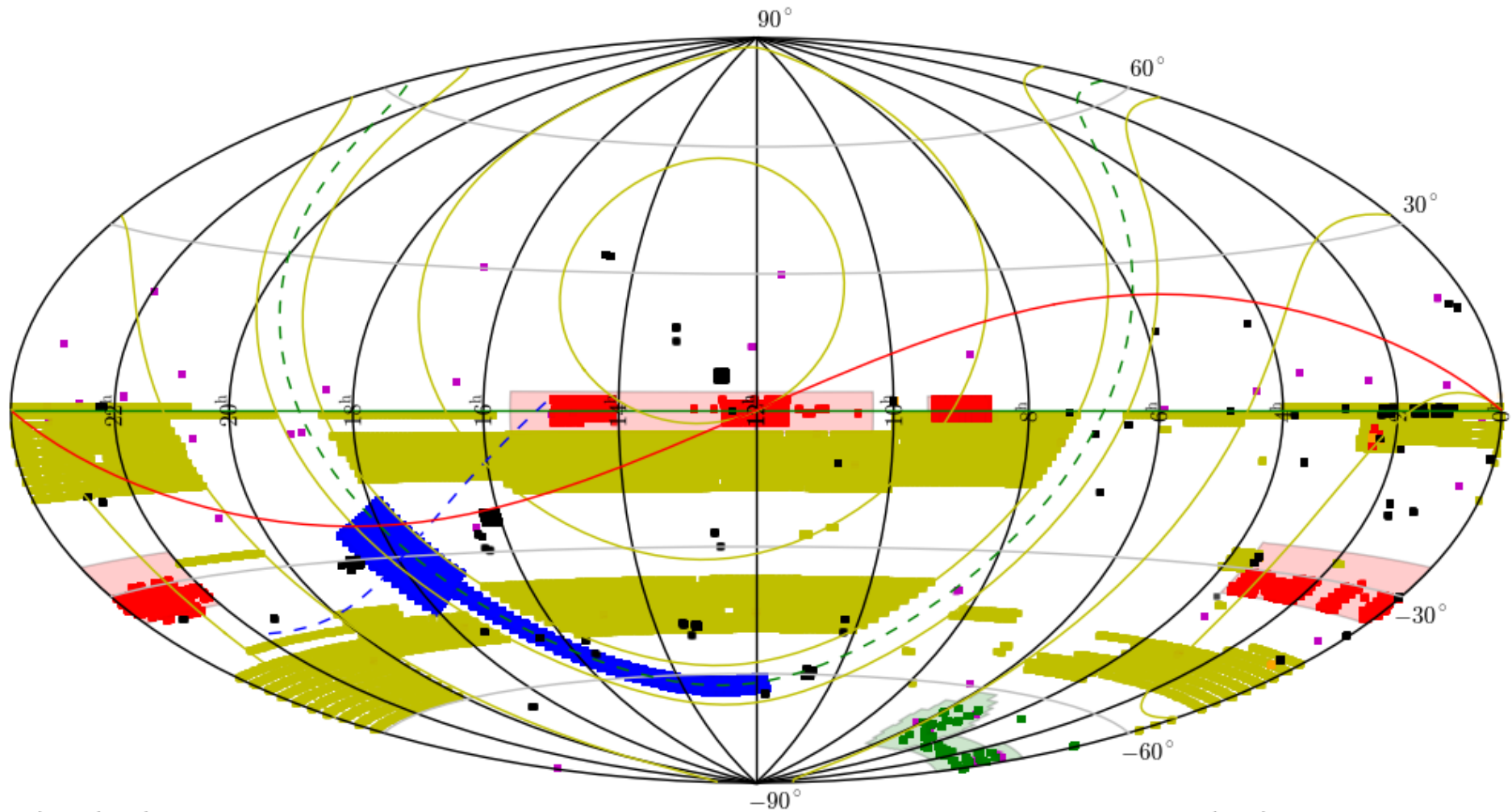
VISTA survey observing strategies							
Survey	Area (deg <sup>2</sup> )	Filters and Depth Measure(mag (10 $\sigma$ , AB))	Depth (mag)				
Ultra-VISTA	0.73 (ultra-deep)	5 $\alpha$ , AB	Y=26.7	J=26.6	H=26.1	K <sub>s</sub> =25.6	NB=26.0
VIKING	1500	5 $\alpha$ , AB	Z=23.1	Y=22.3	J=22.1	H=21.5	K <sub>s</sub> =21.2
VMC	184	10 $\alpha$ , Vega	Y=21.9	J=21.4	K <sub>s</sub> =20.3		
VVV	520	5 $\alpha$ , Vega	Z=21.9	Y=21.2	J=20.2	H=18.2	K <sub>s</sub> =18.1
VHS	20 000	5 $\alpha$ , AB	Y=21.2	Y=21.2	J=21.2	H=20.6	K <sub>s</sub> =20.0
VIDEO	15	5 $\alpha$ , AB	Z=25.7	Y=24.6	J=24.5	H=24.0	K <sub>s</sub> =23.5

- VHS (McMahon)
- VIKING (Sutherland Edge)
- VIDEO (Jarvis)
- Ultra-VISTA (Le Fèvre/Dunlop/Franx/Fynbo)
- VVV (Lucas)
- VMC Survey (Minitti & Cioni)

# VISTA Public Surveys: Policy

- 75% of telescope dedicated to public surveys
- Raw data immediately public
- Reduced data world public after a proprietary stage at the discretion of the PI
  
- More “blurred” than UKIDSS policy...
- VIKING: new management! (DR1 in January)
- UltraVISTA=COSMOS (ie almost public) (DR1)
- VIDEO: DR1 happened already on XMM-LSS

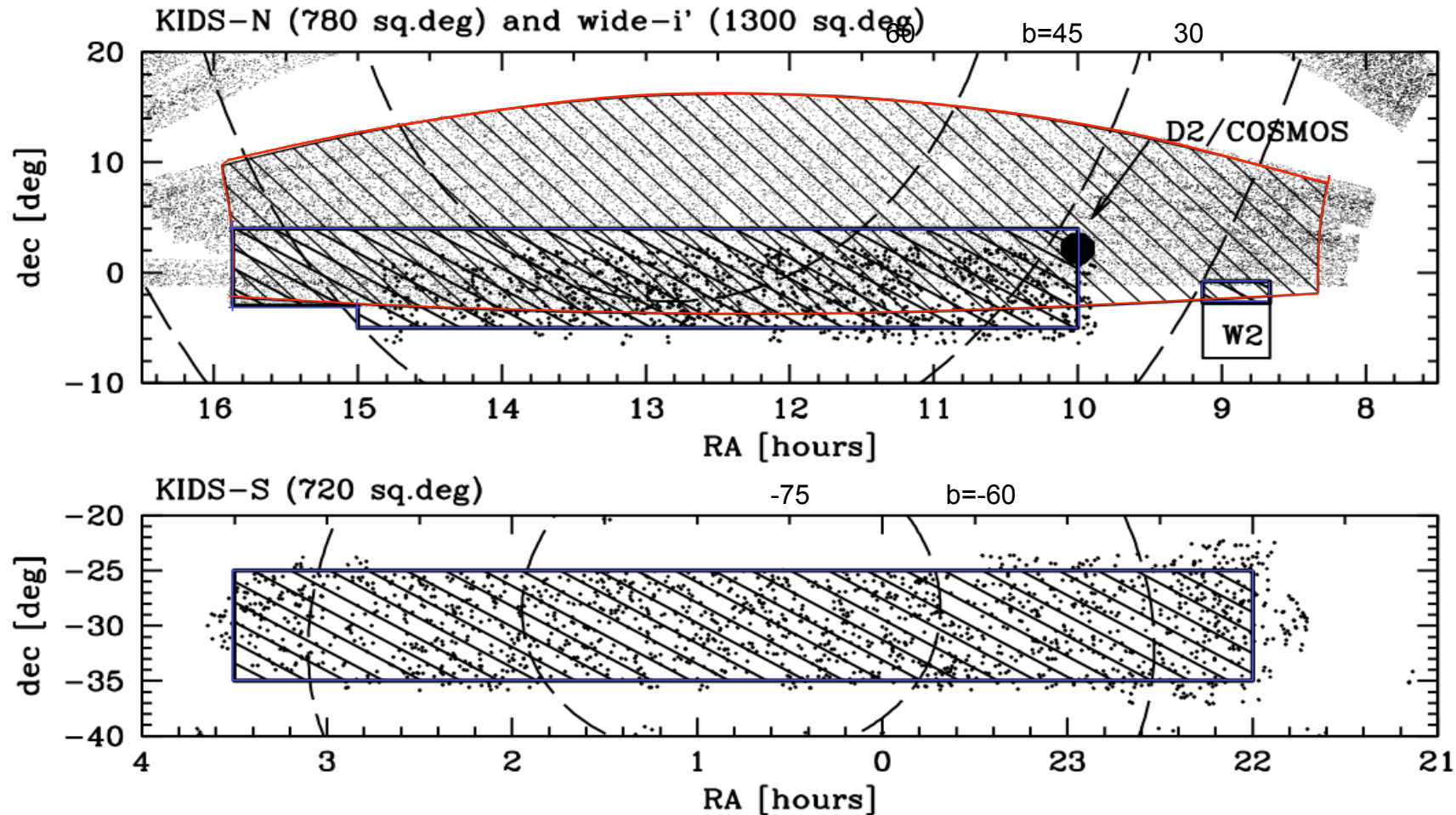
# VISTA: current status



Observing dates: 20091015 - 20120831  
Cambridge Astronomy Survey Unit

Last Updated: 22/11/2012

# VIKING (and VST-KIDS): VISTA Kilo-degree Infrared cosmological survey



1500 sq.deg. in **ugriZYJHK**  
+2000 sq.deg. in **i (+UKIDSS YJHK)**



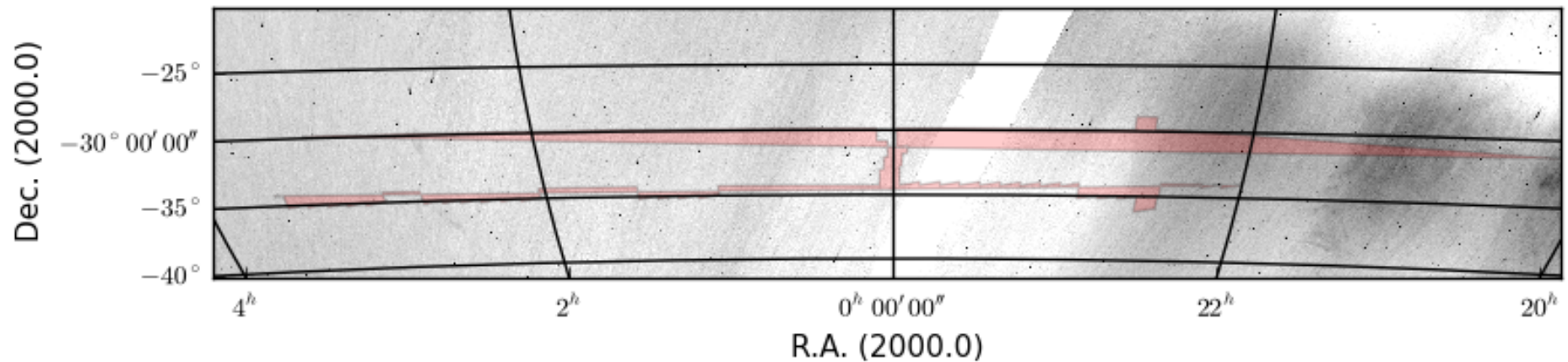
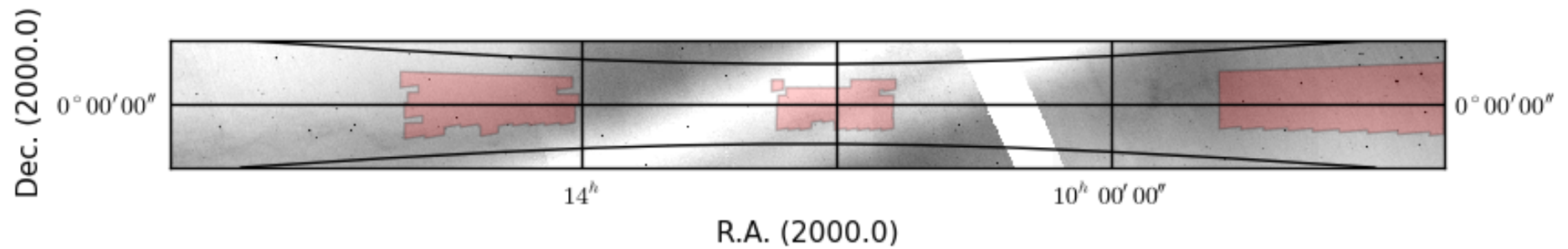
# VIKING (and VST-KIDS):

- VST/OmegaCAM: 1 sq deg, 2.6m telescope
- VISTA/VISTACAM: 0.6 sqdeg, 4m telescope
- 1500 sq.deg. of ugri (~400n VST) + ZYJHK (~200n VISTA)

filter	Exp time (s)	Medn seeing (")	5- $\sigma$ 2" AB
u'	900	1.0	24.8
g'	900	0.75	25.4
r'	1800	0.6	25.2
i'	1080	0.75	24.2
z'	2520	0.75	23.2

filter	Exp (s)	5- $\sigma$ 2" AB	cf. UKIDSS
Z	500	23.1	-
Y	400	22.4	+1.6
J	400	22.2	+1.8
H	300	21.6	+1.6
K	500	21.3	+1.3

# VIKING current status



# VIKING current status

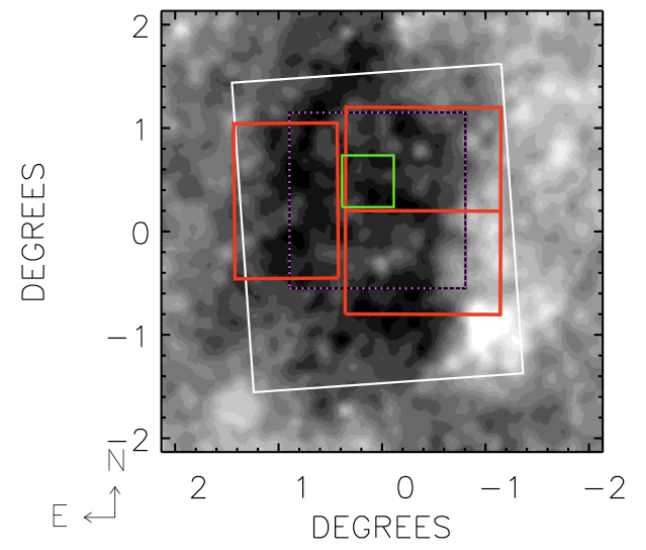
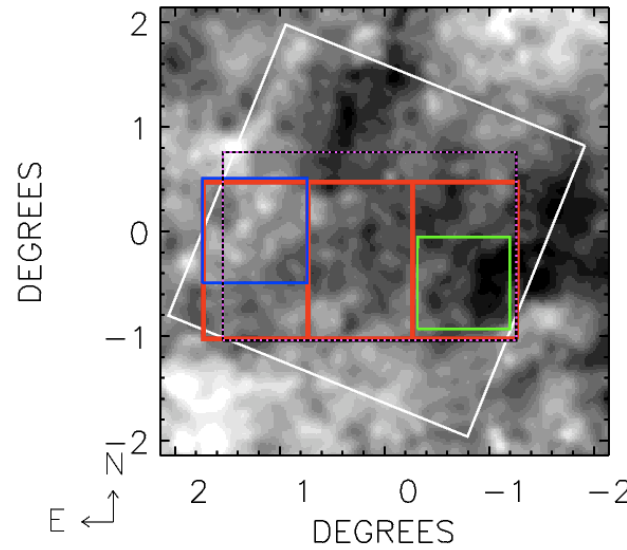
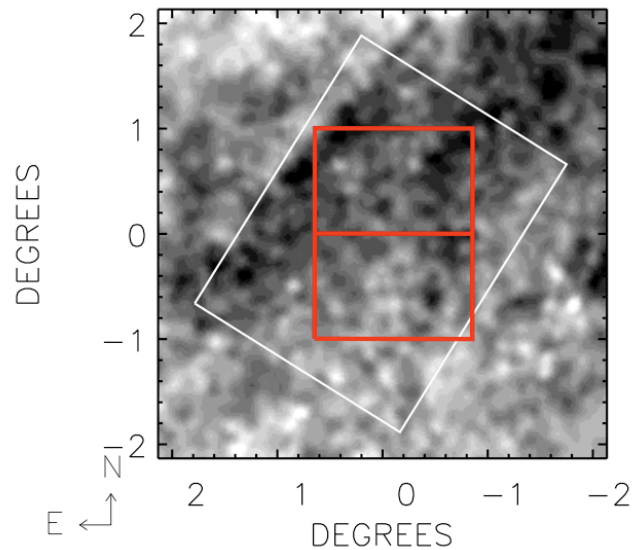
- VIKING no DR1?? ESO stopped observations??
- PI of survey responsible of Phase 3. Strict policy by ESO!
- Jim Emerson too busy ... lack of response ... ESO maaad!
- Change of management: Alastair Edge (Durham)
- Promise DR1 for January 2013 ... ESO happy!
- Seb in direct contact with Alastair to adapt VIKING products to HSC (stringent seeing, higher quality etc.)  
(Seb QC consultant for VIKING!)

# The VIDEO Survey

**Elais-S1** 0034-43

**XMM-LSS** 0218-05

**CDF-S** 0332-27



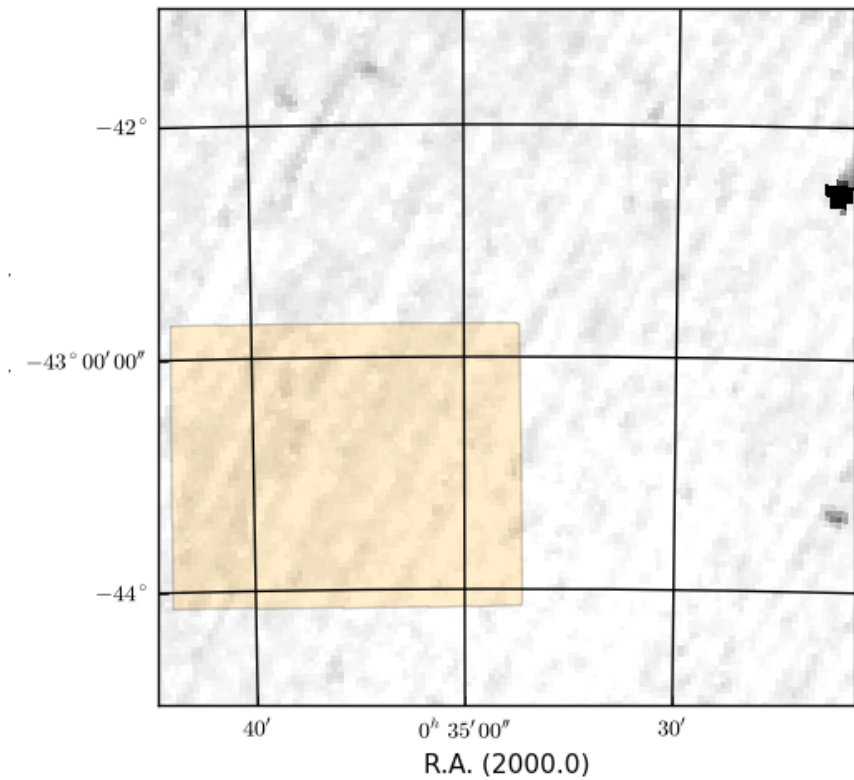
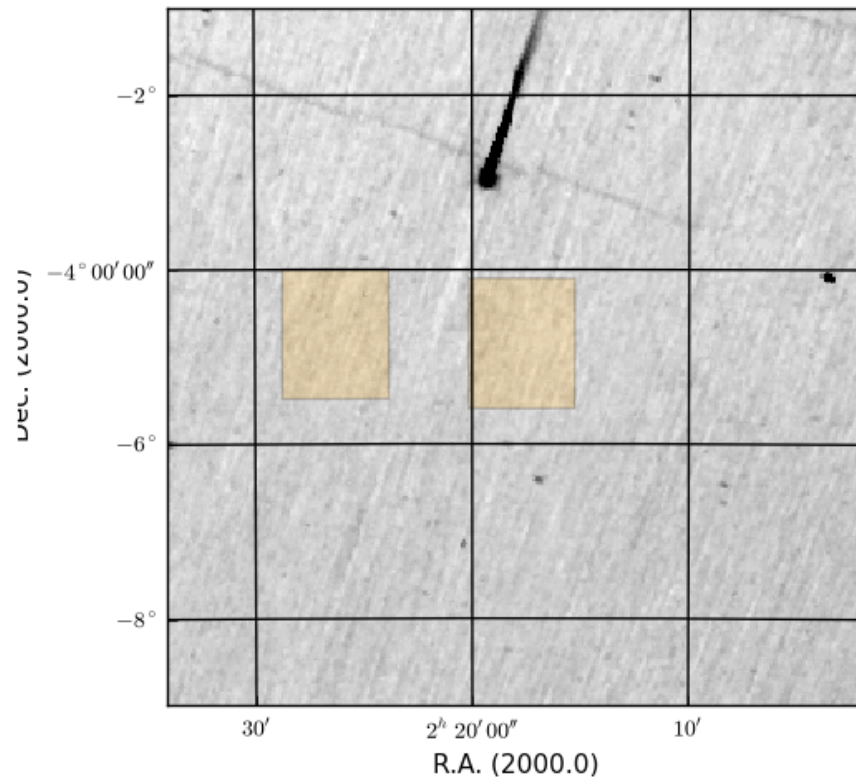
Filter	Time (per source)	Time (full survey)	$5\sigma$ AB	$5\sigma$ Vega	UKIDSS -DXS	Seeing	Moon
Z	17.5 hours	456 hours	25.7	25.2	-	0.8	D
Y	6.7 hours	175 hours	24.6	24.0	-	0.8	G
J	8.0 hours	209 hours	24.5	23.7	22.3	0.8	G
H	8.0 hours	221 hours	24.0	22.7	22	0.8	B
$K_s$	6.7 hours	180 hours	23.5	21.7	20.8	0.8	B



# VIDEO current status

XMM-LSS

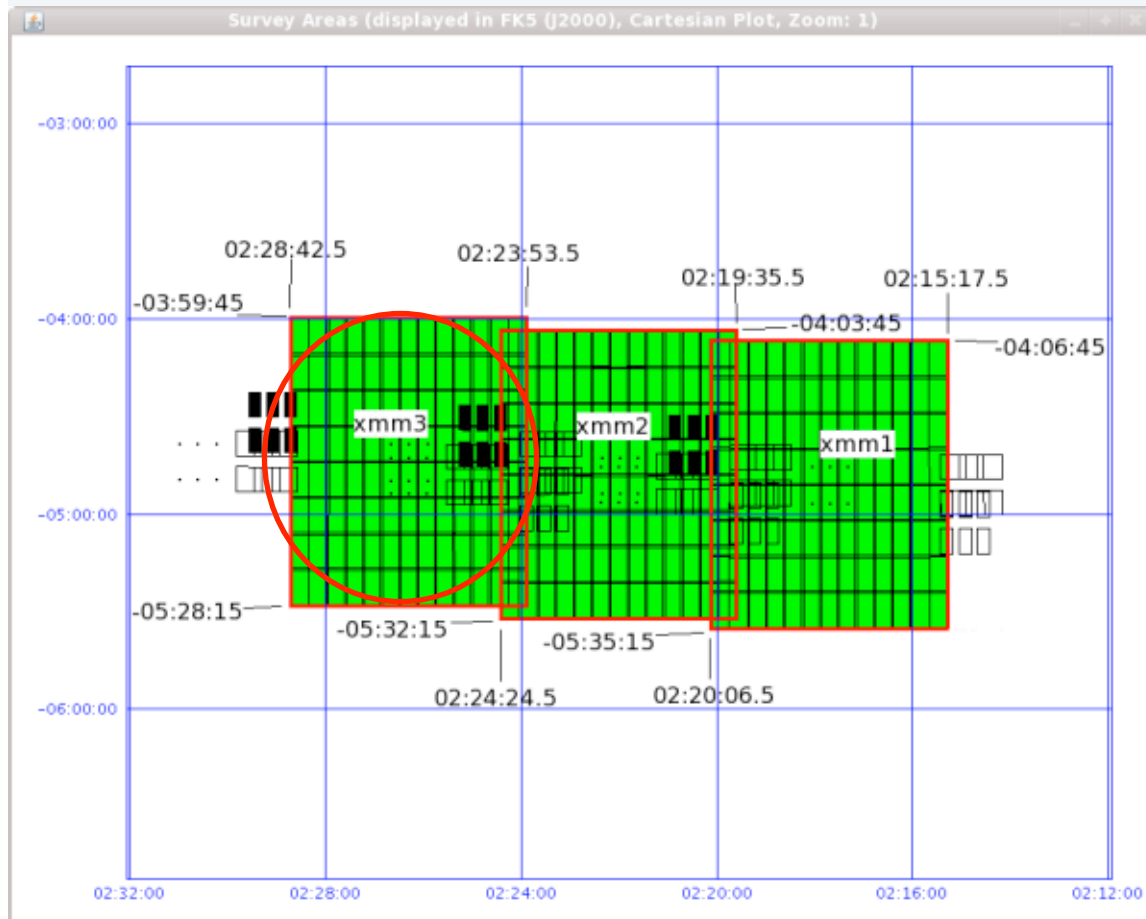
ELAIS S1



# VIDEO DR1

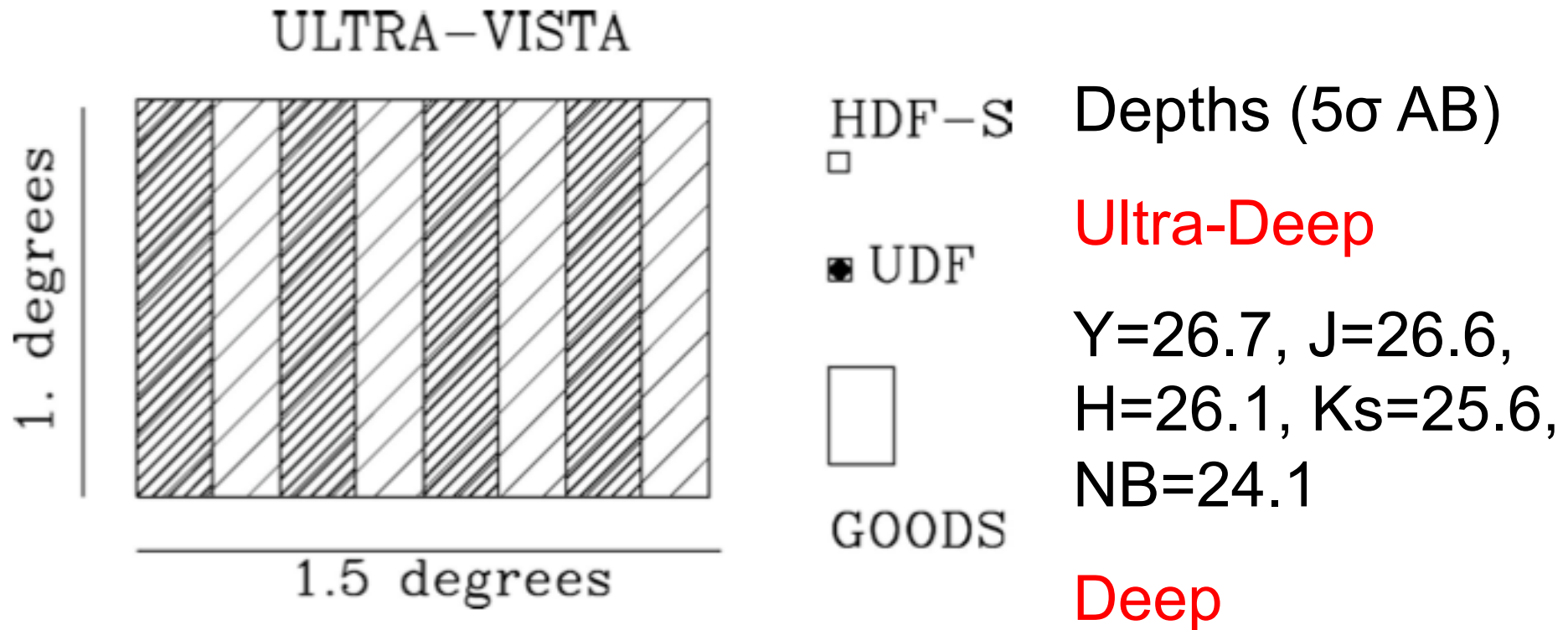
## The VISTA Deep Extragalactic Observations (VIDEO) Survey\*

Matt J. Jarvis<sup>1,2,3,†</sup>, D.G. Bonfield<sup>2</sup>, V.A. Bruce<sup>4</sup>, J.E. Geach<sup>5</sup>, K. McAlpine<sup>6</sup>,  
 R.J. McLure<sup>4</sup>, E. González-Solares<sup>7</sup>, M. Irwin<sup>7</sup>, J. Lewis<sup>7</sup>, A. Kupcu Yoldas<sup>7</sup>,  
 S. Andreon<sup>8</sup>, N.J.G. Cross<sup>4</sup>, J.P. Emerson<sup>9</sup>, G. Dalton<sup>1,10</sup>, J.S. Dunlop<sup>4</sup>, S.T. Hodgkin<sup>7</sup>,  
 O. Le Fèvre<sup>11</sup>, M. Karouzos<sup>12</sup>, K. Meisenheimer<sup>13</sup>, S. Oliver<sup>14</sup>, S. Rawlings<sup>1</sup>,  
 C. Simpson<sup>15</sup>, I. Smail<sup>16</sup>, D.J.B. Smith<sup>2</sup>, M. Sullivan<sup>1</sup>, W. Sutherland<sup>9</sup>, S.V. White<sup>1</sup>,  
 J.T.L. Zwart<sup>3</sup>



Filter	Time (h) (per pixel)	1 <sup>st</sup> (5 $\sigma$ )	2 <sup>nd</sup> (5 $\sigma$ )	3 <sup>rd</sup> (5 $\sigma$ )	4 <sup>th</sup> (5 $\sigma$ )	5 <sup>th</sup> (5 $\sigma$ )
Z	17.13	26.89	25.66	24.87	24.33	23.83
Y	6.05	25.60	24.51	23.74	23.18	22.73
J	9.65	25.59	24.44	23.70	23.11	22.63
H	8.13	25.25	24.12	23.42	22.87	22.40
K <sub>s</sub>	9.03	24.86	23.77	23.10	22.53	22.13

# UltraVISTA



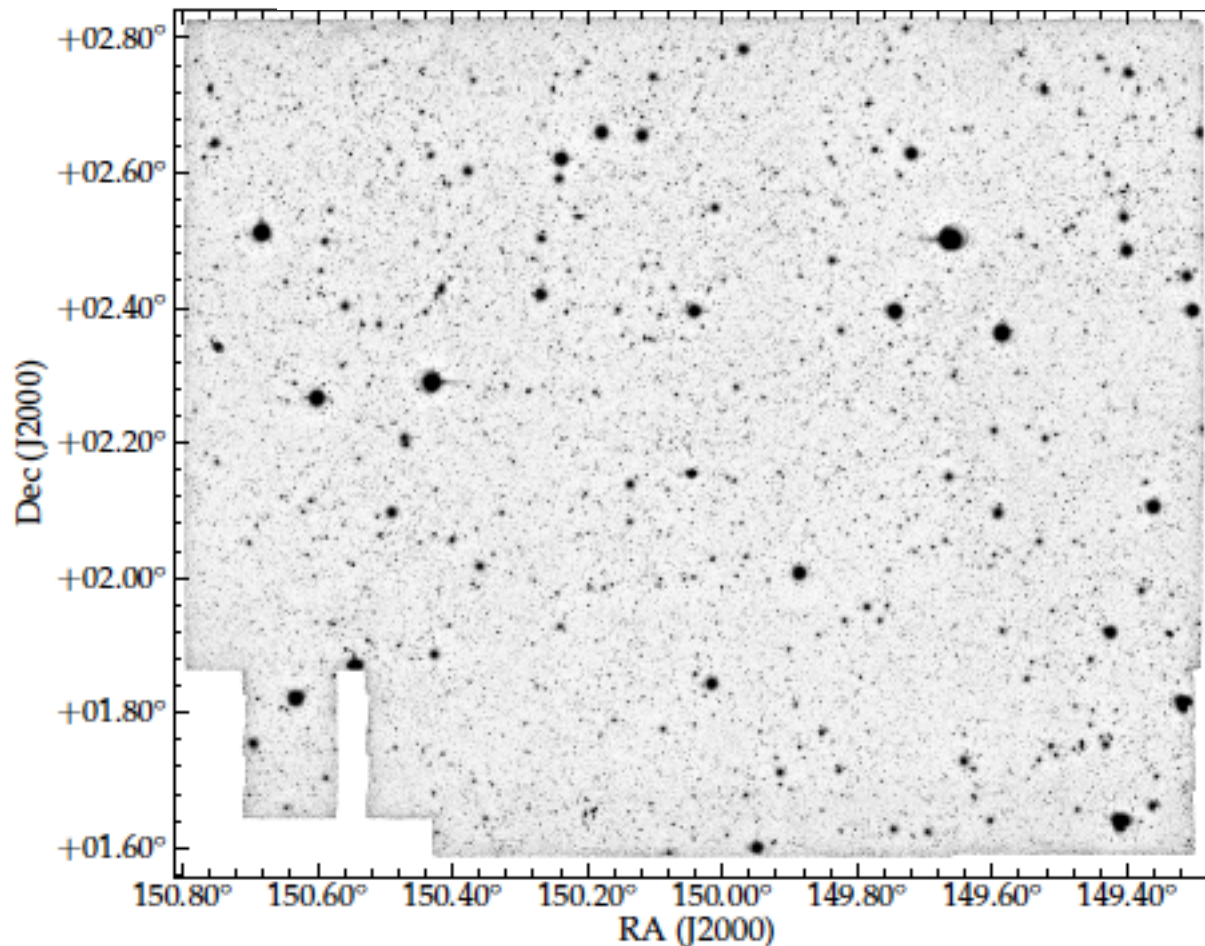
- The first galaxies
- The growth of stellar mass
- Dust obscured star formation
- All in a 'representative volume'

# UltraVISTA

## DR1

### UltraVISTA: a new ultra-deep near-infrared survey in COSMOS\*

H. J. McCracken<sup>1</sup>, B. Milvang-Jensen<sup>2</sup>, J. Dunlop<sup>3</sup>, M. Franx<sup>4</sup>, J. P. U. Fynbo<sup>2</sup>, O. le Fèvre<sup>5</sup>  
J. Holt<sup>4</sup>, K. I. Caputi<sup>3,6</sup>, Y. Goranova<sup>1</sup>, F. Buitrago<sup>3</sup>, J. Emerson<sup>7</sup>, W. Freudling<sup>8</sup>, P. Hudelot<sup>1</sup>,  
C. López-Sanjuan<sup>5</sup>, F. Magnard<sup>1</sup>, Y. Mellier<sup>1</sup>, P. Møller<sup>8</sup>, K. K. Nilsson<sup>2</sup>, W. Sutherland<sup>7</sup>,  
L. Tasca<sup>5</sup> and J. Zabl<sup>2</sup>



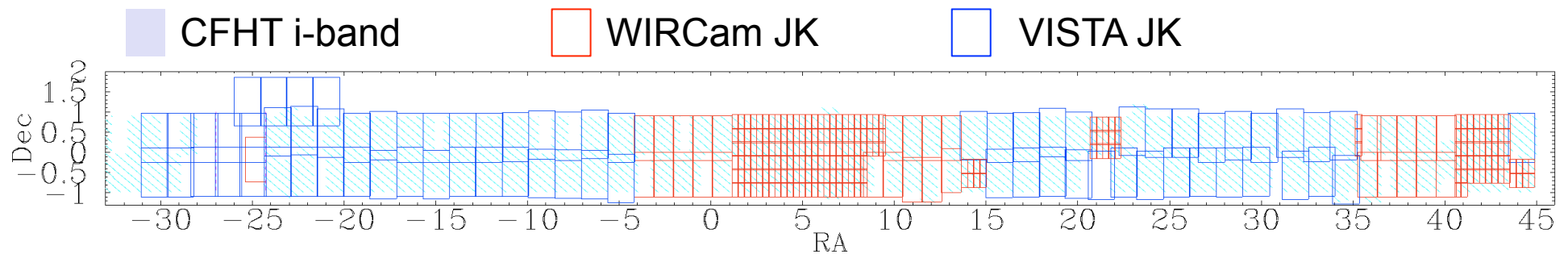
Filter	Av. exposure time per pixel	Total exposure time	$5\sigma(2'')$ ( $\pm 0.1$ mag)	95% comp. ( $\pm 0.1$ mag)	seeing ( $''$ ) ( $\pm 0.1''$ )
<i>Y</i>	42360	127080	24.6	24.2	0.82
<i>J</i>	49720	149160	24.4	24.2	0.79
<i>H</i>	42520	127560	23.9	24.1	0.76
<i>K<sub>1</sub></i>	39400	118200	23.7	23.8	0.75
NB118	23773	35660	$22.9 \pm 0.2$	22.6	0.75



# VICS82: Vista-Cfht Stripe 82

## WISER: the WIRCam SDSS Equatorial Region

100 sq. deg J=22.4, Ks=22 mag



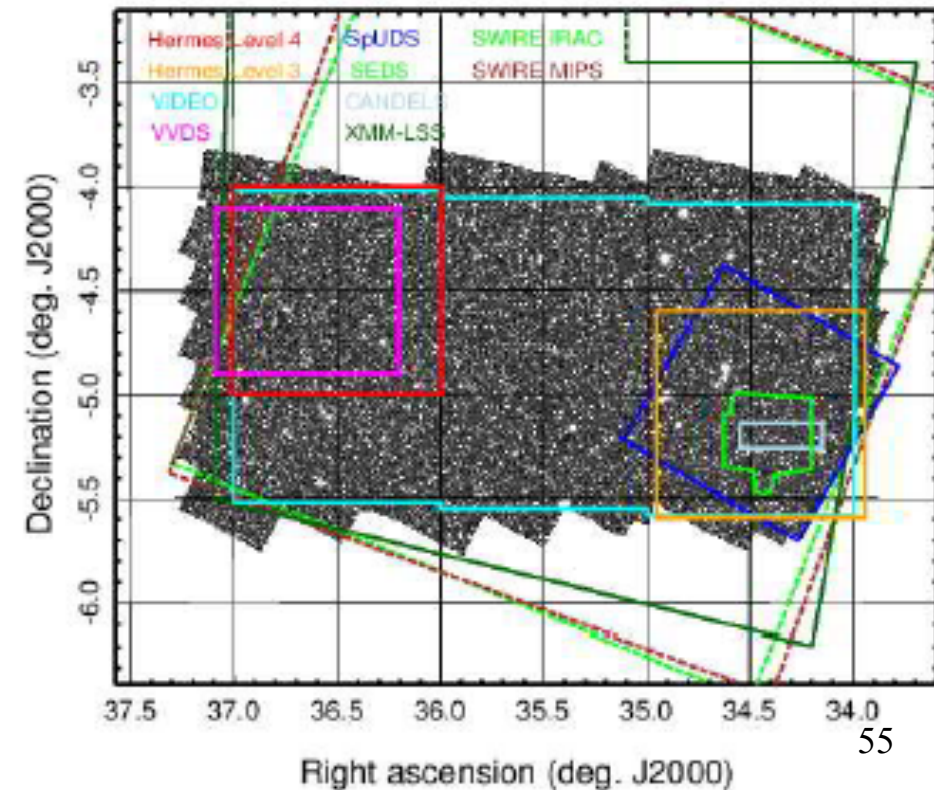
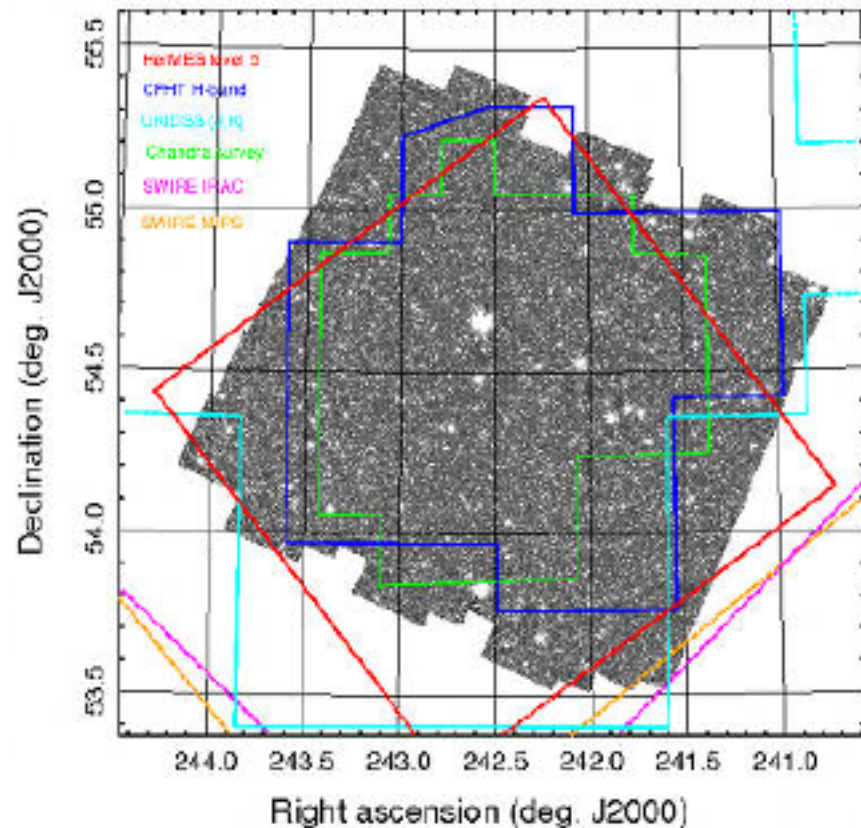
CFHT: Canada (J. Geach), France (J-P Kneib), Taiwan (T.-T. Lin) and Brazil (M. Makler)  
VISTA: France (J-P Kneib)

VISTA survey ~70% complete, CFHT done!  
Maybe some “holes”... but essentially there!

# Spitzer Extragalactic Representative Volume Survey (SERVS)

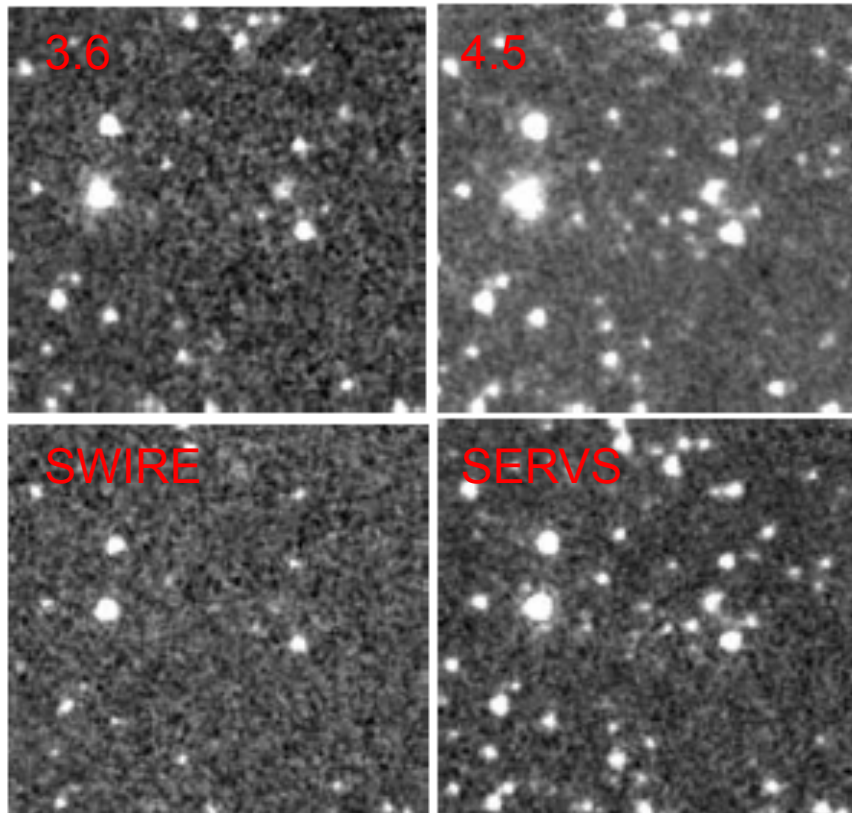
Field Name	Field Center RA, Dec (J2000)	Field PA (deg)	Field Area (deg <sup>2</sup> )	Vertices* of the area covered by both [3.6] & [4.5] (deg)			
EN1	16:10:00, +54:30	350	2.0	(244.2,54.2)	(243.1,55.4)	(240.9,54.8)	(241.7,53.6)
ES1	00:37:48, -44:00	0	3	(10.5,-44.9)	(10.4,-42.9)	(8.4,-43.0)	(8.4,-45.1)
Lockman	10:49:12, +58:07	328	4.0	(165.0,57.4)	(161.7,59.8)	(159.3,59.0)	(162.7,56.4)
CDFS	03:32:19, -28:06	0	4.5	(54.4,-27.1)	(51.8,-27.0)	(51.7,-28.9)	(54.4,-28.9)
XMM-LSS	02:20:00, -04:48	0	4.5	(37.2,-5.4)	(37.0,-3.9)	(33.9,-4.1)	(34.3,-5.7)

\* Single-band catalogs extend beyond vertices.



## THE SPITZER EXTRAGALACTIC REPRESENTATIVE VOLUME SURVEY (SERVS): SURVEY DEFINITION AND GOALS

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Measurement	[3.6] value ( $\mu\text{Jy}$ )	[4.5] value ( $\mu\text{Jy}$ )
$5\sigma_{\text{pp}}$	1.3	1.5
$5\sigma_{\text{ap}}$	1.9	2.2
$S_{50c}^{\dagger}$	4.0, 3.0	3.5, 3.5
$S_{80c}^{\dagger}$	7, 5	5, 5

# SPitzer Large Area Survey with Hyper-Suprime-Cam (SPLASH)

- PI: Peter Capak
- Allocation: 1251.4 hours
- 1.8 Square degree fields, COSMOS
- Reaches  $ch1=25.4$ ,  $ch2=25$ ,  $0.1M^*$  at  $z\sim 7$  for typical galaxy

Epoch Start Date End Date (UT)

1A 2013 Feb 3 to 2013 Feb 7

1B 2013 Feb 8 to 2013 Feb 12

1C 2013 Feb 13 to 2013 Feb 17

1D 2013 Feb 18 to 2013 Feb 22

1E 2013 Feb 23 to 2013 Feb 27

1F 2013 Feb 28 to 2013 Mar 4

2A 2013 Jul 4 to 2013 Jul 9

2B 2013 Jul 10 to 2013 Jul 15

2C 2013 Jul 16 to 2013 Jul 21

2D 2013 Jul 22 to 2013 Jul 27

2E 2013 Jul 28 to 2013 Aug 2

2F 2013 Aug 3 to 2013 Aug 8

3A 2014 Feb 10 to 2014 Feb 15

3B 2014 Feb 16 to 2014 Feb 20

3C 2014 Feb 21 to 2014 Feb 25

3D 2014 Feb 26 to 2014 Mar 2

3E 2014 Mar 3 to 2014 Mar 7

3F 2014 Mar 8 to 2014 Mar 12

# SUMMARY

- u-band data on Deep and Udeep:  
 $u_{AB}=25-25.5$  and  $27.5-28$
- NIR: UKIDSS finished and VISTA on-going
- NIR UDeep: part to  $K_{AB}=24.5$ , smaller to  $K_{AB}=26$
- NIR Deep: 2.5 fields covered to  $J_{AB}=23.5$  to  $24.5$
- NIR Wide: VIKING and VICS82 to
- MIR Deep: SERVS covering 1.5 field at  $AB\sim 23.6$
- MIR UDeep: SPLASH one field at  $AB\sim 25.4$





*THANKS!*