CHILES-VERDES

Deep-drilling the variable radio sky

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Radio provides energetics, environments, and progenitor properties of transients

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Supernovae

GRBs

NS NS mergers

TDEs

Flare stars

Magnetars

AGN variability

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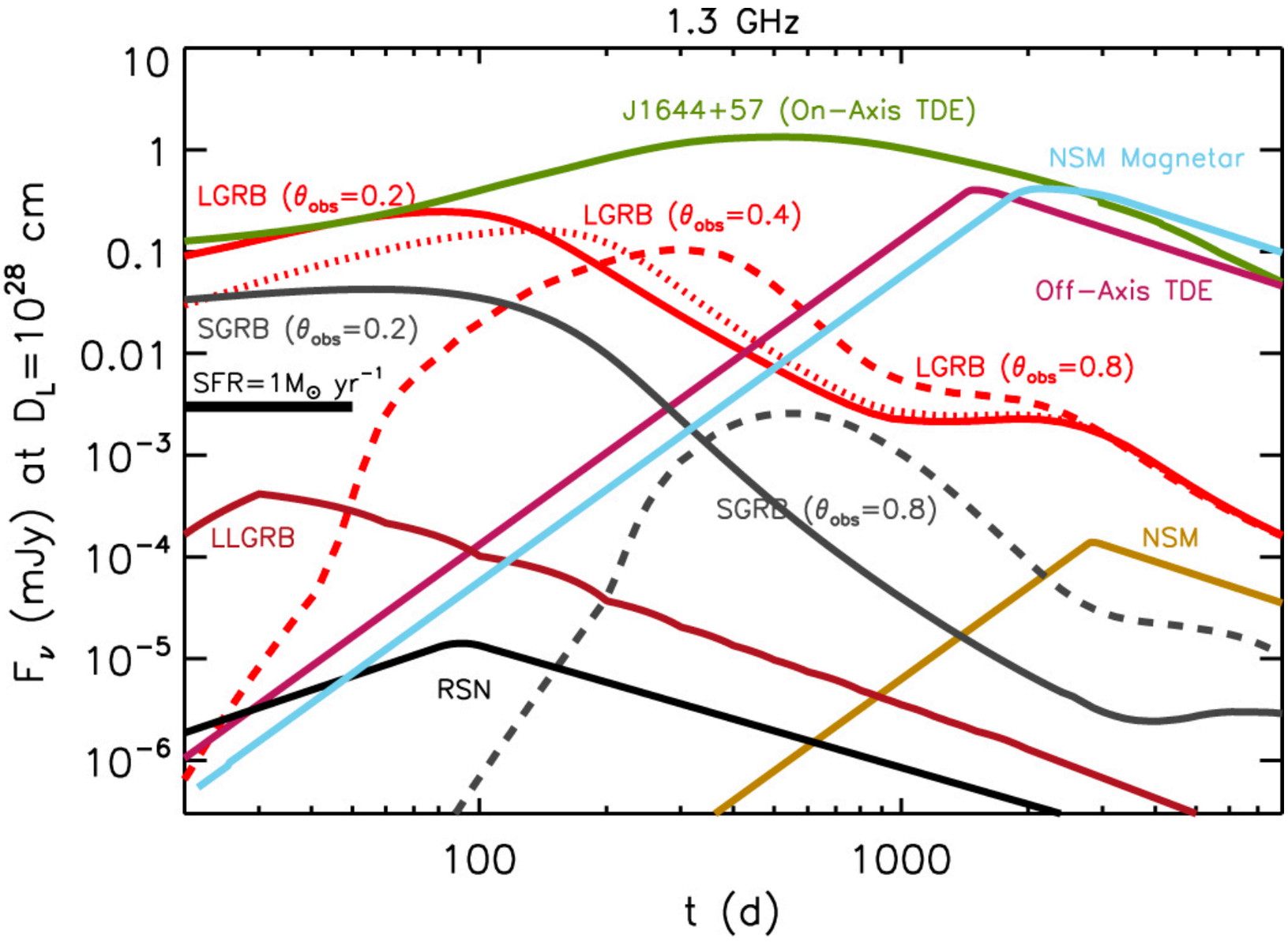
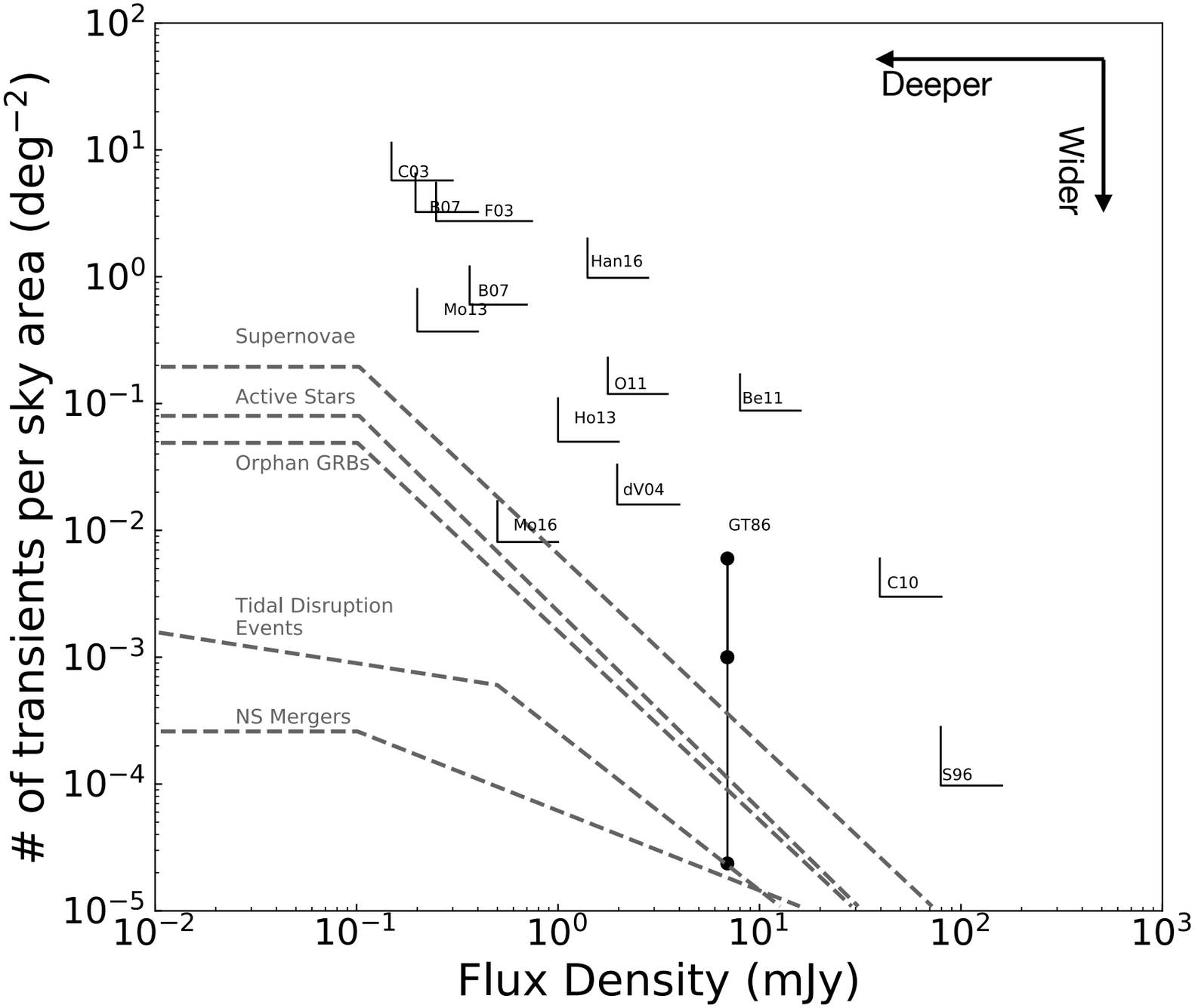
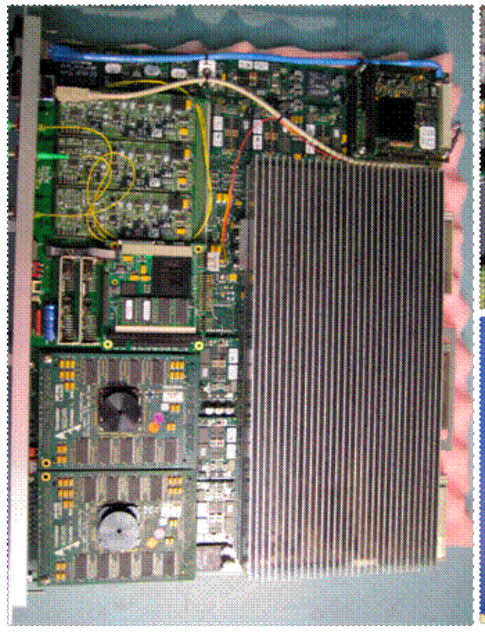
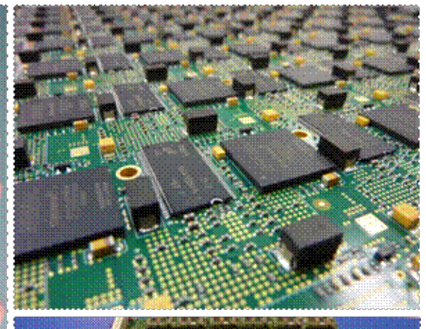


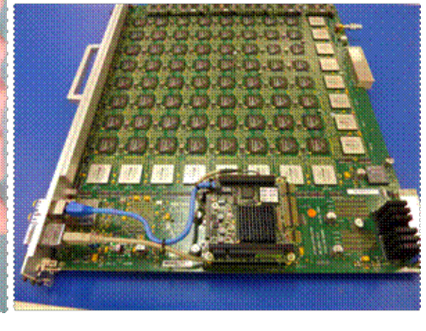
Generally difficult to detect radio transients in blind surveys



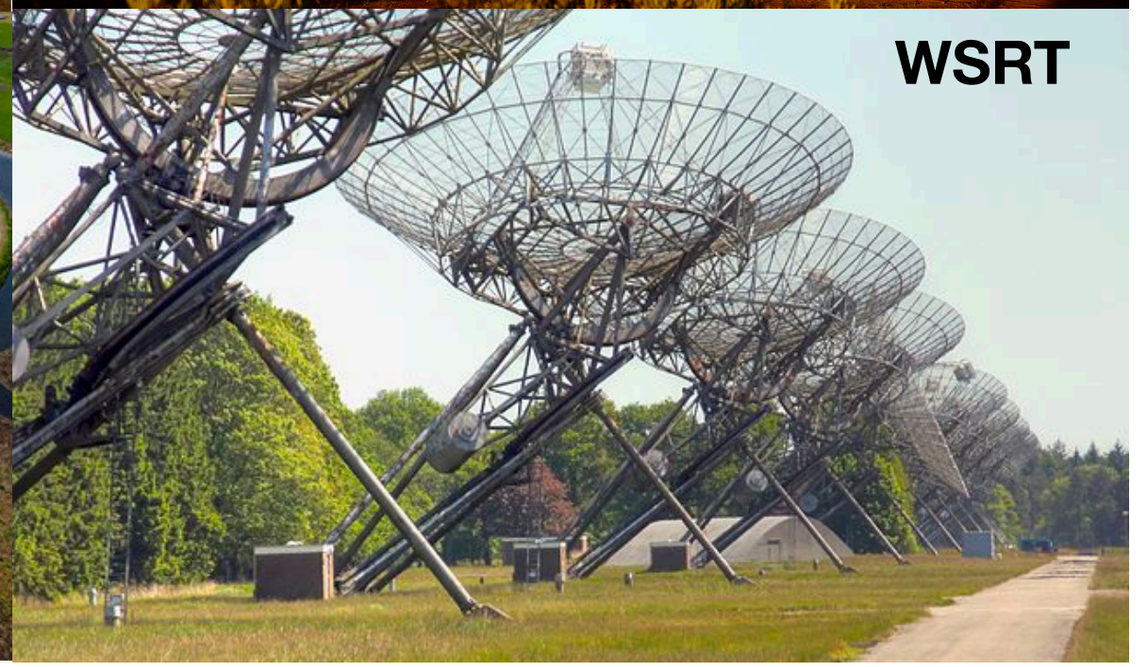
Karl G. Jansky VLA revolutionized the study of radio transients







Also, other exciting telescopes with active transient programs



CHILES VERDES

CHILES VERDES

(Variable and Explosive Radio Dynamic Evolution Survey)

(COSMOS HI Large Extragalactic Survey)

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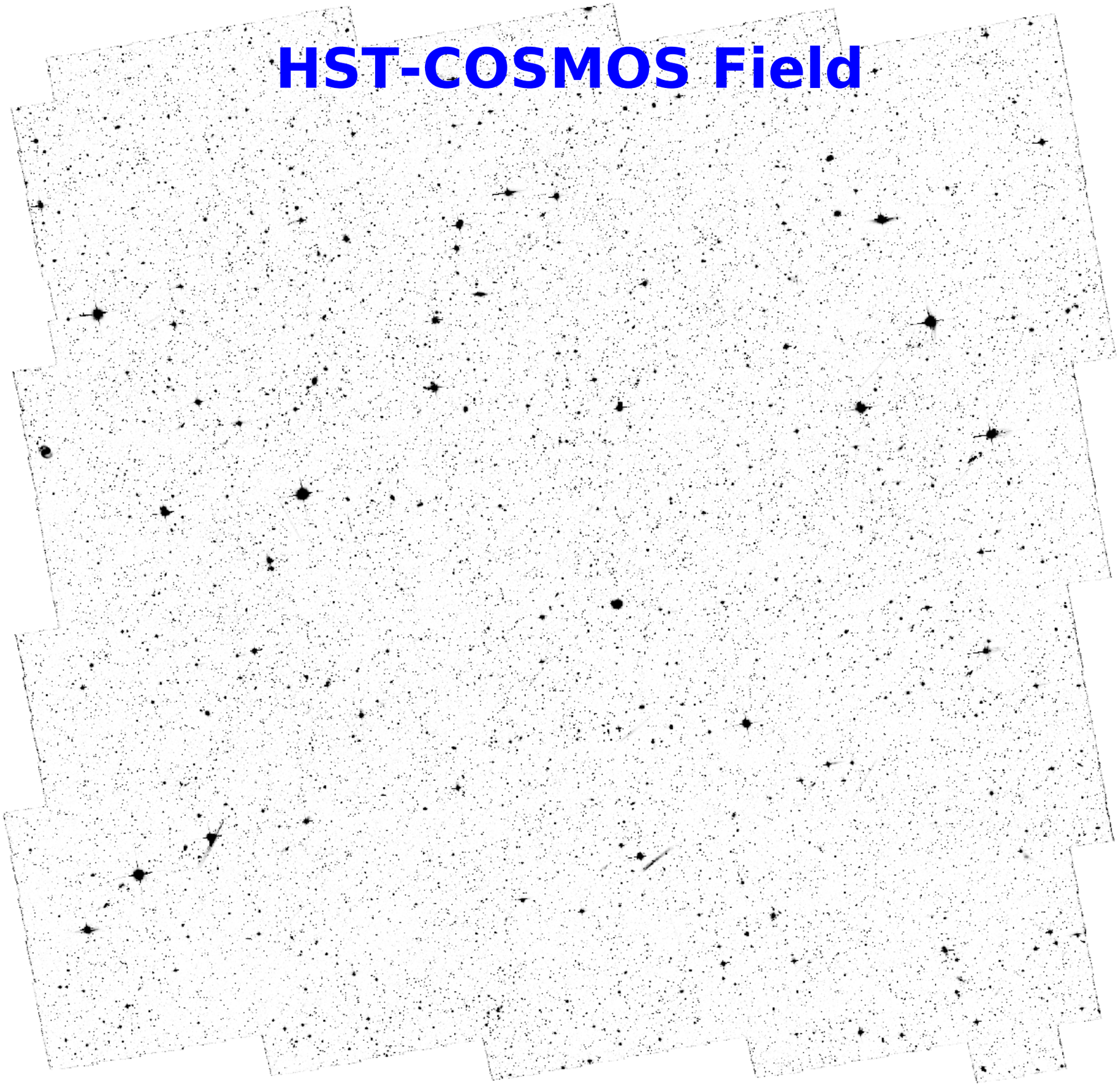
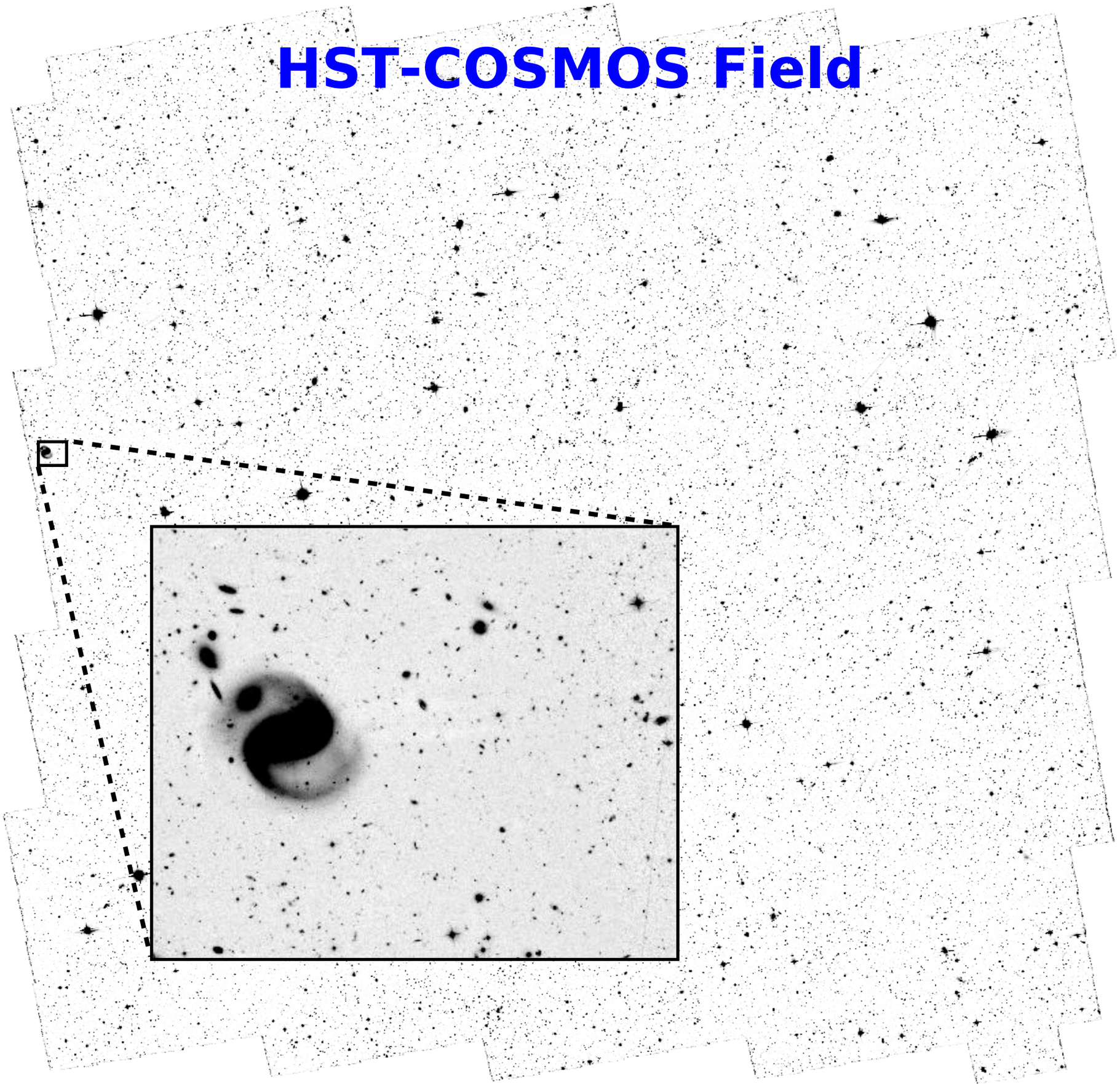
HST-COSMOS Field



https://irsa.ipac.caltech.edu/data/COSMOS/images/acs_mosaic_2.0/

HST-COSMOS Field



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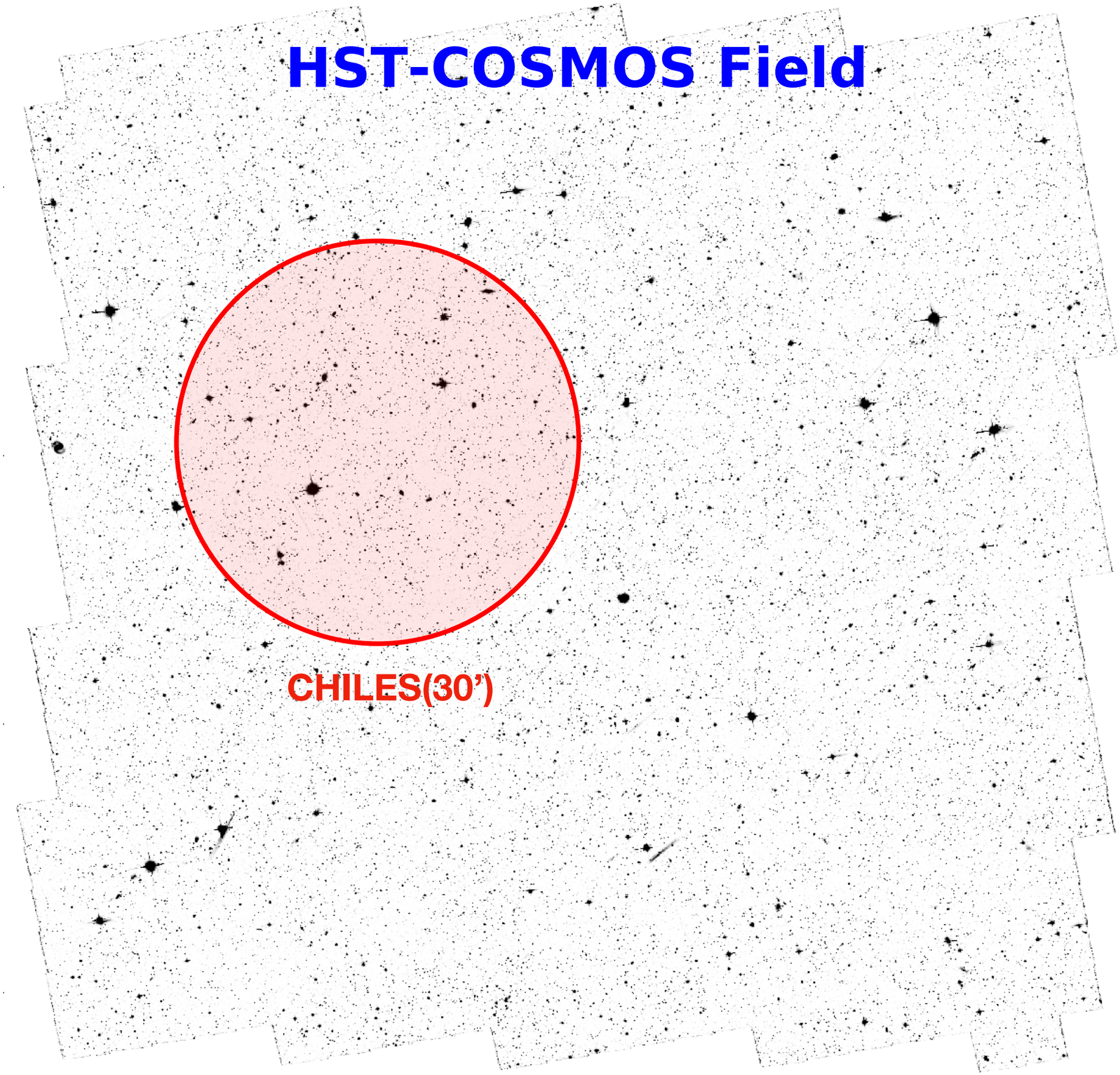
HST-COSMOS Field



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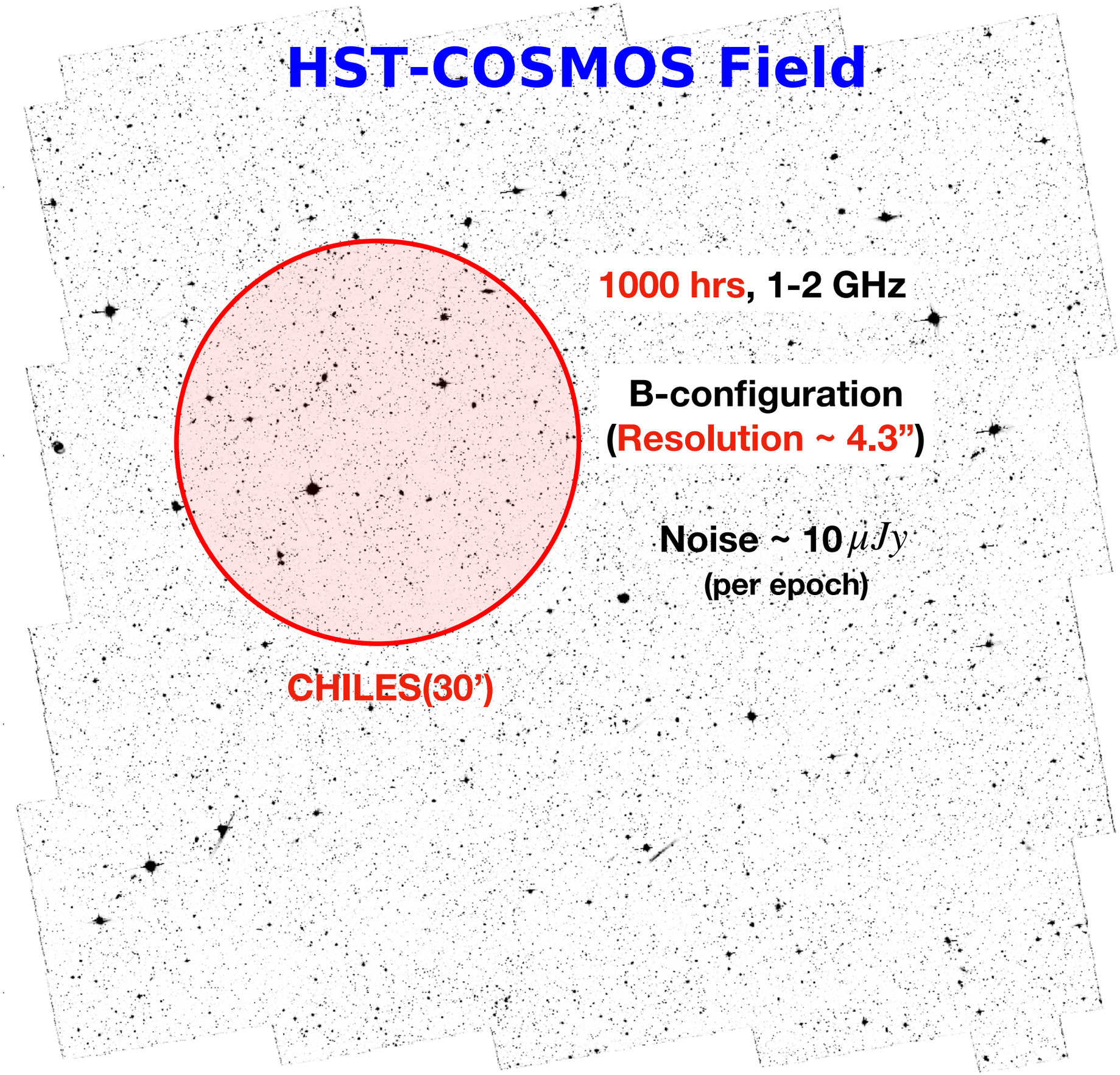
HST-COSMOS Field



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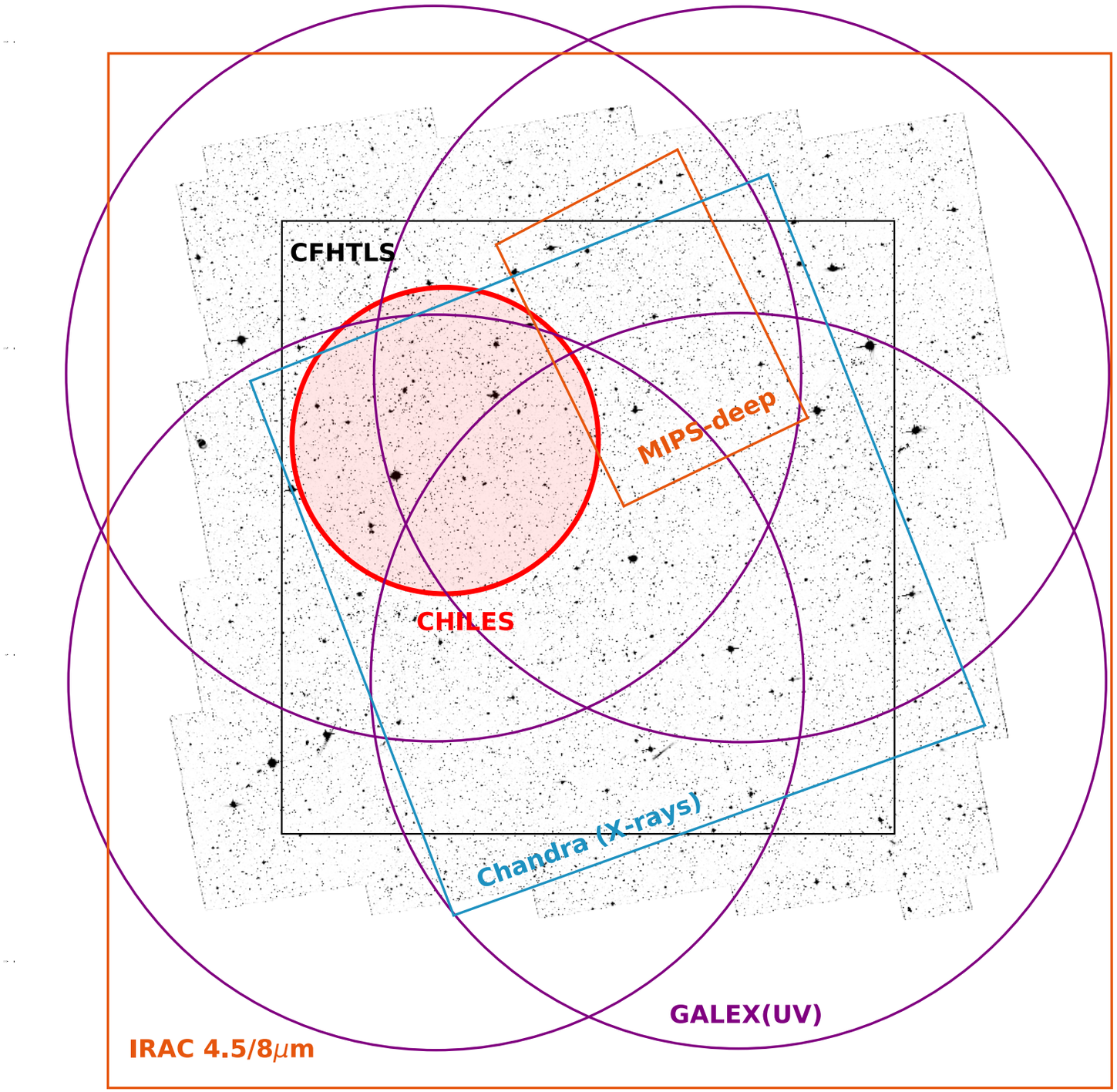
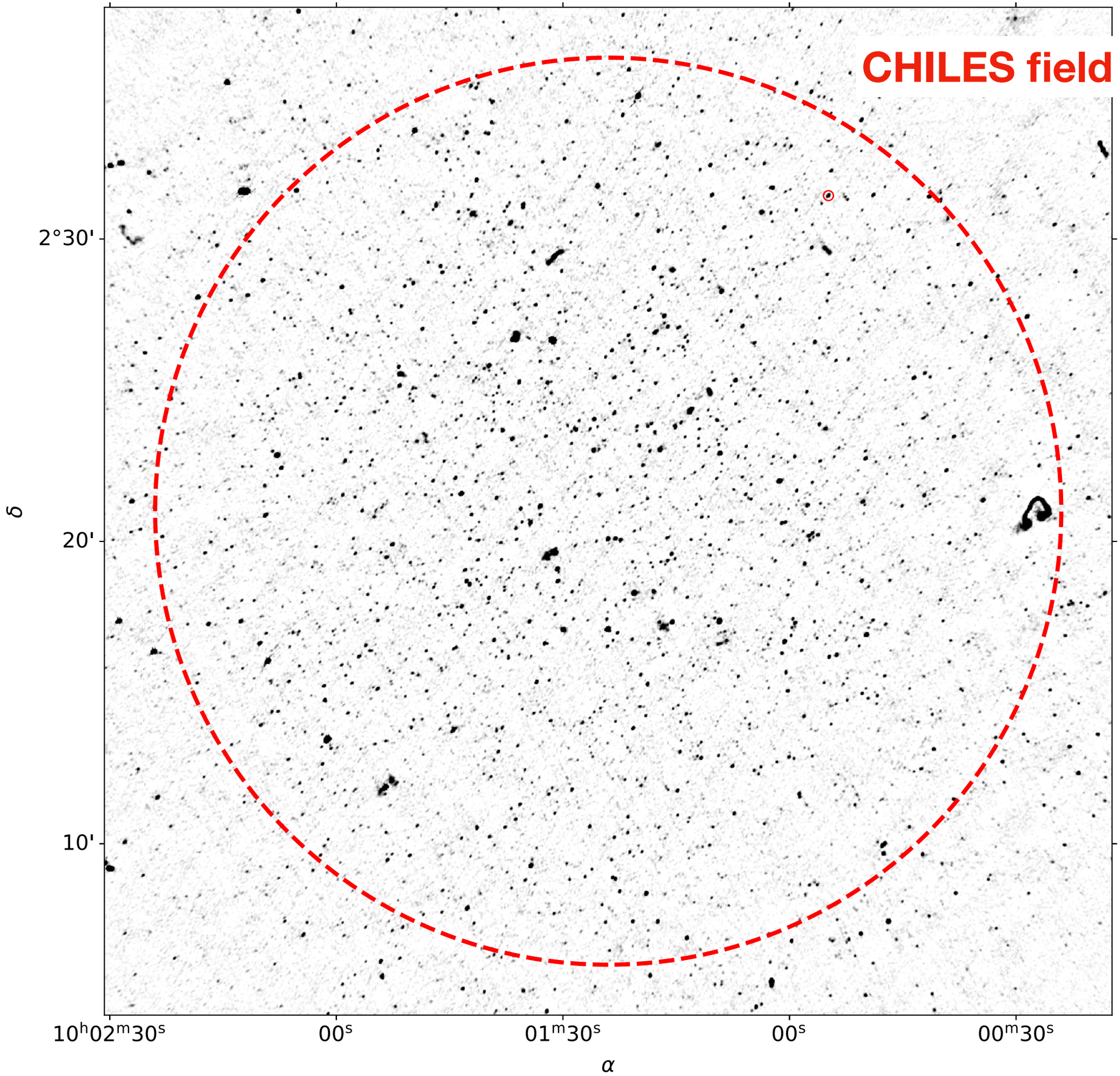
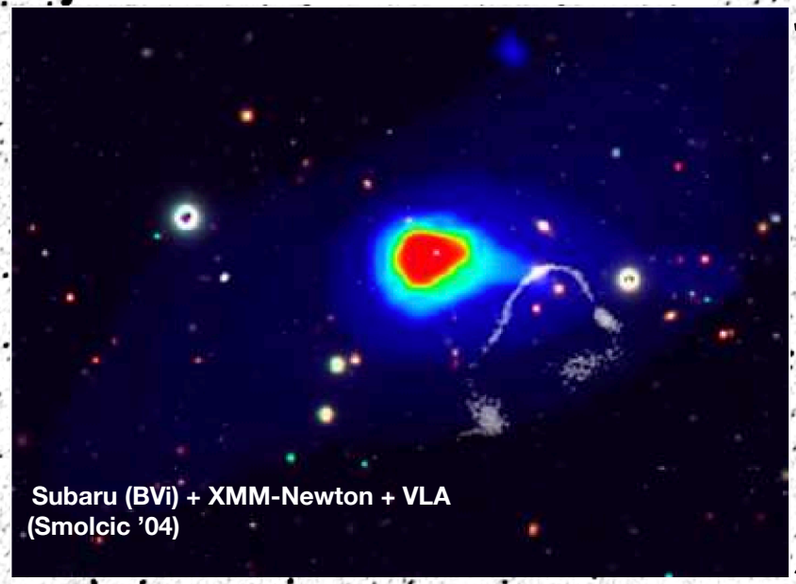
Rich, multi-wavelength data on transient hosts and variables sources!




CHILES field
2°30'
20'
10'
δ
10h02m30s
00s
01m30s
00s
00m30s
α

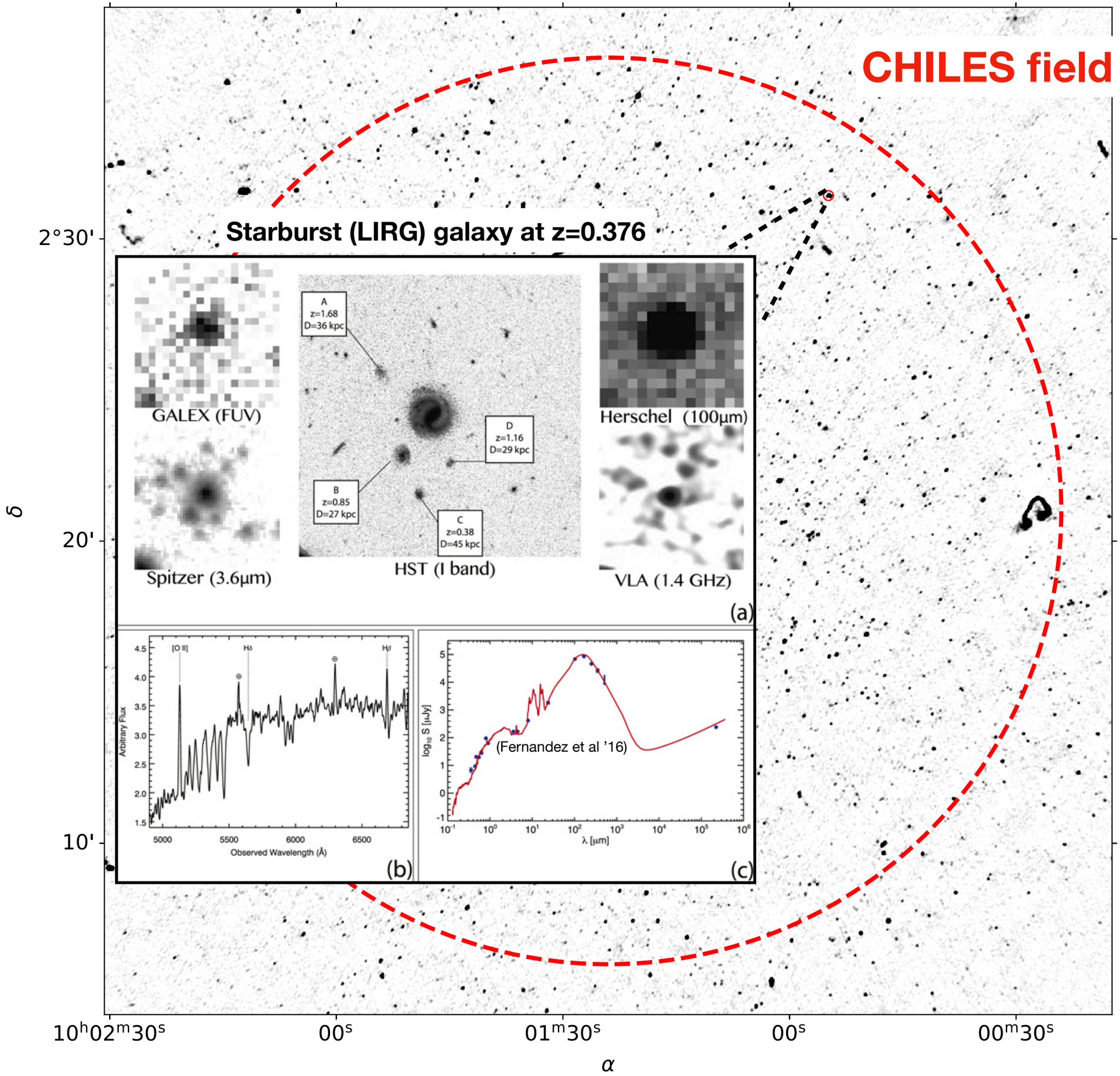
CHILES field

Wide-angle tail (WAT) galaxy



2°30'
20'
10'
δ

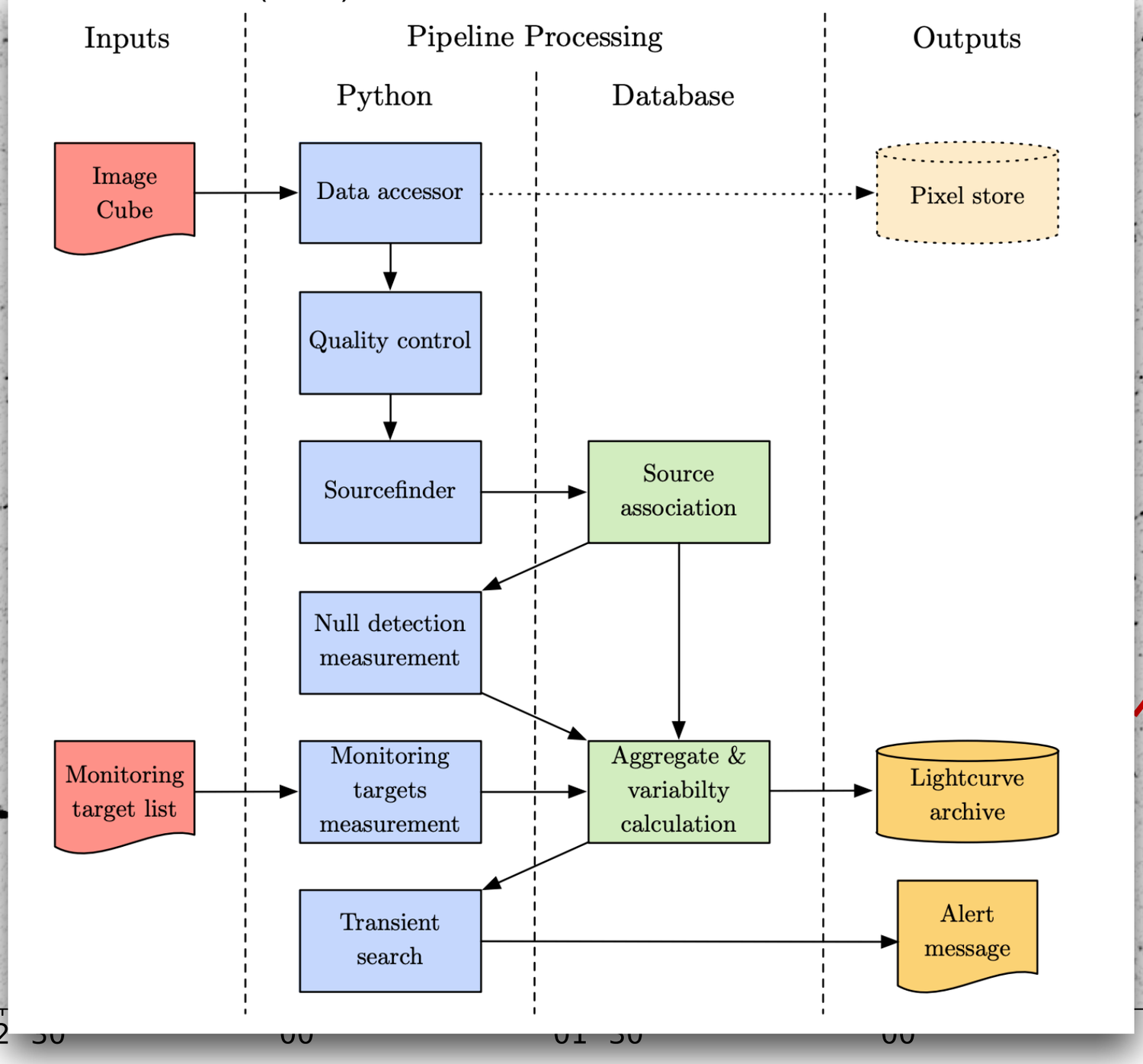
$10^h02^m30^s$
00^s
01^m30^s
00^s
00^m30^s
α


CHILES field
Starburst (LIRG) galaxy at z=0.376
GALEX (FUV)
Spitzer (3.6μm)
A
z=1.68
D=36 kpc
B
z=0.85
D=27 kpc
C
z=0.38
D=45 kpc
D
z=1.16
D=29 kpc
HST (I band)
Herschel (100μm)
VLA (1.4 GHz)
(a)
[O II]
Hδ
Hβ
Arbitrary Flux
Observed Wavelength (Å)
(b)
(Fernandez et al '16)
log10 S [μJy]
λ [μm]
(c)
2°30'
20'
10'
δ
10h02m30s
00s
01m30s
00s
00m30s
α

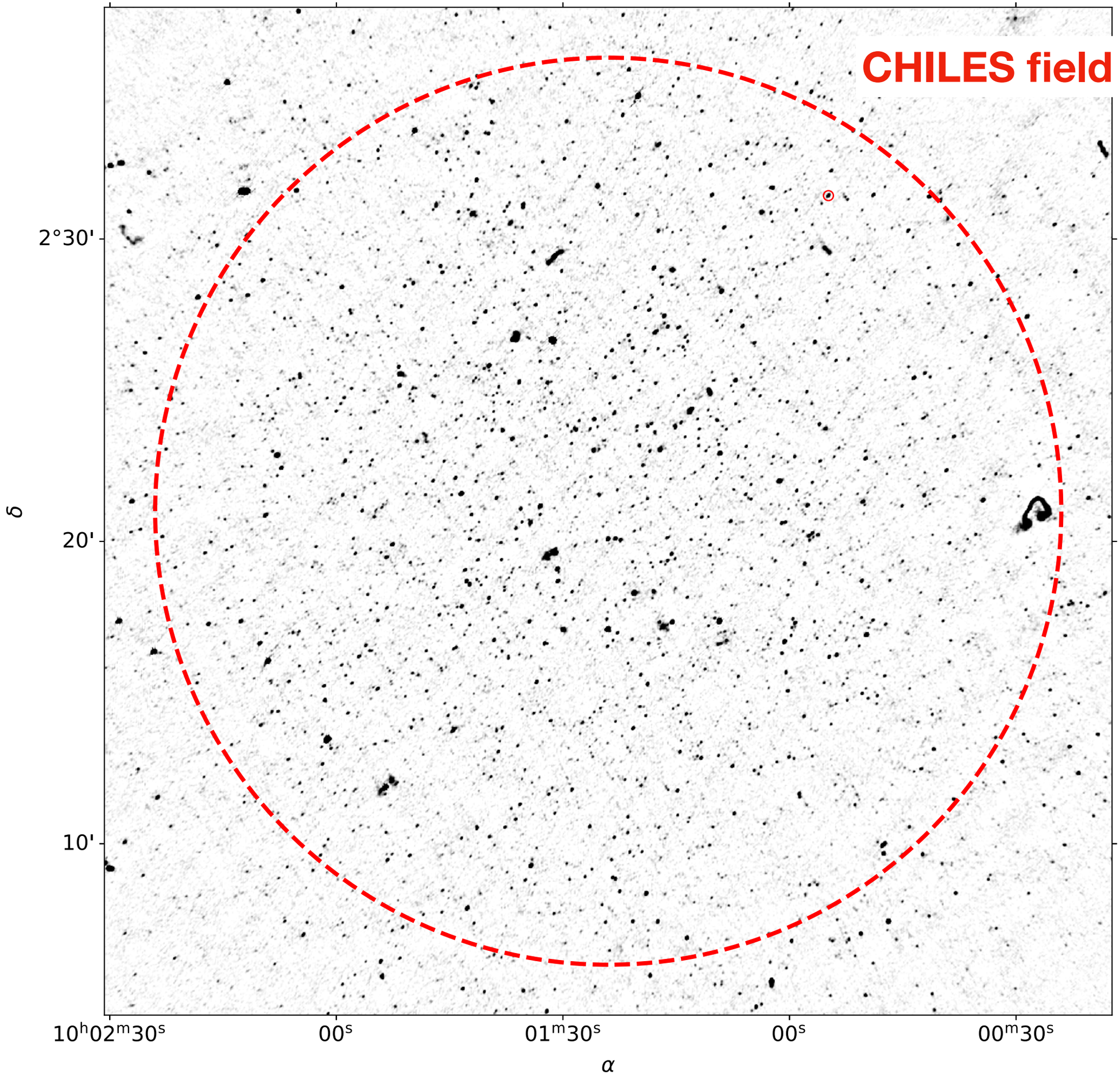
CHILES field

The LOFAR Transient Pipeline (TrAP)

Swinbank et al (2015)

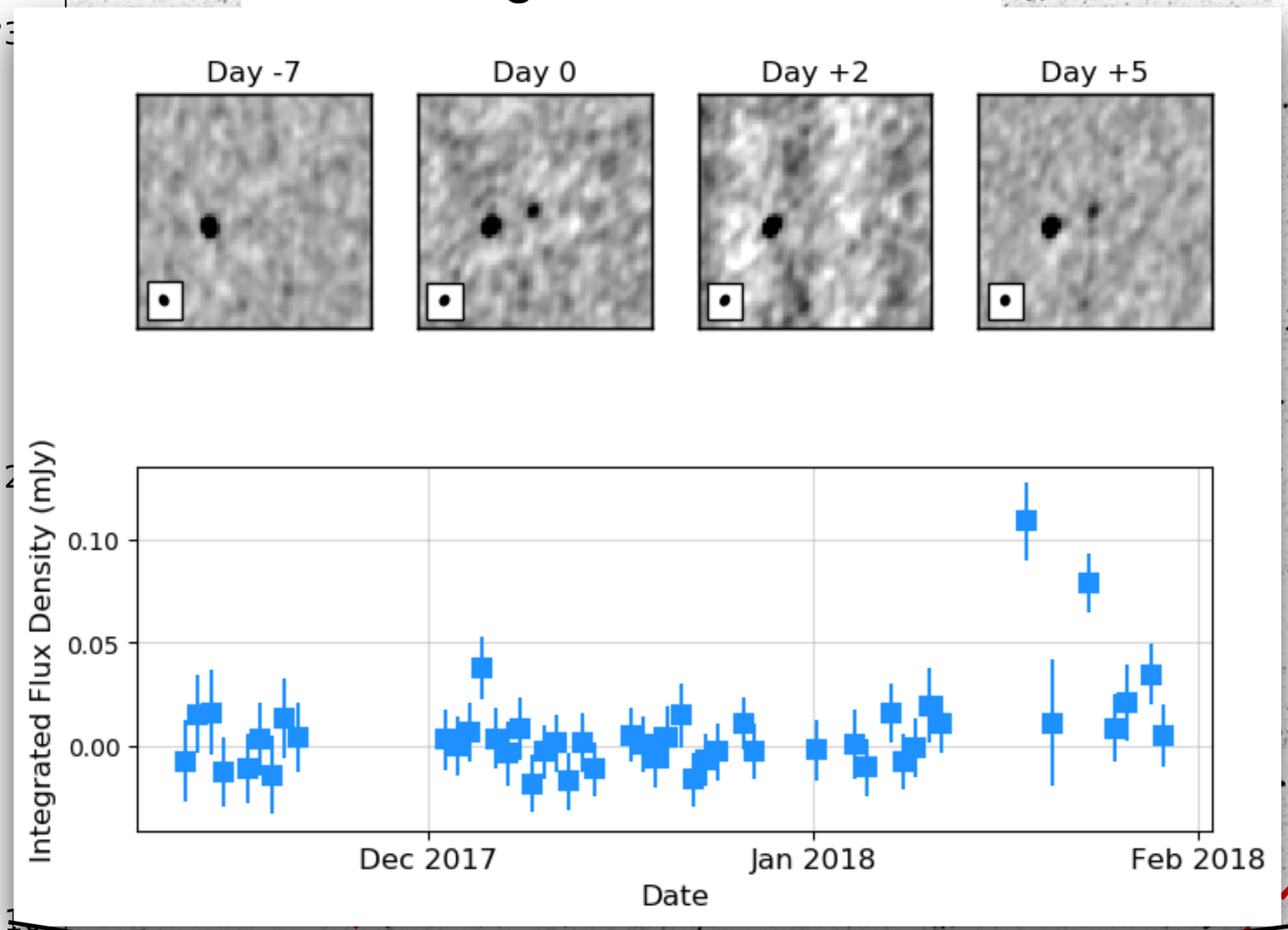


2°30'
20'
10'
δ
10h02
00m30s
α


CHILES field
2°30'
20'
10'
δ
10h02m30s
00s
01m30s
00s
00m30s
α

CHILES field

Flaring M2/M3 Dwarf



$10^h02^m30^s$ 00^s 01^m30^s 00^s 00^m30^s

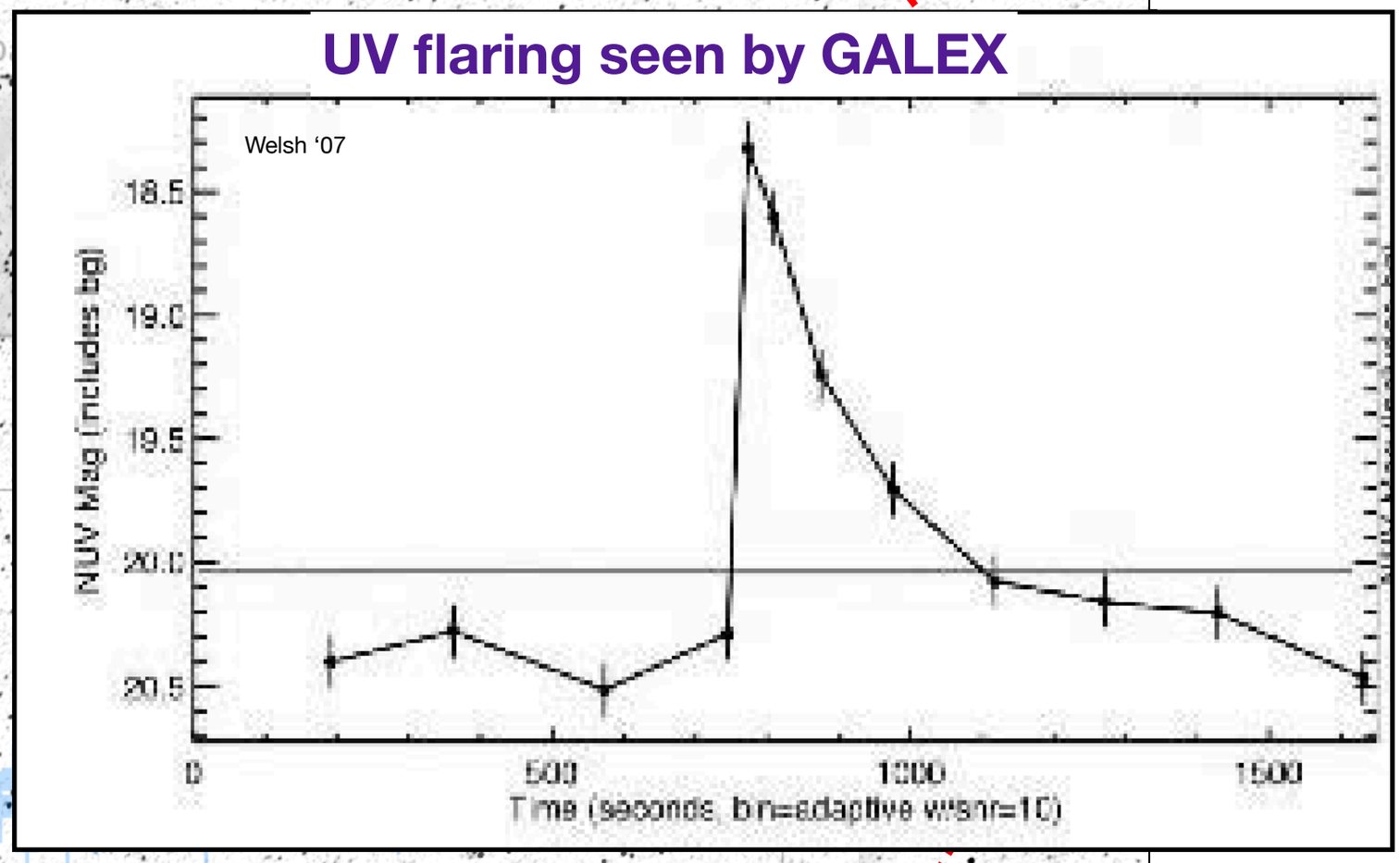
α

δ

CHILES field

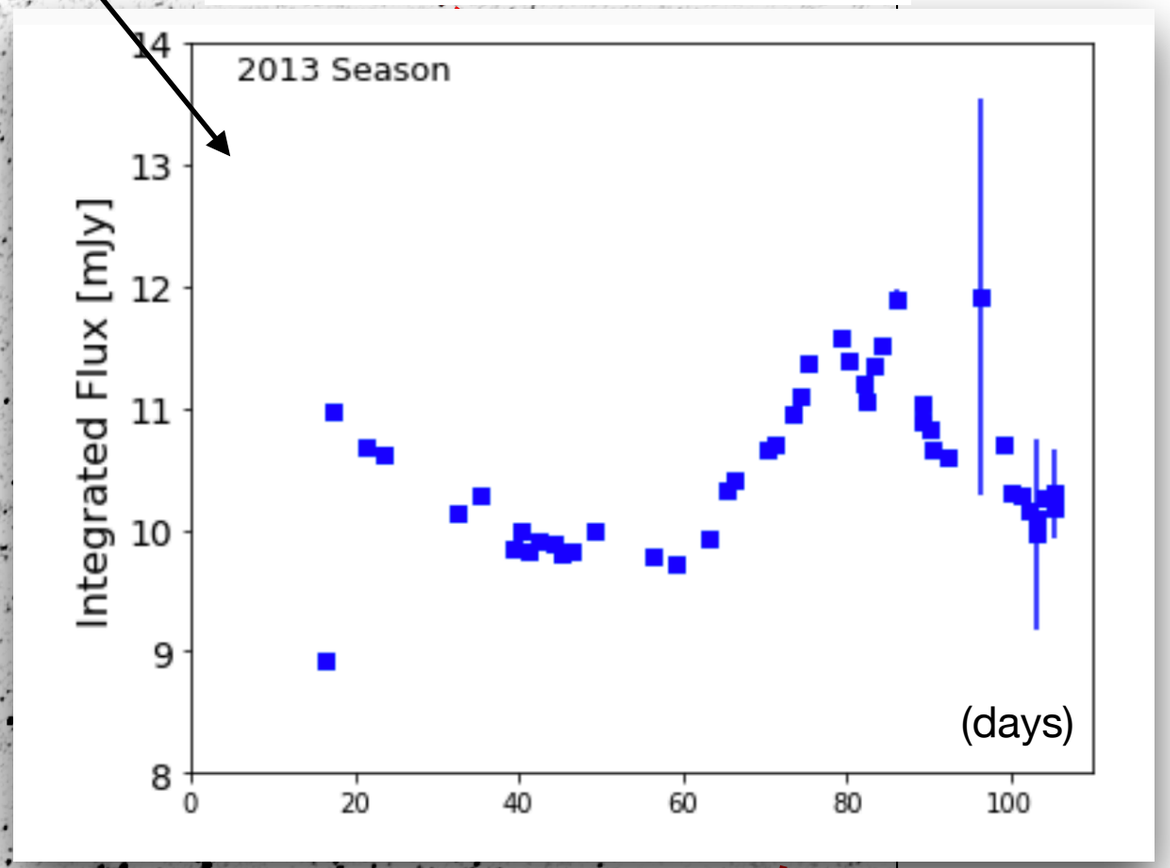
Flaring M2/M3 Dwarf

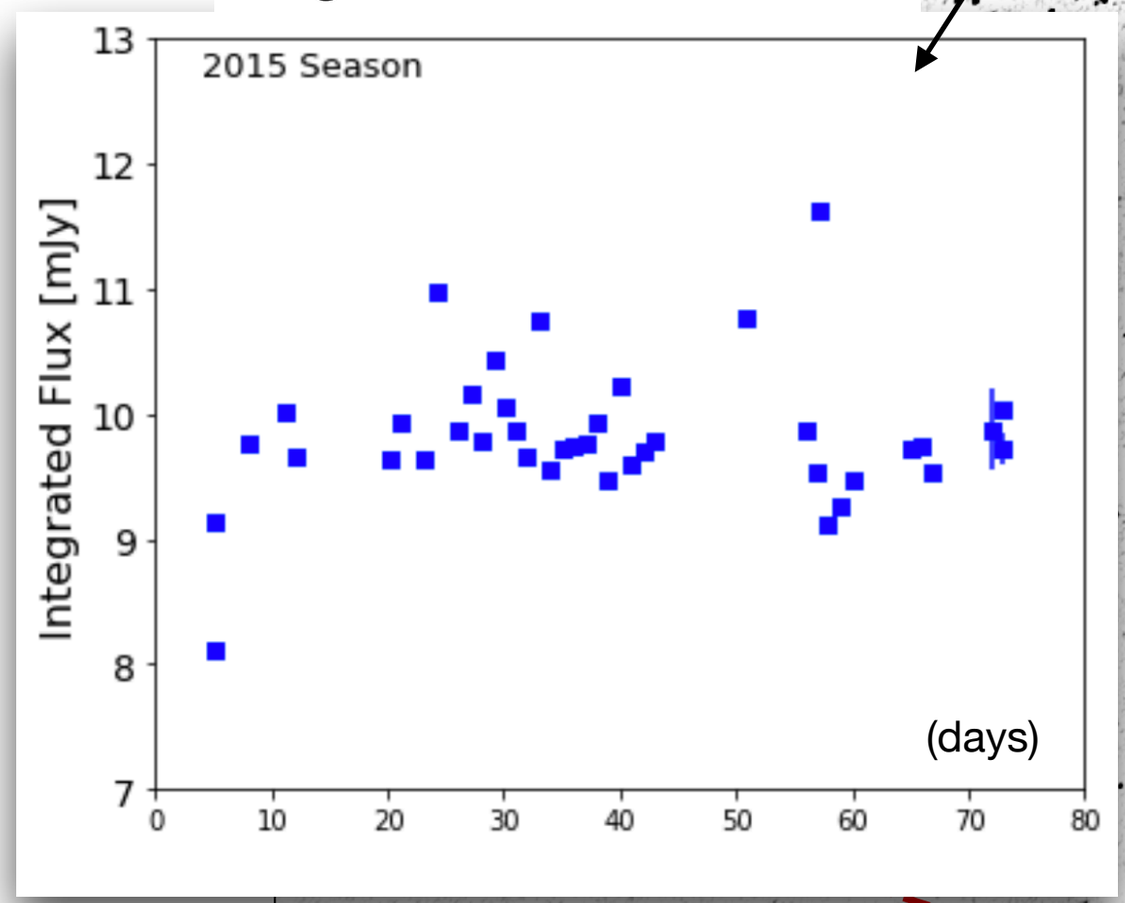
UV flaring seen by GALEX



Bright variable source 1

Bright variable source 2



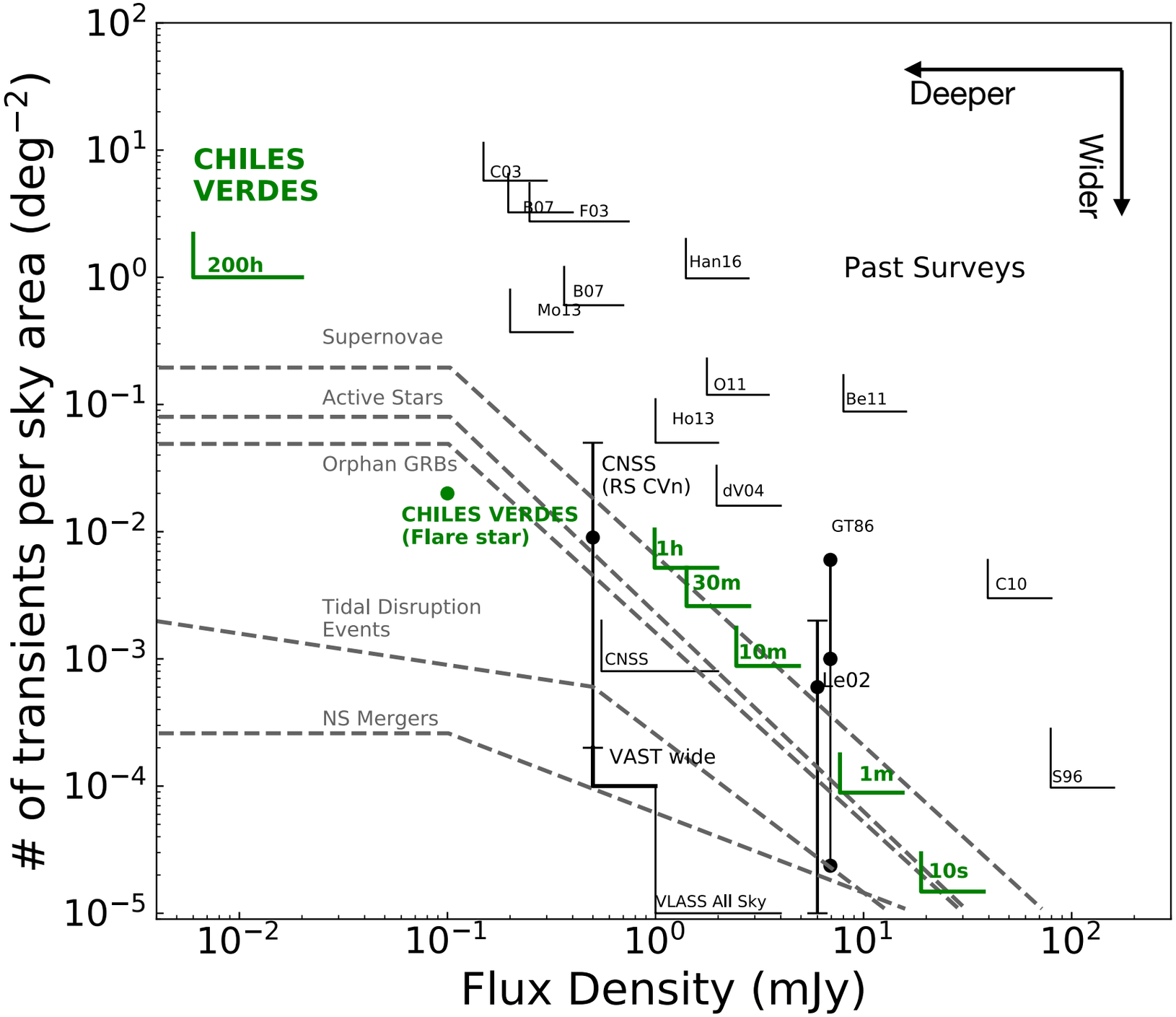


2°30'

$10^h02^m30^s$ 00^s 01^m30^s 00^s 00^m30^s

α

CHILES VERDES can provide the deepest limits on the transient rate



Future work

- Still have **2019 B-configuration data** coming up!
- Parallel observations in **optical** (PanSTARRS, Liverpool, LCOGT, KMTNet) for light curve comparison
- **Quality control** of images
- **Polarization variability** with **CHILES Con Pol** (PI: Chris Hales)

Summary

- **CHILES VERDES** is a **1000 hr**, B-configuration VLA survey of transients in the COSMOS field.

- The deep-drilling strategy will provide **unprecedented depth** and **high-quality time-series data (>10 years with VLA-COSMOS!)**

- **Abundant multi-wavelength information** available on transient hosts and variable sources.

- So far, found **1 transient (flaring M dwarf)** - indications that galactic flare stars may be the most dominant radio transient in surveys.

- Stay tuned!