

ESO Surveys and LSST

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Overview

- Short history
- Current public surveys
 - Imaging: VST, VISTA
 - Spectroscopy: Gaia-ESO, PESSTO
- VIMOS Public Spectroscopic Surveys
- Future of surveys at ESO
- ESO and LSST

Short history

■ ESO-SERC southern sky survey

- complement to the Palomar Sky Survey
- ESO (and UK) Schmidt telescopes
- photographic plates
- photographic laboratory (started in Geneva)

■ HIPPARCOS Input Catalogue

- La Silla small telescopes

■ ESO Imaging Survey

- NTT + EMMI
- dedicated survey team at ESO



Short History

■ Spectroscopic Surveys

➤ Several large surveys with ESO telescopes

- Exo-planet searches (>700 nights, HARPS)
- VVDS (> 60 nights, >58000 targets, >38000 redshifts, VIMOS)

<http://cesam.lam.fr/vvds>

- zCOSMOS (>60 nights, >40000 redshifts, VIMOS)

<http://www.exp-astro.phys.ethz.ch/zCOSMOS/>

- VIPERS (>40 nights, >100000 redshifts, VIMOS)

<http://vipers.inaf.it/>

- GOODS (>40 nights, FORS2, VIMOS)



Current Surveys

- Summary of all public surveys available in The Messenger 154 (December 2013)
- <http://www.eso.org/sci/publications/messenger/archive/no.154-dec13/messenger-no154-public-surveys.pdf>

The Messenger



No. 154 – December 2013

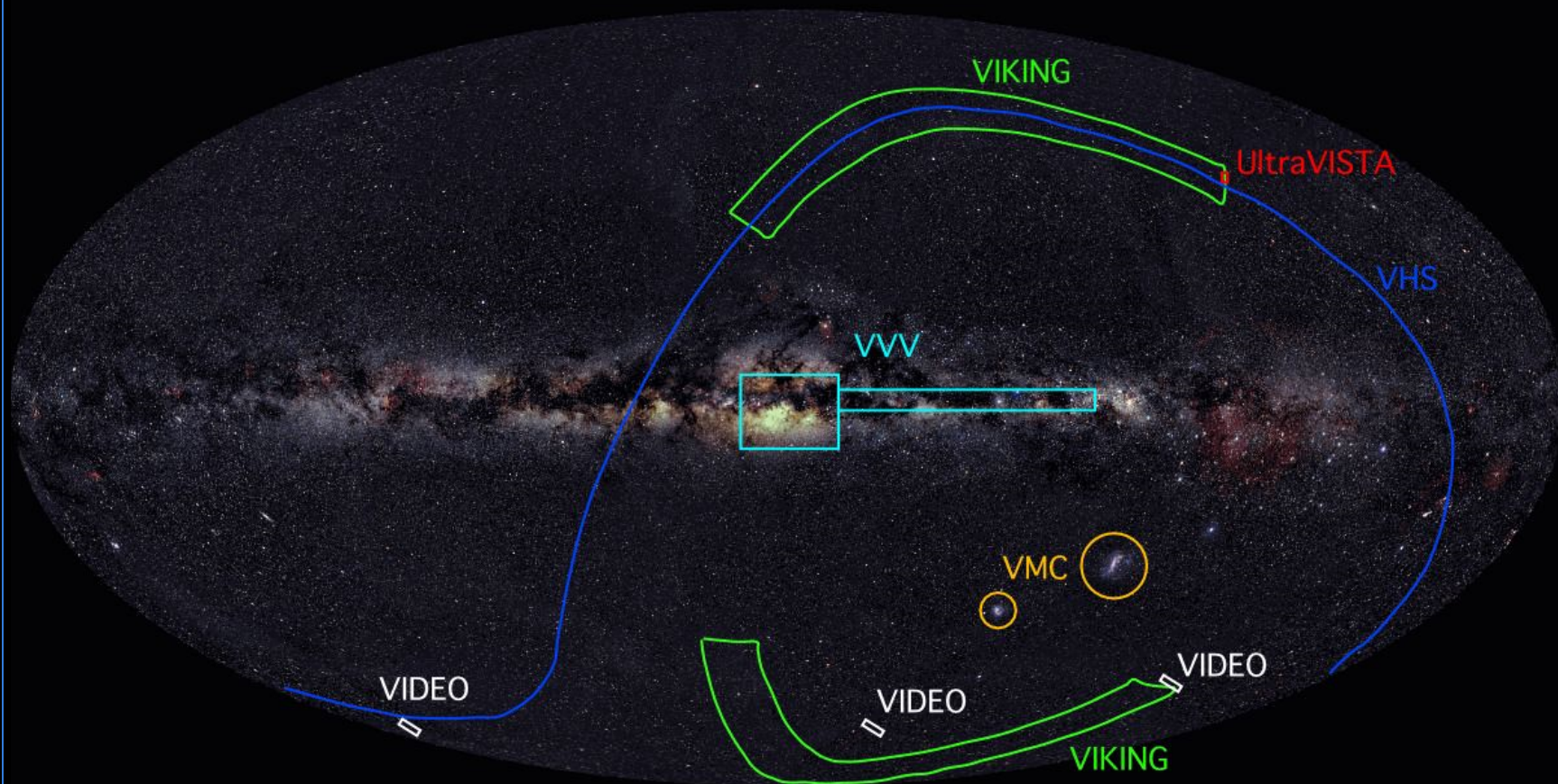


Paranal instrumentation programme
Focus on ESO Public Surveys
Resolving AGN with MIDI



VISTA Public Surveys

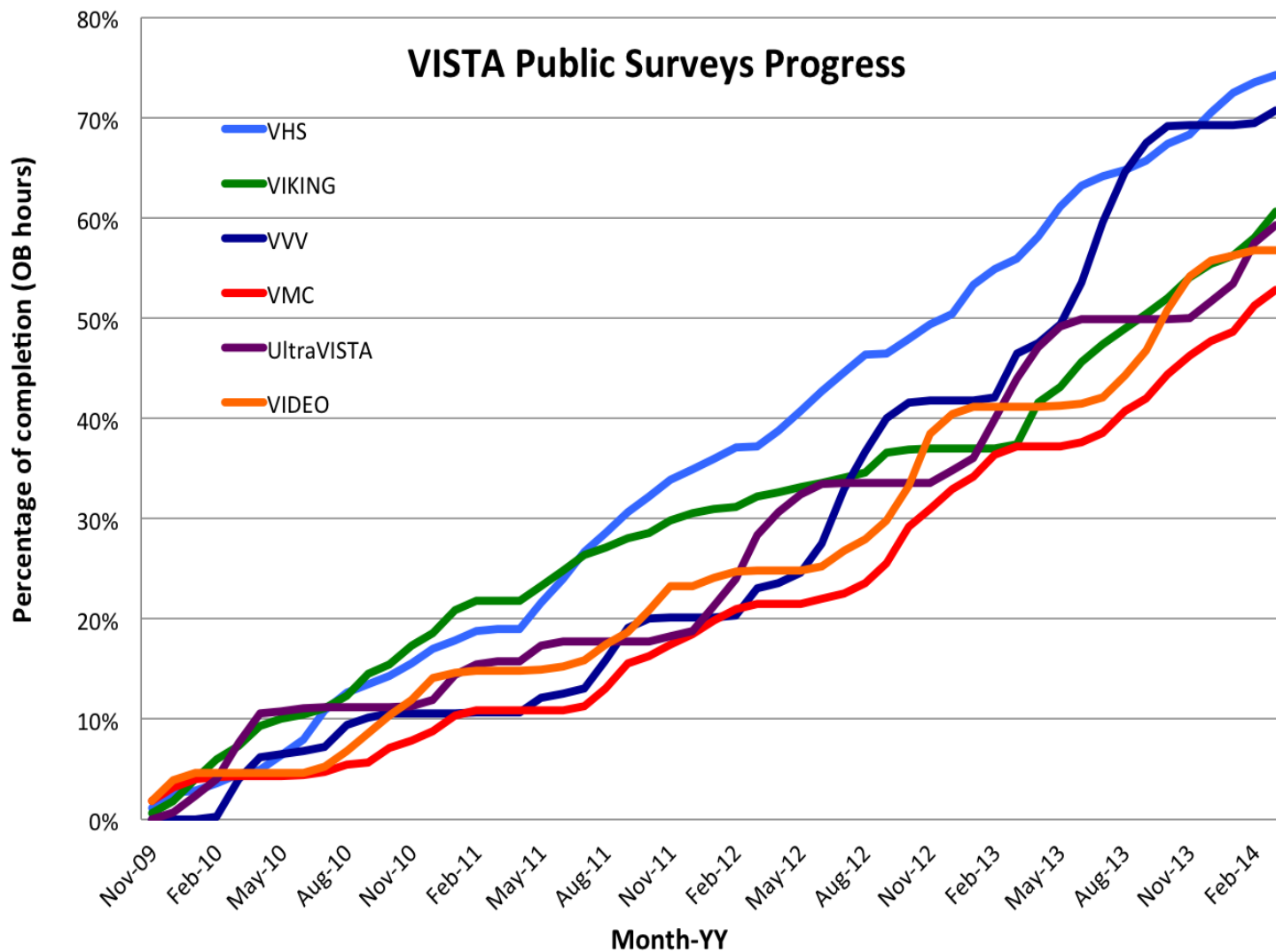
Six public surveys selected



VISTA Surveys

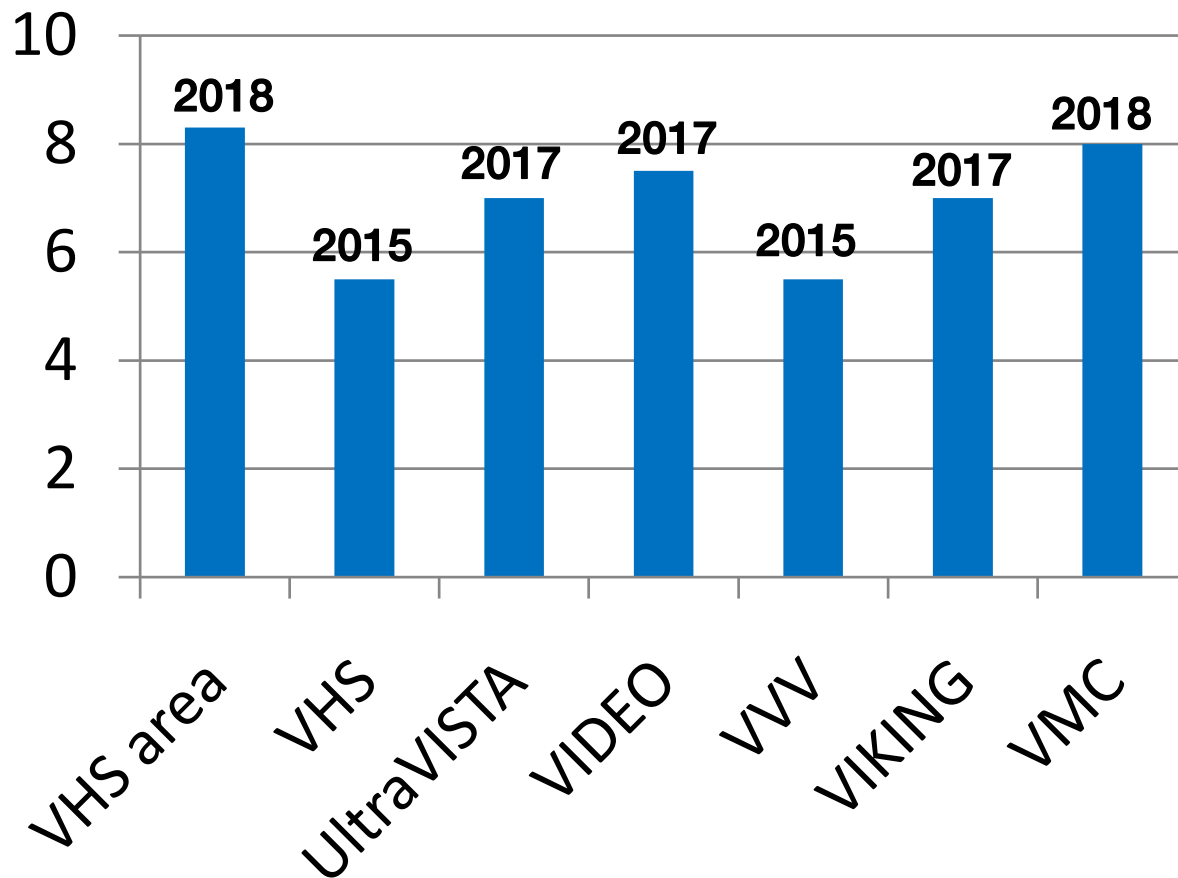
Survey	Area (deg ²)	Depth measure	Filters and depth
Ultra-VISTA	0.73 (ultra-deep)	5 σ , AB	Y=26.7, J=26.6, H=26.1, K=25.6, NB=26.0
VIKING	1500	5 σ , AB	Z=23.1, Y=22.3, J=22.1, H=21.5, K _s =21.2
VHS	20000	5 σ , AB	Y=21.2, Y=21.2, J=21.2, H=20.6, K _s =20.0
VIDEO	15	5 σ , AB	Z=25.7, Y=24.6, J=24.5, H=24.0, K _s =23.5
VMC	184	10 σ , Vega	Survey
VVV	520	5 σ , Vega	Z=21.9, Y=21.2, J=20.2, H=18.2, K _s =18.1

Current status of VISTA surveys



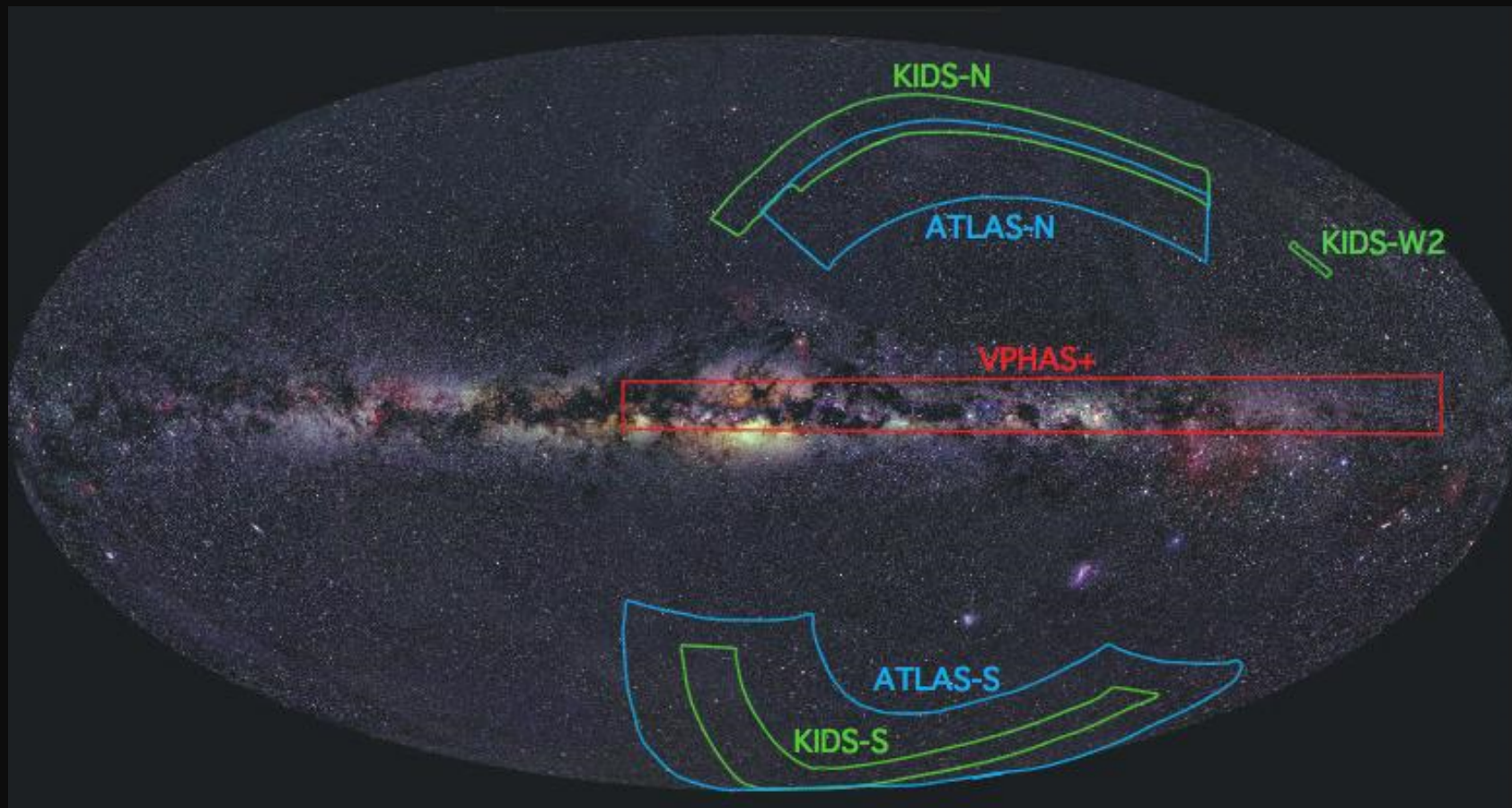
Status of VISTA Surveys

■ Expected completion time



VST Public Surveys

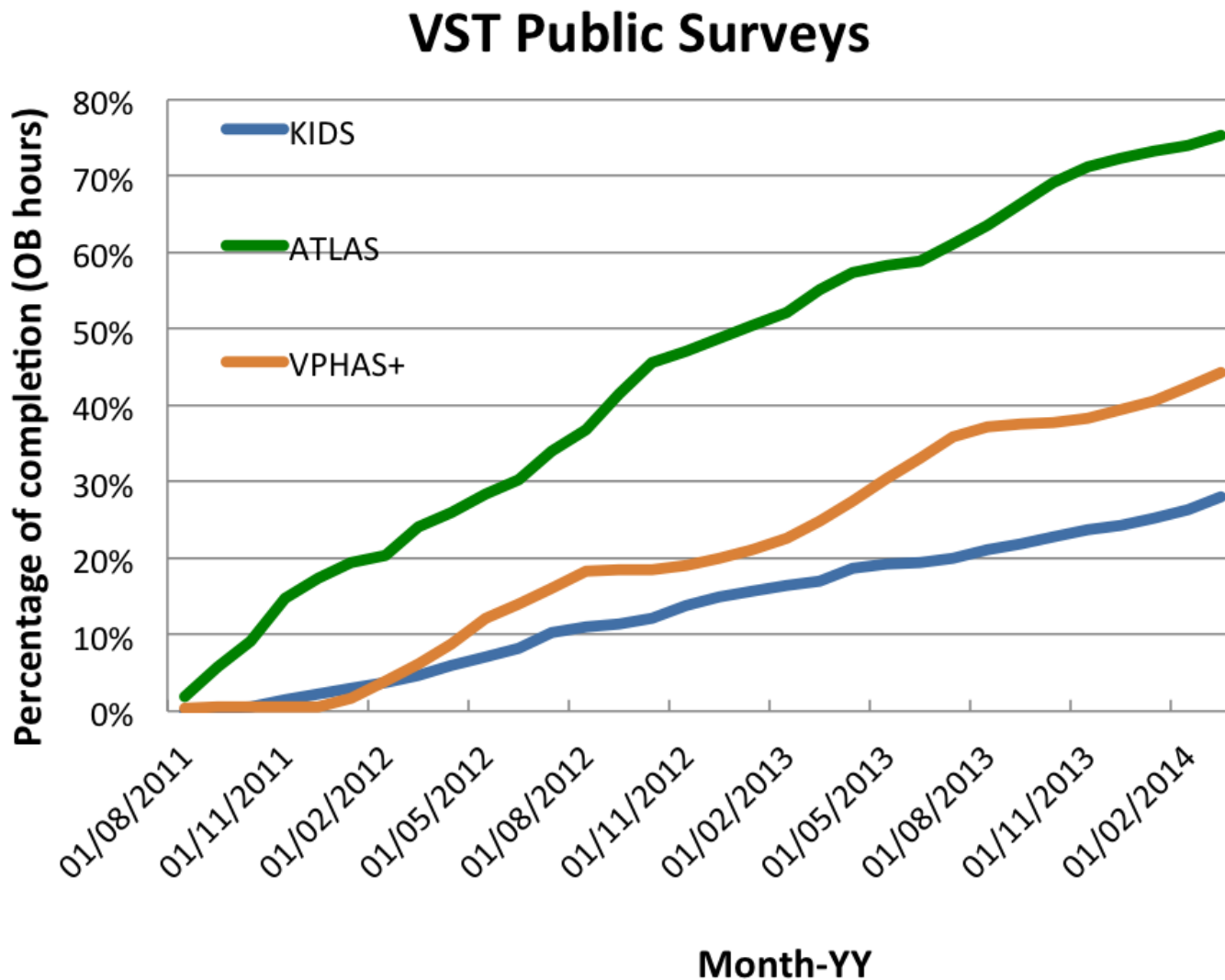
Three public surveys
(and several GTO surveys)



VST surveys

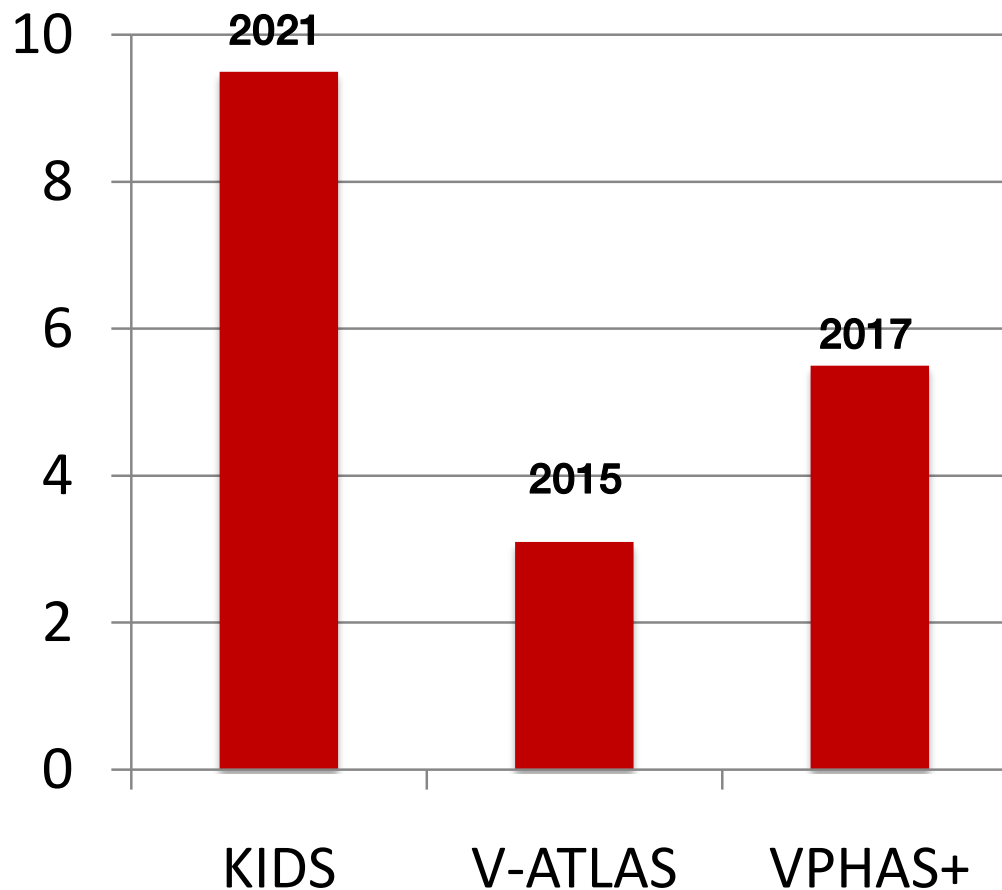
Survey	Area (deg ²)	Filters and depth (10 σ , AB)
KIDS	1500	u'=24.8, g'=25.4, r'=25.2, i'=24.2
ATLAS	4500	u'=22.0, g'=22.2, r'=22.2, i'=21.3, z'=20.5
VPHAS+	1800	u'=21.8, g'=22.5, H α =21.6, r'=22.5, i'=21.8

Current status of VST surveys



Status of VISTA Surveys

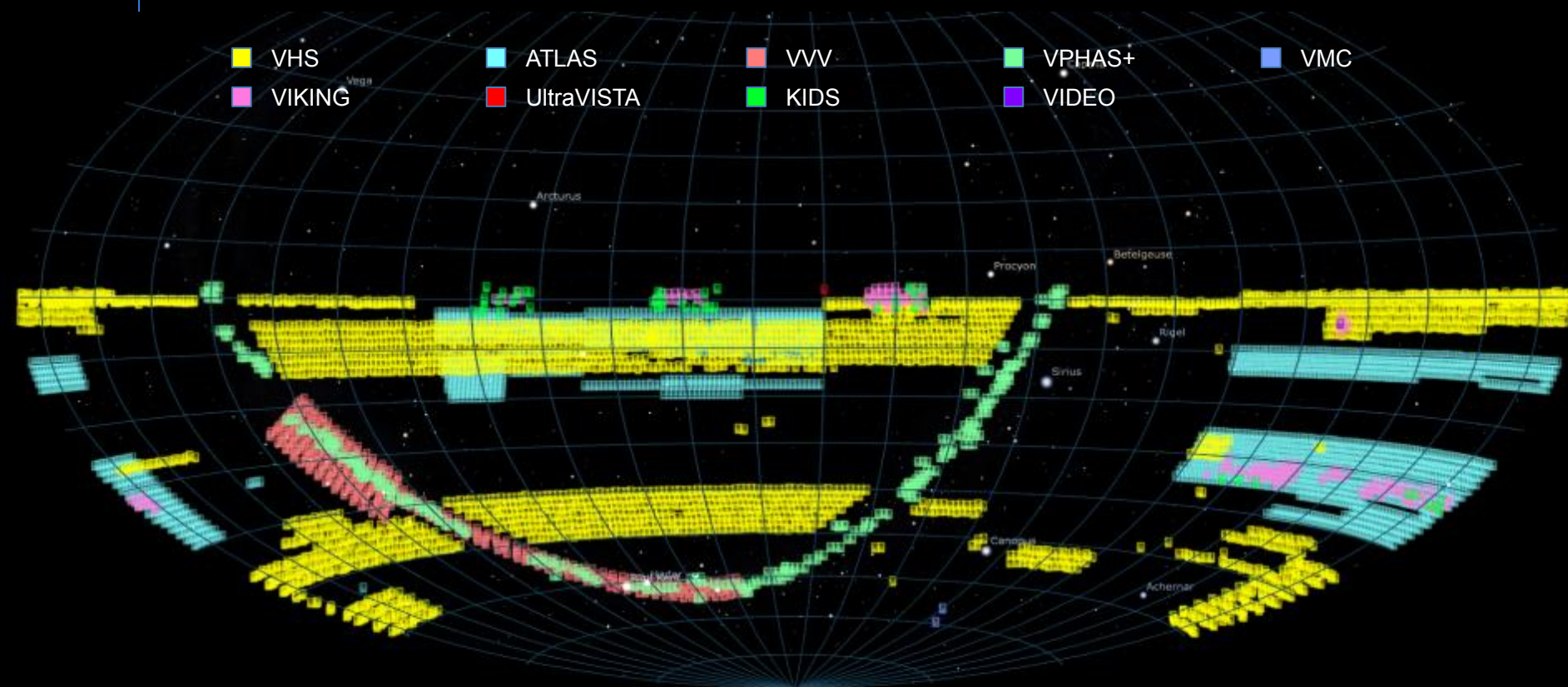
■ Expected completion time



Public data

■ Available through the ESO archive

http://archive.eso.org/wdb/wdb/adp/phase3_main/form



Survey Review

- All ongoing surveys reviewed by external panels
 - Public Survey Panel (28/29 April 2014)
 - involved in the selection of the VISTA and VST surveys
 - previous review (VISTA surveys) in November 2012
 - now reviewed all imaging surveys
 - Public Spectroscopic Survey Panel (30 April 2014)
 - selection of spectroscopic surveys
 - review of Gaia-ESO and PESSTO
 - recommendation for VIMOS surveys to OPC

Imaging Surveys

- All surveys considered successful and on track
- Rate of completion a concern
 - surveys remain competitive
 - provide large legacy value
- Resolve some issues between ESO and the PIs concerning delivery of data products
- Improve communications between ESO and PIs

Spectroscopic Surveys

- UT2 with FLAMES/UVES
 - ‘Gaia-ESO Spectroscopic Survey’
- NTT with EFOSC2/SOFI
 - ‘Public Spectroscopic Survey of the Transient Universe’
- UT3 with VIMOS
 - ‘The Physical Properties of Galaxies 7 Gyrs Ago’
 - ‘VANDELS – A deep VIMOS survey of the CANDELS UDS and CDFS fields’



Gaia-ESO

- About 1/3 of the survey done
- Very positive evaluation by the PSSP
 - legacy value of the data in connection with Gaia
 - good progress in data handling
- Many subprojects, which lead to important results in structure of the Milky Way
 - multiple kinematic structures in young clusters
 - mapping of Sagittarius stream and MW tri-axial potential
 - transition of thick to thin disk (chemical tagging)
 - chemical composition of bulge stars (super-solar metallicity, sub-solar alpha elements)

PESSTO

- Positive evaluation by PSSP
- Excellent classification of many explosive events
 - >400 classifications so far
 - typically 24 hour turn around
- Follow-up of peculiar events to investigate the physical parameters of the explosions
 - >70 events observed in detail
 - spectroscopy and photometry
- First results
 - circumstellar absorption around SNe Ia
 - SNe in remote locations (Ia or Ib?)
 - superluminous supernovae



Selection of VIMOS surveys

- 20 Letters of Intent submitted in October 2013
- PSSP evaluated Lols (December 2013)
- 3 proposals invited for further selection
- PSSP met on 30 April to discuss the proposals and made a recommendation to the OPC
- OPC met in May to discuss the recommendations

OPC recommendations

- **Public Imaging Surveys**
 - OPC recommended extensions: VHS, VVV, VST-ATLAS, subject to timely ingestion of data to ESO Archive
 - OPC asked for new imaging Call in ~18 months, prior to next PSP mtg, so that PSP can tension new vs old ideas
- **Public Spectroscopic Surveys**
 - OPC concurred with PSSP recommendation to continue with ESO-Gaia and PESSTO – both very successful
 - OPC recommended support of two new public surveys:
 - VANDELS, PIs: McClure and Pentericci
 - The physical properties of galaxies 7 Gyrs ago, PI: van der Wel
 - 640 hours each of on-source integration

Future of ESO Surveys

- Bright time with VST becoming available
 - offer in open time
- VISTA call for future imaging surveys depending on progress with 4MOST
- Currently no plans for another call for spectroscopic surveys
 - general discussion needed in the framework of the science strategy discussion at ESO
 - Workshop in January 2015

MOONS

Telescope	Field of view	wavelength range	multiplex	resolution
UT	500 arcmin ²	0.8 to 1.8 μ m	1000 fibres	5000 20000

■ Science

- Galactic archeology, Gaia follow-up
 - Bulge, disc, streams, stellar clusters
- Galaxy evolution
 - ‘SDSS at $z>1$ ’
 - relations between stellar mass, star formation, metallicity, feedback
- Follow-up of optical and IR imaging surveys
- Synergy with Euclid

4MOST

Telescope	Field of view	wavelength range	multiplex	resolution
VISTA	4 deg ²	400 to 900nm	2400 fibres	5000 20000

■ Science

- Formation history of the Milky Way
 - complementing Gaia for 6D information + chemistry
- dynamical substructure in the Milky Way and Galactic potential
- eROSITA follow-up
 - >50000 galaxy clusters

ESO and LSST

- ESO invited to early reviews
- Decision by ESO Council not to pursue LSST further (2007)
- Recent discussions in the ESO Strategy Working Group
- LSST discussed amongst other projects
- No direct engagement with CCAT, EST, LSST
 - Monitor developments and consider opportunities for scientific follow-up (LSST)