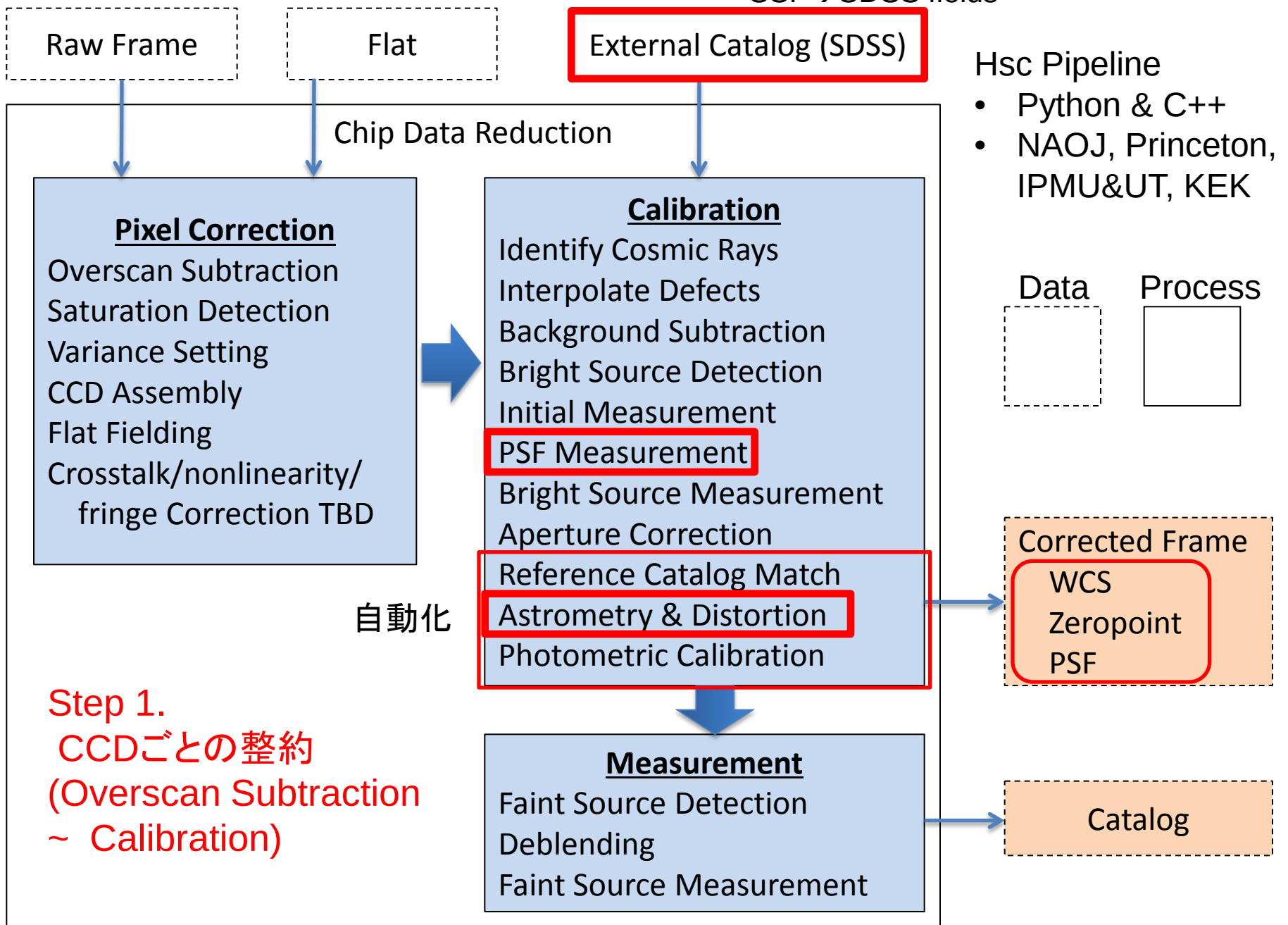


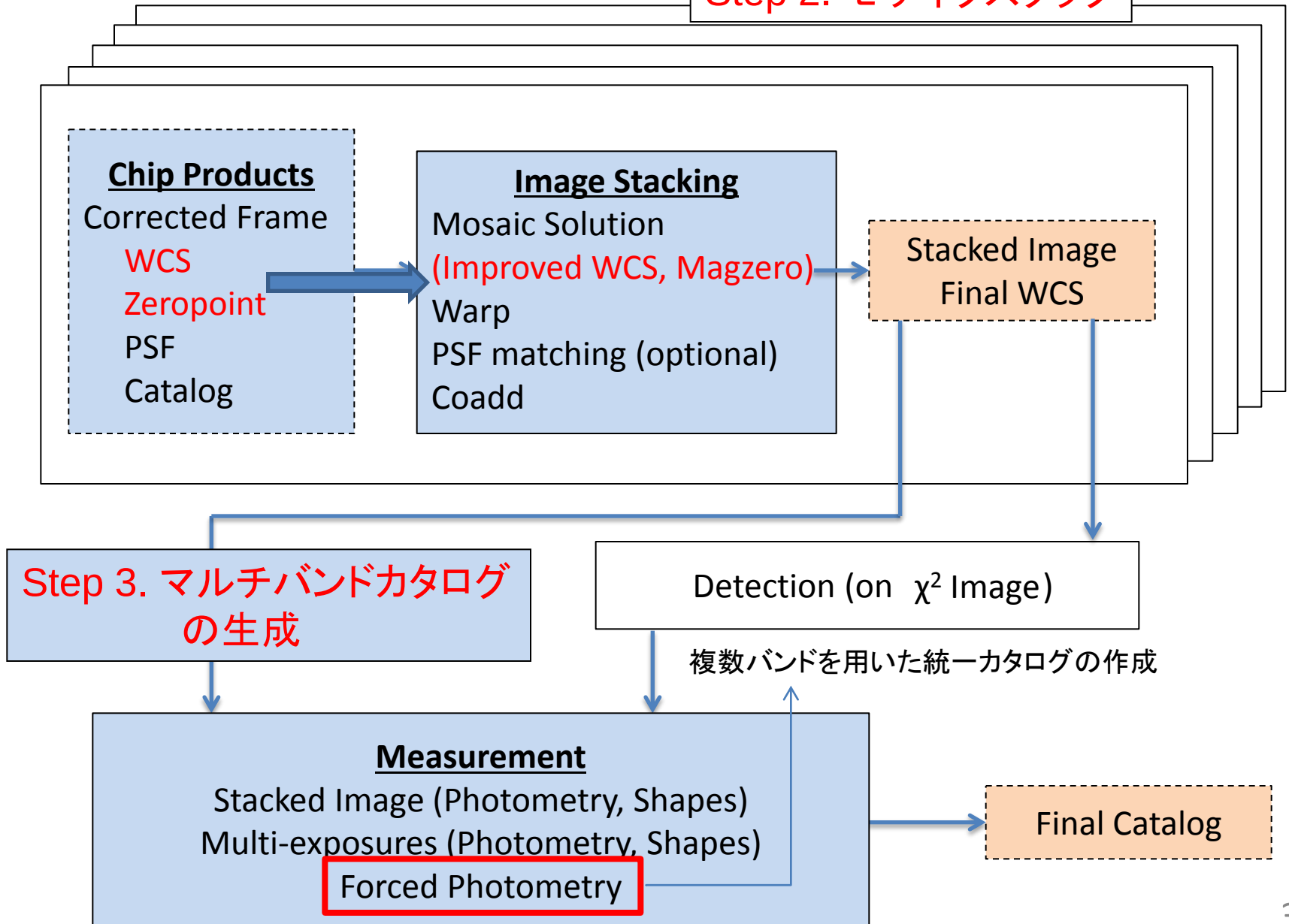
# HSC Data Products for SSP

1.15.2013 H. Furusawa @ Subaru UM



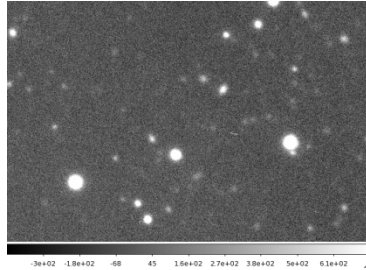
For Each Pass-band

## Step 2. モザイクスタック



# Processed Image Format

HDU0: Header only  
HDU1: Science Image

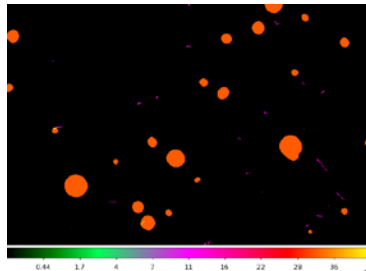


Calibrated  
astrometry and  
photometry

16bit integer

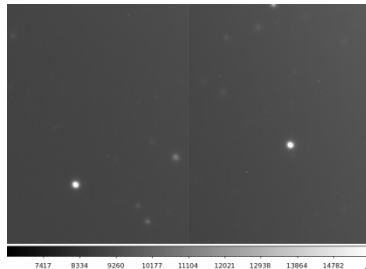
Assigned for pixel attributes

HDU2: Mask Image



Plane 0 -> BAD  
Plane 1 -> SAT  
Plane 2 -> INTRP  
Plane 3 -> CR  
Plane 4 -> EDGE  
Plane 5 -> DETECTED  
Plane 6 -> DETECTED\_NEGATIVE  
Plane 7 -> CROSSTALK

HDU3: Variance Image

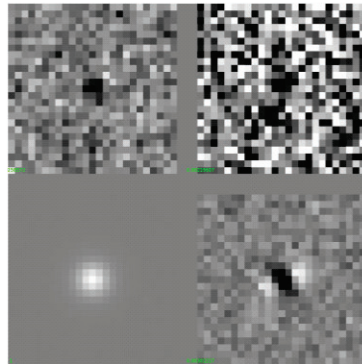


ADU count / Gain

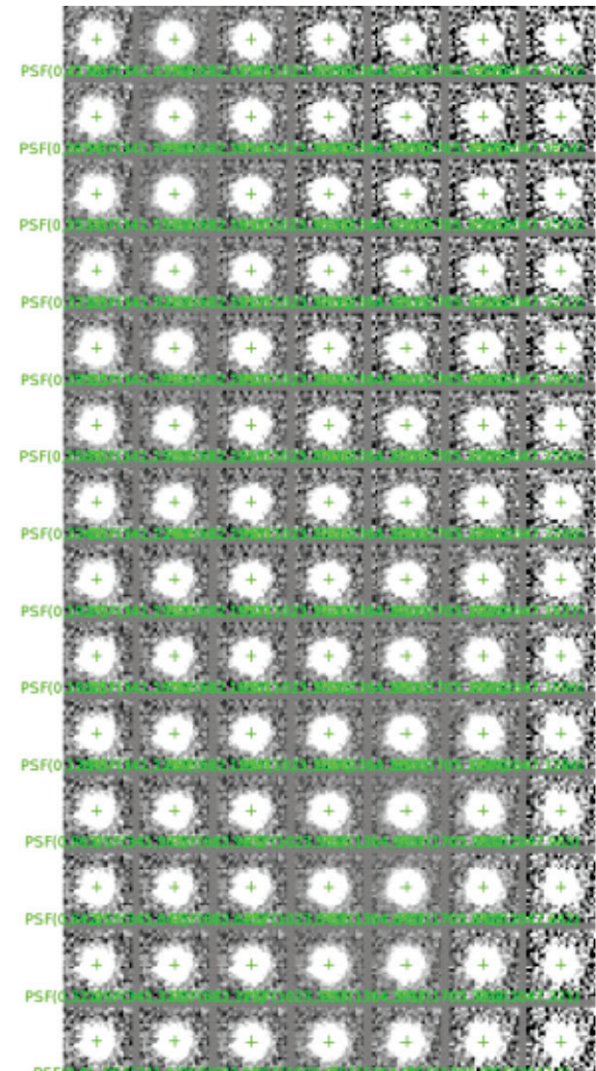
# Mapping Point Spread Functions

- SDSS approach of PSF determination by PCA
- Spatial variation in PSF fitted by polynomials

Eigen PSF  
images

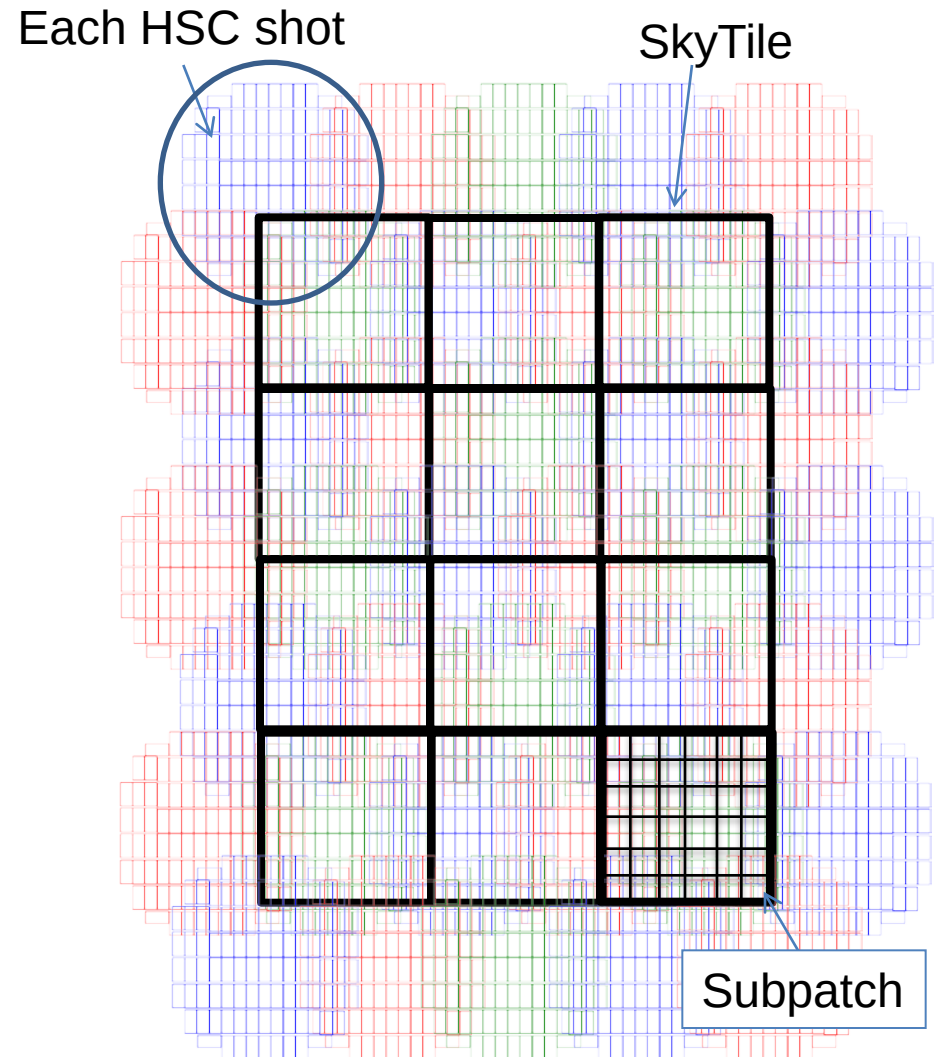


Reconstructed PSFs



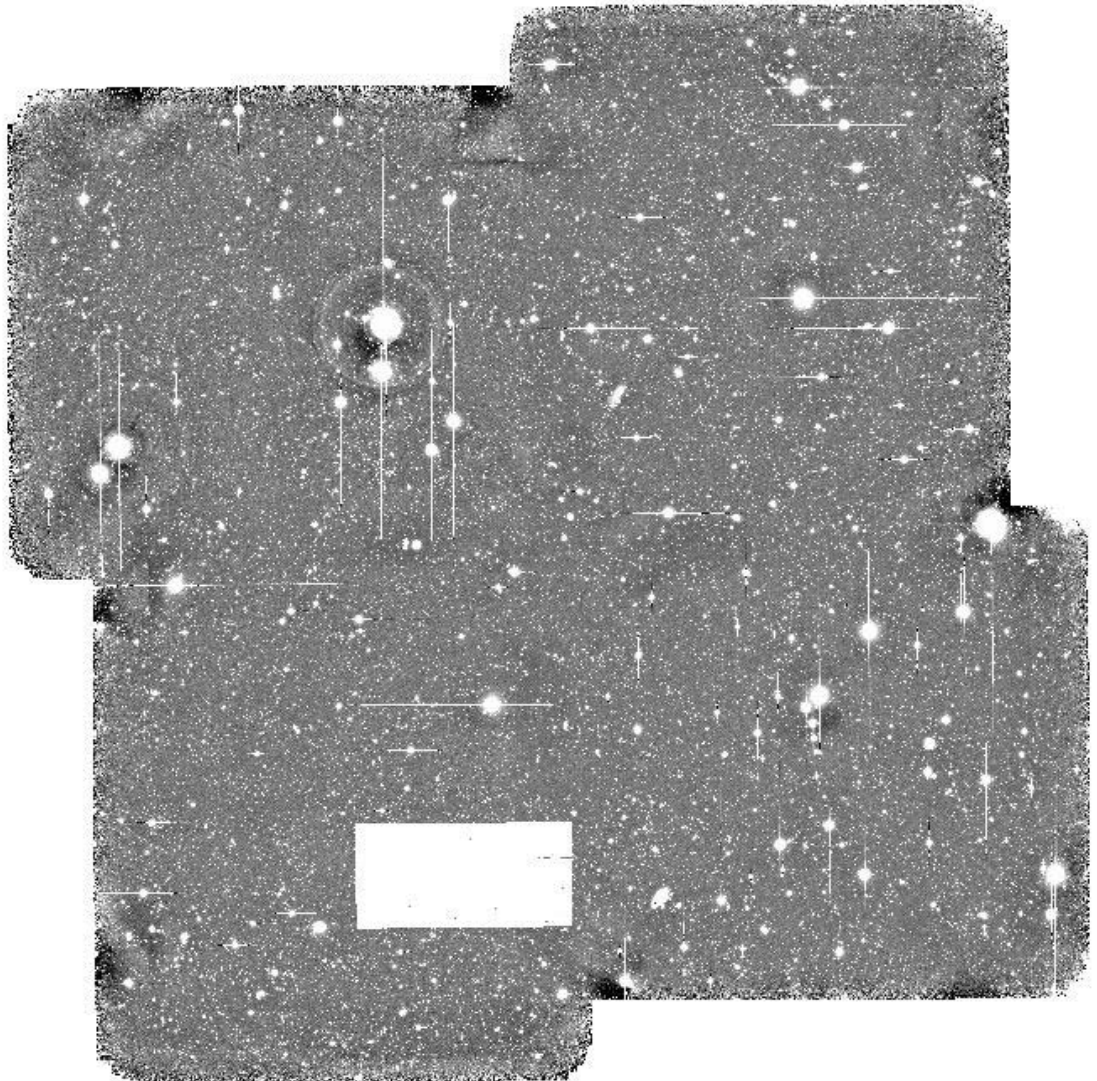
# Mosaic-Stack & Catalog Creation

- Pre-defined "SkyTile"
- Mosaic-Stack & Catalog creation on each Skytile
- A SkyTile  $\sim 1.5$  deg wide
  - Unit working area = subpatch  $> \sim 2k2k$  pixel



# Stacked Image

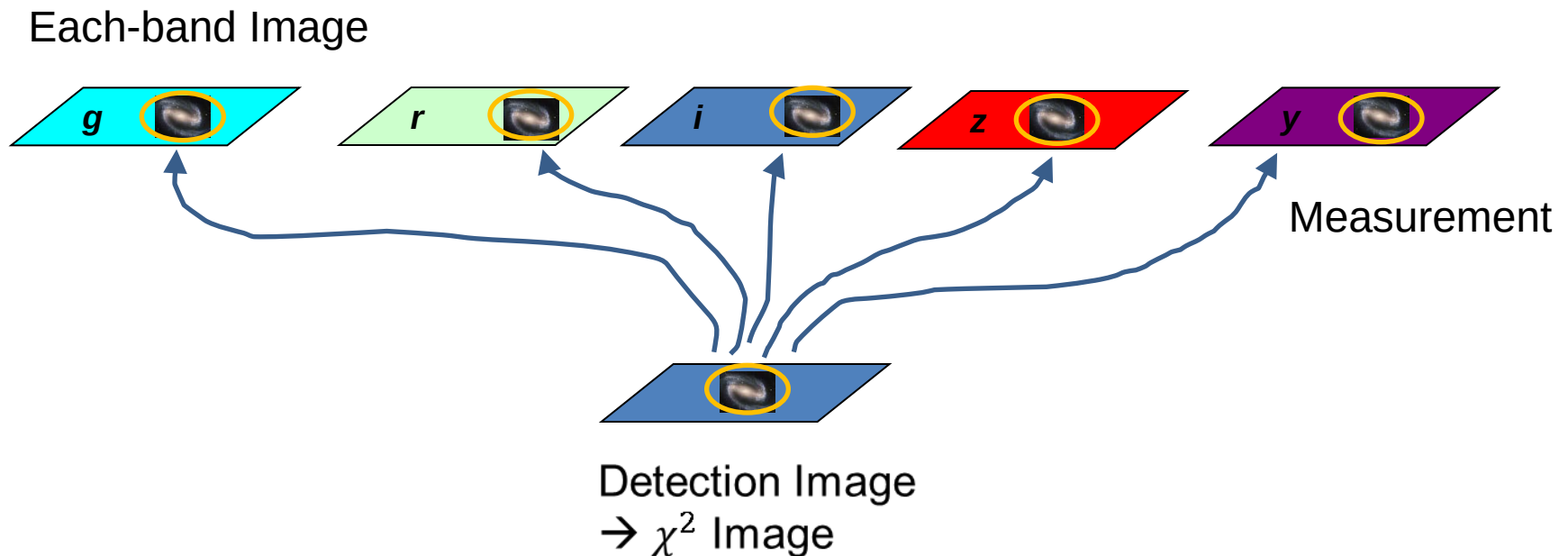
- 処理時間 for SSP
  - << 数分 / mosaic
  - 数時間 / skytile  
(2-4 threads)
  - 最適化中





# Catalog Creation with Forced Photometry

- Detection on one image & Measurements in each image → Single multi-band catalog



$$y = \sum_{i=1}^{N_{\text{band}}} g_i^2$$

$g_i$  = Image – sky : Sum of Bkg counts of all bands  
→ Statistical detects significant objects



# HSC Data Products

- 画像 (Images)

Products Sizing  
85MB / CCD  
220TB/SSP

- Corrected Single CCD Images

- WCS, Magnitude zeropoint
    - Variance, Mask Map
    - PSF Map

- Mosaic-Stacked Images per skytile/patch

- WCS, Magnitude zeropoint
    - Variance, Mask Map
    - PSF Map

10GB / Stack  
/  $1.5^2$  sq.deg  
50TB/SSP  
360TB (exposureごと)

- カタログ (Catalogs)

- Single CCD Catalogs

3 million row / sq.deg  
1.5TB

- Multi-band Catalogs (HSC) per skytile

0.4 million row / sq.deg  
0.5TB

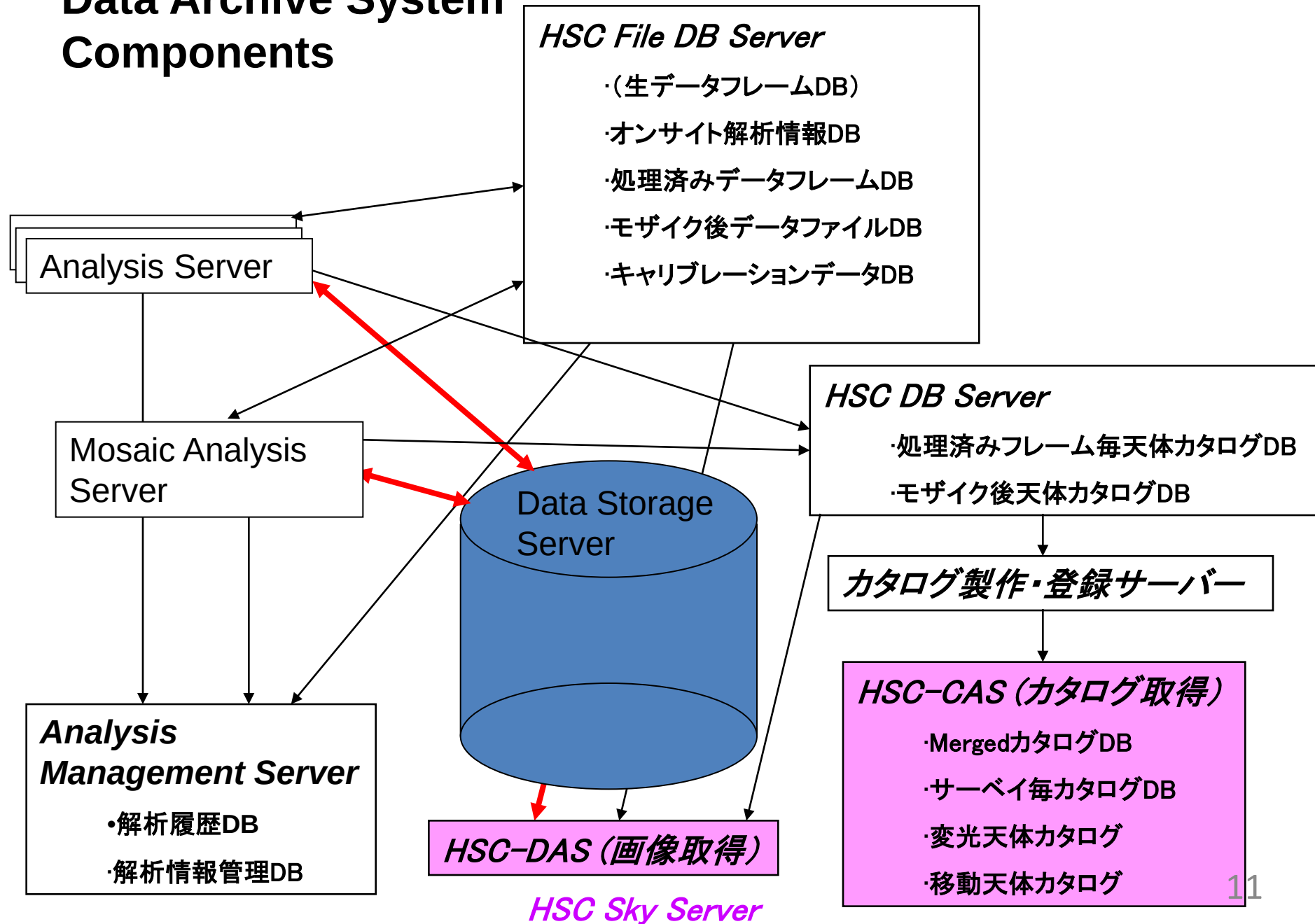
→ Multi epoch (積分ごと or 夜ごと)

# ***Products Data Distribution***

- Data Distribution to SSP Members
  - Data query & retrieval through Web-based UI
  - Access control by simple password authentication (TBD)
  - Hosted primarily at NAOJ/Mitaka
    - TBD for Web-UI at other sites
- Mirroring (all or part of) products data & database to core institutes (e.g., IPMU, Princeton, Taiwan etc)

Release of products data to the world-wide community is under discussion at HSC SSP Executive Board + Collaboration meeting

# Data Archive System Components



# 画像データ配布用GUI (DAS) Prototype

## Suprime-Cam Frame Search [DEMO]

Frame

Exposure

Mosaic

filter

g

r

i

z

y

Observation Date

☐ Universal Time ☐ Hawaiian Standard Time

DateTime

From: 2012-08-11 (yyyy-mm-dd) 00:00:00.0 (hh:mm:ss.s 24h)

To: 2012-08-11 (yyyy-mm-dd) 23:59:59.9 (hh:mm:ss.s 24h)

Search Mode

☐ Radial ☐ Box

RA: 328 (degree) DEC: 0 (degree)

Width: 6000 (arcmin) Height: 40 (arcmin)

Search

Reset

Number of Frames: 490

| No | img                                 | cat                                 | mat                                 | psf                                 | Frame ID     | Ra            | Dec               | Filter | Date Obs   | UT       | Seeing | ZP     |
|----|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------|---------------|-------------------|--------|------------|----------|--------|--------|
| 1  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355625 | 328.000197563 | -0.0727636608866  | W-S-I+ | 2012-08-11 | 12:35:48 | 0.708  | 32.322 |
| 2  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355855 | 328.344822964 | 0.127209152876    | W-S-I+ | 2012-08-11 | 13:16:16 | 0.876  | 32.271 |
| 3  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355927 | 328.266200346 | 0.0256804355158   | W-S-I+ | 2012-08-11 | 13:24:16 | 0.704  | 32.322 |
| 4  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355491 | 327.884162768 | 0.12074228427     | W-S-I+ | 2012-08-11 | 12:22:32 | 0.753  | 32.337 |
| 5  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355683 | 328.36302907  | -0.00205263368757 | W-S-I+ | 2012-08-11 | 12:54:45 | 0.714  | 32.351 |
| 6  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355530 | 327.808654223 | 0.119885193054    | W-S-I+ | 2012-08-11 | 12:26:38 | 0.577  | 32.370 |
| 7  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355618 | 328.235832385 | -0.0935424529044  | W-S-I+ | 2012-08-11 | 12:34:48 | 0.691  | 32.359 |
| 8  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355647 | 328.118496861 | 0.298785128828    | W-S-I+ | 2012-08-11 | 12:38:02 | 0.800  | 32.328 |
| 9  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355907 | 328.24953219  | 0.059047789932    | W-S-I+ | 2012-08-11 | 13:22:16 | 0.721  | 32.318 |
| 10 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355963 | 327.828915745 | 0.279744429393    | W-S-I+ | 2012-08-11 | 13:28:21 | 0.779  | 32.315 |
| 11 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355827 | 328.229732171 | 0.248781066965    | W-S-I+ | 2012-08-11 | 13:10:13 | 0.775  | 32.304 |
| 12 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355510 | 327.775333632 | 0.119941676898    | W-S-I+ | 2012-08-11 | 12:24:39 | 0.694  | 32.357 |
| 13 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355752 | 328.205275351 | 0.249465196325    | W-S-I+ | 2012-08-11 | 13:02:36 | 0.790  | 32.307 |
| 14 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355712 | 328.205662234 | 0.0390453734342   | W-S-I+ | 2012-08-11 | 12:58:07 | 0.778  | 32.317 |
| 15 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355948 | 328.229455374 | 0.00823614584762  | W-S-I+ | 2012-08-11 | 13:26:17 | 0.761  | 32.311 |
| 16 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | SUPA01355755 | 328.086395423 | 0.0428822441543   | W-S-I+ | 2012-08-11 | 13:02:36 | 0.766  | 32.309 |

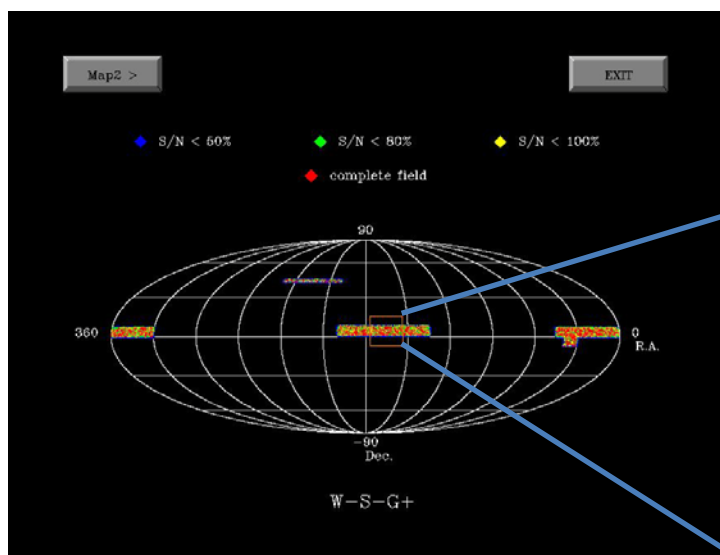
Number of Selected Data:

img: 490 cat: 490 mat: 490 psf: 490

Request

# Survey Progress Check

- (オンサイト)解析結果に基づいてデータの基本性質とサーベイ進捗をチェックする仕組み



Map of Expected S/N  
based on  
seeing, magzero, & sky sigma  
per HEALPix index

