Tools for implementing S.I.A and S.S.A

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Plan

Who needs these tools ?

S.S.A

- Deploying S.S.A example
- The validator
- Examples of S.S.A in use : Fuse, HFA, H1G, Be

S.I.A

- Deploying S.I.A example
- S.I.A in use : ESOR survey and soon SRCJ survey, PALOMAR-1-E

Evolution and future

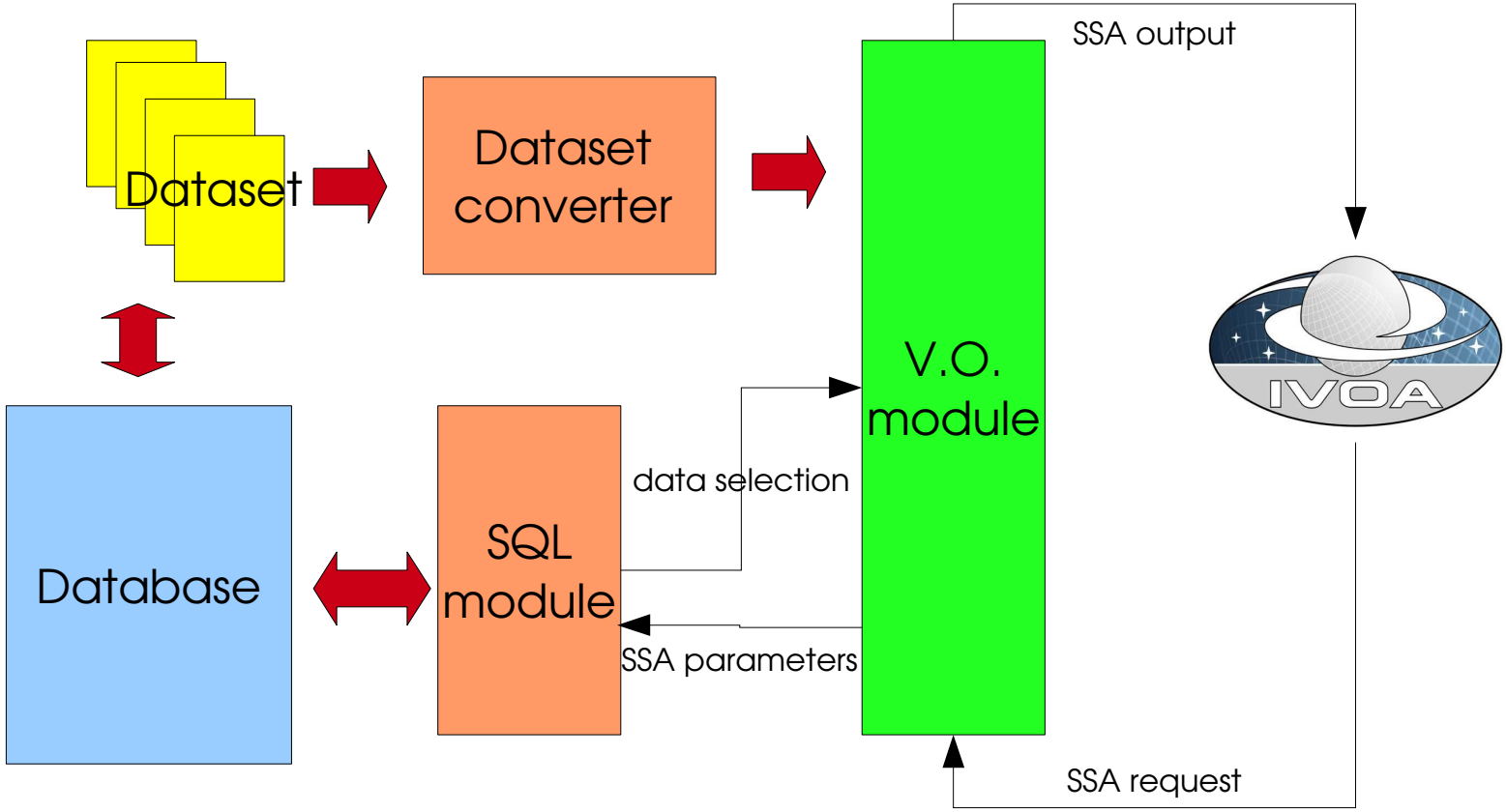
Who need these tools?

- What we provide :
  - parameters validity check
  - easy votable output V.O. protocol complient
  - error management
  - protocol validator
- What we don't provide :
  - need datas (for sure)
  - you must build your own database
- Do simple tasks ==> easy to use
- Tools have small dependencies
  - you can use only the tool that you need
  - you have the control on process
  - You keep your database and datasets format as they are.

Deploying SSA : package presentation

- perl module created by Igor Chilingarian
  - based on Votable perl module
    - Parse or write Votable 1.0 or 1.1
    - created by Eric Winter and modified by Igor
  - easy produce of Simple Spectrum Access version 0.2 to 0.97
  - manage S.S.A standard error
    - parameters check
    - datatype check
  - validate your S.S.A
    - analyse Votable syntax
    - check required fields
    - check error response

Deploying SSA : Architecture



Deploying SSA : example of code (1/2)

```
use Astro::VO::SSAP::Response;
use Astro::VO::VOTable::Document;
use DBI;
use CGI;

my $query=new CGI;
print $query->header(-type=>'text/xml');

my $pos = (defined $query->param('pos'))?
$query->param('pos') : $query->param('POS');
my $SIZE = (defined $query->param('size'))?
$query->param('size') : $query->param('SIZE');
$SIZE = 0.1 if ((not defined $SIZE)||($SIZE == 0));

my ($dbh, $sth);
 $dbh = DBI>connect(
  "dbi:Pg:dbname=$dbname;port=$dbport",$dbuser,"");
my $sql=
  "SELECT objname,dataset,data,ra2000,dec2000 FROM a601   WHERE ".
   "  (dec2000 BETWEEN $decmin AND $decmax ) AND ".
   " DEGREES(ACOS(SIN(RADIANS(dec2000)) *
   SIN(RADIANS($dec2000)) "."  + COS(RADIANS(DEC2000)) *
    COS(RADIANS($dec2000)) * ".
   "    COS(RADIANS(ra2000-$ra2000))))<$SIZE AND".
   "  btype IN ('\\047FLUX-PHY\\047','\\047FLUX-SRC\\047')
     AND "."  bunit ~~ '\\047erg%' ORDER BY objname,dataset";

$sth = $dbh->prepare($sql) || &err_response();
$sth->execute();
```

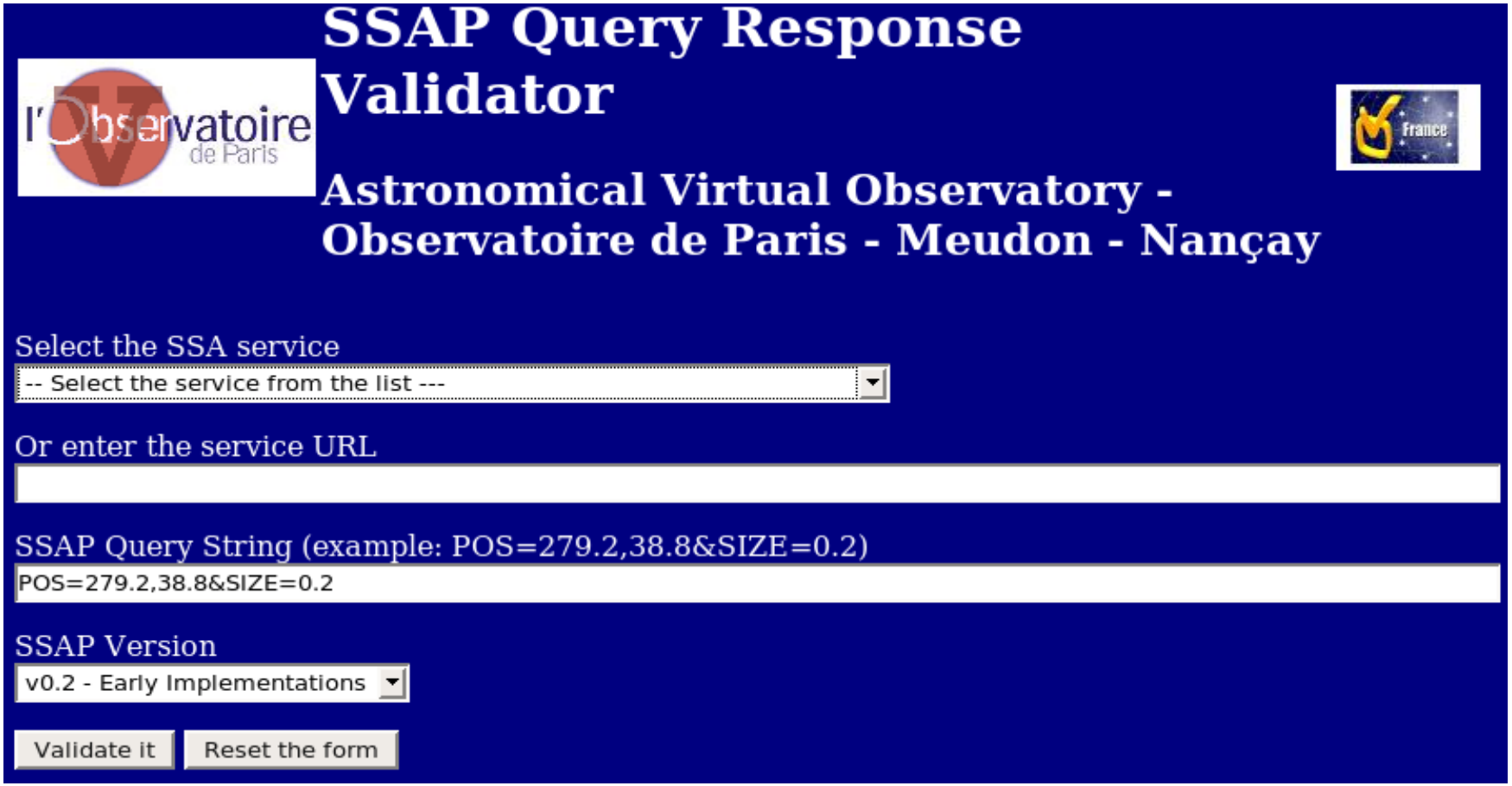
Deploying SSA : example of code (2/2)

```
$response = Astro::VO::SSAP::Response->new(
            description=>"Spectral Service at ObsPM");
while($row = $sth->fetchrow_hashref())
{
  my $fitsn=$1;
  my $reference = "http://basebe.obspm.fr/cgi-bin/".
    "extBeSS.pl?fits=".uri_escape($row->{fits_path});
  $response->add_data_by_utype([{
    "sdm:SSA.Dataset.Type" => "spectrum",
    "sdm:SSA.Dataset.Length" => 1,
    "sdm:SSA.DataID.Title" => "BeSS:".$row->{objname},
    "sdm:SSA.Access.Reference" => $reference,
    "sdm:SSA.Target.Name" => $row->{objname},
    "sdm:SSA.Target.Class" => "Star",
    "sdm:SSA.Char.SpatialAxis.Coverage.Location.Value" =>
      $row->{$racol}." ".$row->{$deccol},
    "sdm:SSA.Char.SpectralAxis.Coverage.Location.Value" =>
      $row->{band},
    "sdm:SSA.Char.TimeAxis.Coverage.Location.Value" =>
      $row->{mean_mjd},
    "sdm:SSA.Char.TimeAxis.Coverage.Bounds.Extent" =>
      $row->{expotime},
    "sdm:SSA.Char.TimeAxis.Coverage.Bounds.Start" =>
      $row->{starttime},
    "sdm:SSA.Char.TimeAxis.Coverage.Bounds.Stop" =>
      $row->{endtime},
    "sdm:SSA.Char.SpectralAxis.Coverage.Bounds.Extent" =>
     ($row->{band_max} - $row->{band_min}),
    "sdm:SSA.Char.SpectralAxis.Coverage.Bounds.Start" =>
     $row->{band_min},
    "sdm:SSA.Char.SpectralAxis.Coverage.Bounds.Stop" => $row->{band_max},
    "sdm:SSA.Char.FluxAxis.Accuracy.Calibration" => "Uncalibrated",
    "sdm:SSA.Char.SpectralAxis.Accuracy.Calibration" => "Calibrated",

    "sdm:SSA.DataID.CreationType" => "pointed",
    "sdm:SSA.DataID.DataSource" => "observed",
    "sdm:SSA.Dataset.SpectralSI" => "L 1.0E-10",
    "sdm:SSA.Dataset.FluxSI" => "ML-1T-3 1.0E+7",
    "sdm:SSA.Access.Format" => "application/fits",
    "sdm:SSA.DataID.Collection" => "BeSS-Spectra",
    "sdm:SSA.DataID.Creator" => "BeSS",
    "sdm:SSA.DataID.CreatorDID" => "BeSS:".$row->{spec_id},
    "sdm:SSA.Curation.Publisher" => "Observatoire de Paris-Meudon -> GEPI",
    "sdm:SSA.Curation.PublisherDID" => "ivo://obspm.fr/SSAP_BESS#".$row-
>{spec_id},
    "sdm:SSA.Curation.Date" => $row->{date_validation},
    "sdm:SSA.Curation.Version" => "1.0",
    "sdm:SSA.Curation.Rights" => "public",
    "sdm:SSA.CoordSys.SpaceFrame.Name" => "FK5",
    "sdm:SSA.CoordSys.SpaceFrame.Equinox" => "2000.0",
    "sdm:SSA.Char.FluxAxis.ucd" => "phot.flux;em.wl",
    "sdm:SSA.Char.SpectralAxis.ucd" => "em.wl"
  }]);
  }
  $sth->finish();
  $dbh->disconnect();
  print $response->toString(1);
```

The validator (1/2)

http://vo.obspm.fr/cgi-bin/siap/ssap_validator.pl



The validator (2/2)

Analyse Far UltraViolet Spectroscopic Explorer SSA

SSAP Version

v0.2 - Early Implementations

Validate it | Reset the form

Analysing:
http://vo.obspm.fr/cgi-bin/siap/ssapFUSE.pl?POS=279.2,38.8&SIZE=1

Congratulations! Query Response is SSAP compliant

Warnings:

No data returned by the service for a given Query

SSAP Version

v0.9 - IVOA DAL WG Draft

Validate it | Reset the form

Analysing:
http://vo.obspm.fr/cgi-bin/siap/ssapFUSE.pl?POS=279.2,38.8&SIZE=1

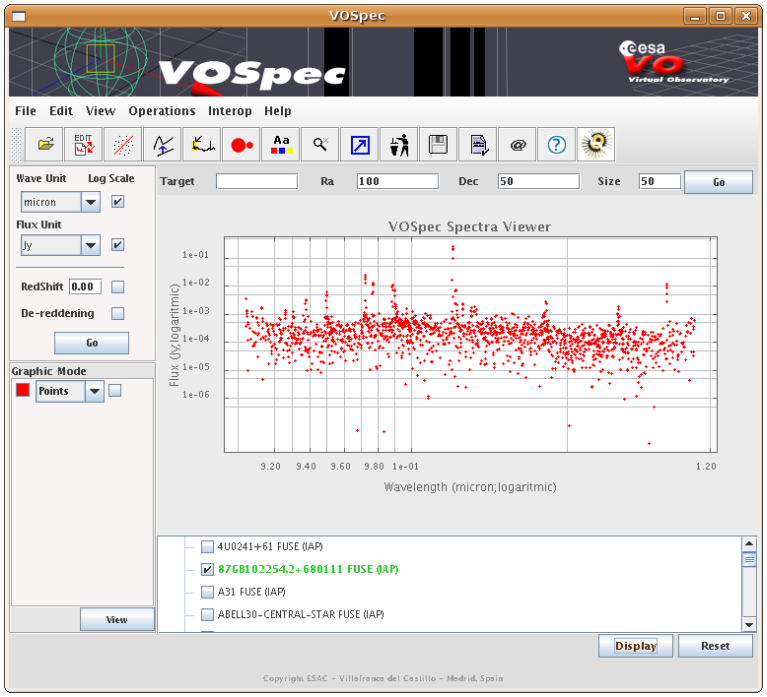
Oppps! Query Response is NOT SSAP compliant

Definition of at least one of the required fields not found

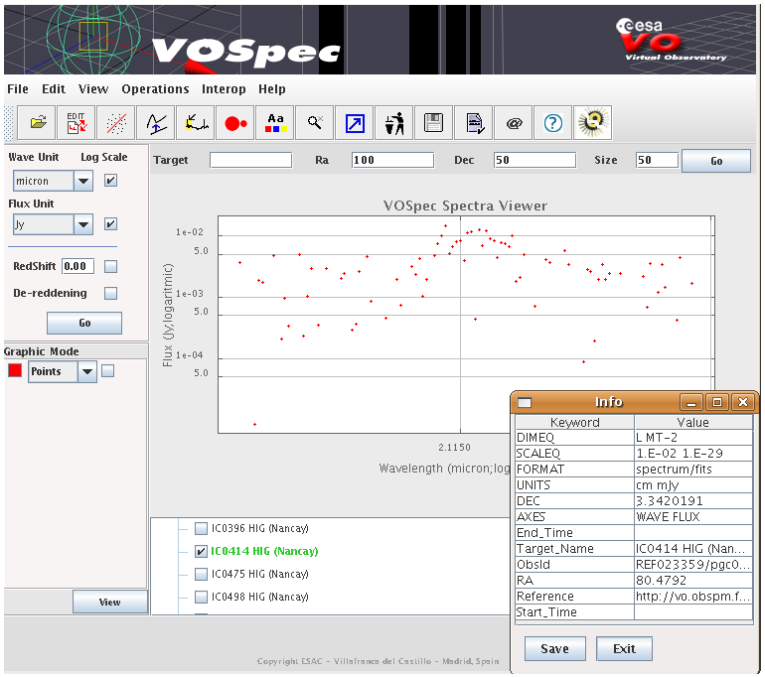
Required Field (utype=sdm:SSA.Dataset.Type) not Found
Required Field (utype=sdm:SSA.Dataset.SSA.NSamples) not Found
Required Field (utype=sdm:SSA.Coverage.Location.Spatial) not Found
Required Field (utype=sdm:SSA.Coverage.Location.Spectral) not Found
Required Field (utype=sdm:SSA.Coverage.Location.Time) not Found
Required Field (utype=sdm:SSA.Coverage.Bounds.Time) not Found
Required Field (utype=sdm:SSA.Coverage.Bounds.Spectral) not Found
Required Field (utype=sdm:SSA.Access.Reference) not Found
Required Field (utype=sdm:SSA.Access.Format) not Found

Example of SSA in use

- Fuse



- Hig (HI profiles of Galaxies)

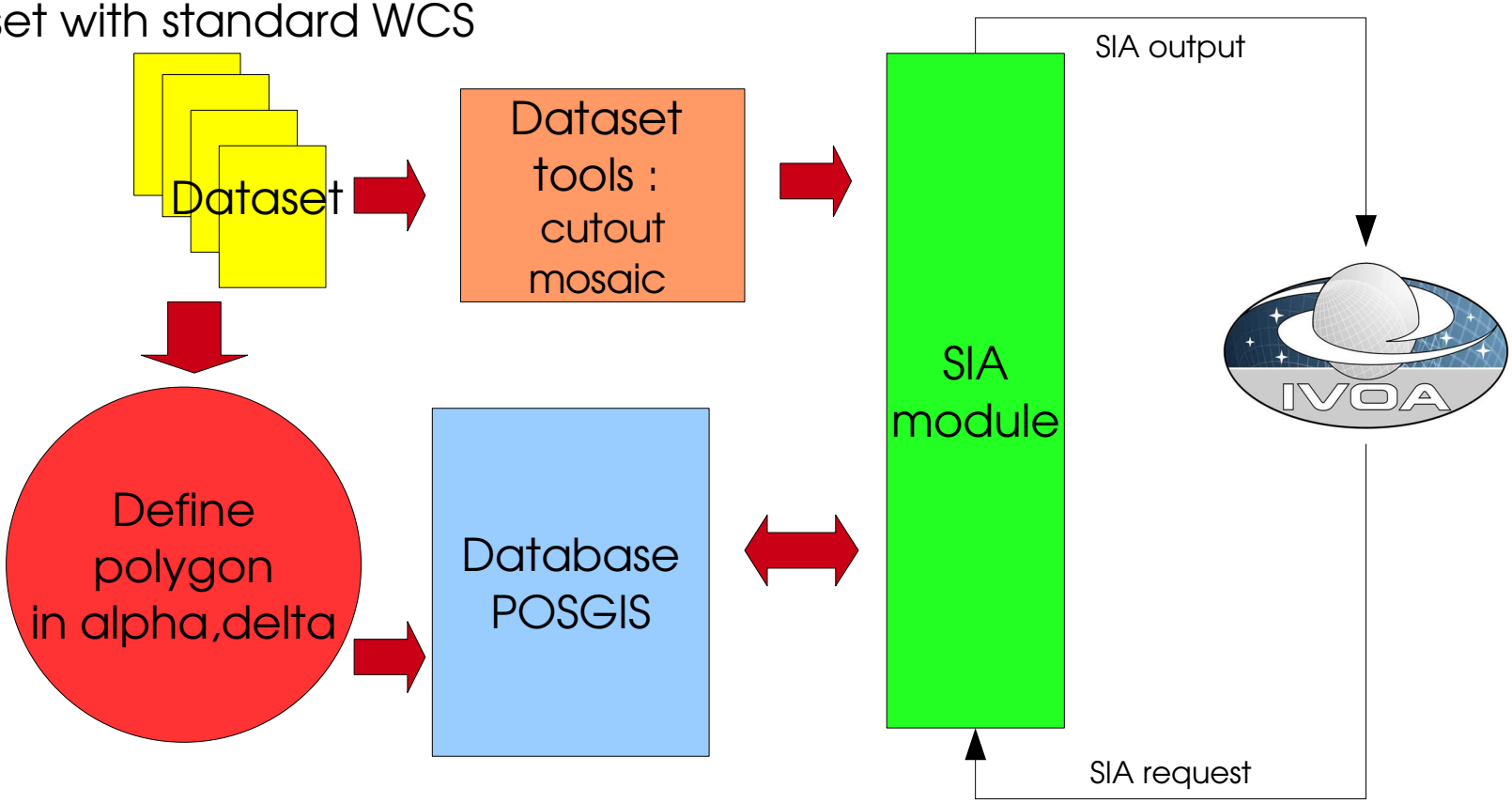


Deploying SIA : package presentation

- SIA perl module created by R. Haigron
  - based on SSA module of Igor for messaging
  - overlayer of GIS database system
    - compute the R.O.I
    - do the GIS request to database system
  - need to define images like polygons in alpha, delta
- C program for cutout images
  - Images need WCS (crpix, crval, and cd1_1...)
- Using SWARP created by E. Bertin (TERAPIX) to resampling
  - resample images given the same region
  - generate weightmaps to “hide” bad pixel : “cosmetic treatment”

Deploying SIA : Architecture

Dataset with standard WCS



Deploying SIA : example of code (1/2)

```
use strict;
use SIA::params;
use SIA::wcs;
use SIA::gis;
use SIA::sia;

 my ($RAMIN,$DECMIN,$RAMAX,$DECMAX) = SIA::sia::init("CUTOUT","Image Service at ObsPM");

 SIA::gis::configure(
        HOST => "host.domain",
        USER => "username",
        PASS => "password",
        PORT => portnumber,
        DATABASE =>"dbname",
        GIS_FIELD => "gisfield",
        GIS_TABLE => "gistable"  );

 SIA::gis::request($RAMIN,$DECMIN,$RAMAX,$DECMAX);

 my $data = data_prepare();

 SIA::sia::display($data,'href="http://voplus.obspm.fr/mama/sia_response.xsl" type="text/xsl"');
```

Deploying SIA : example of code (2/2)

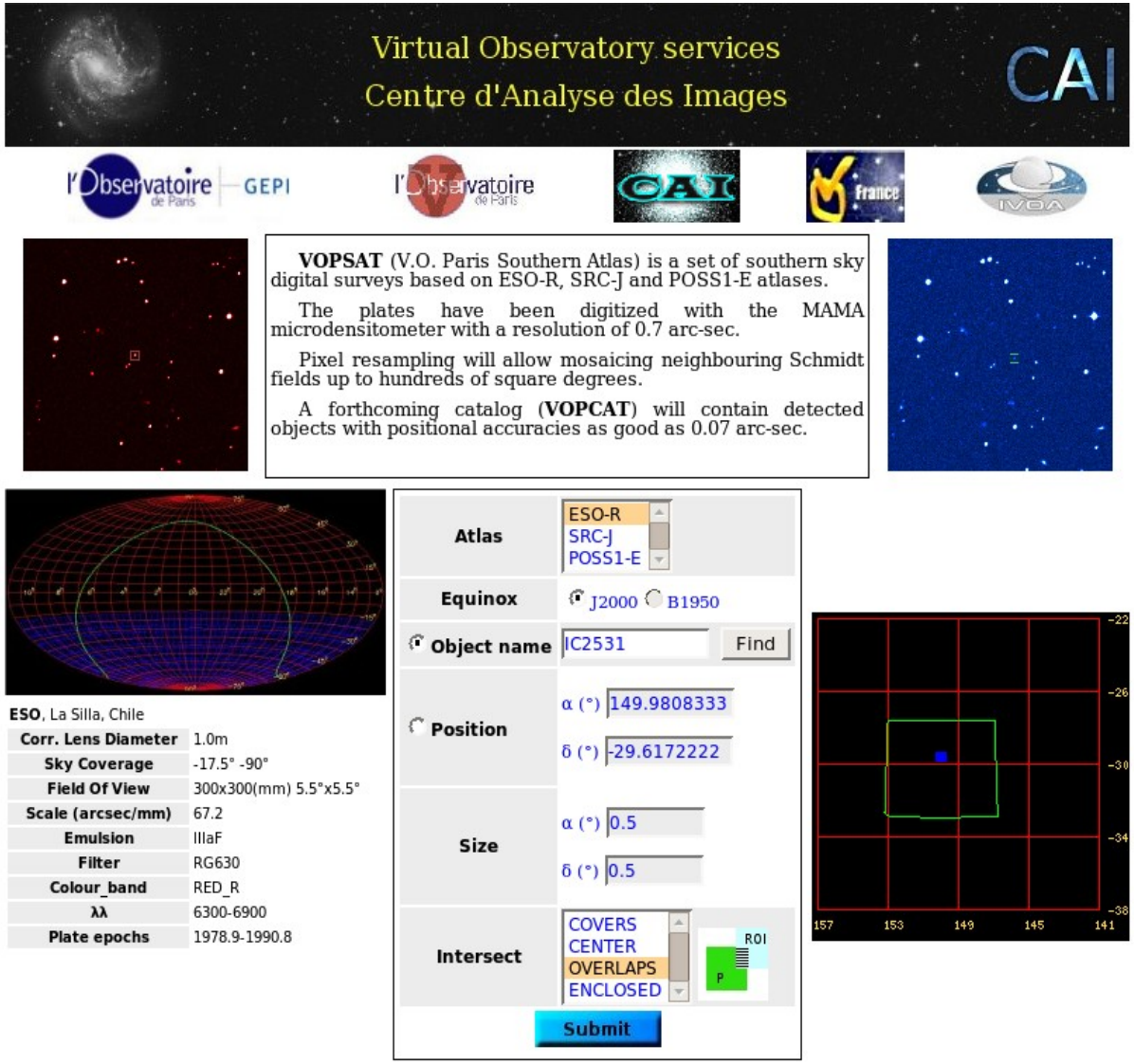
```
sub data_prepare
{
  my $dataArr = [];

   while (my $row = SIA::gis::fetch_row()) {
        my $dataEntry = {};
        my ($ra,$dec);
        my ($xmin,$ymin,$xmax,$ymax,$size) = SIA::gis::nohole($row-
        >{p1},$row);
        $row->{naxis1} = $xmax-$xmin;
        $row->{naxis2} = $ymax-$ymin;
        $row->{crpix1} = $row->{crpix1}-$xmin;
        $row->{crpix2} = $row->{crpix2}-$ymin;
        ($ra,$dec) = SIA::wcs::get_center($row);

        $dataEntry->{ObsId}= $row->{telescope};
        $dataEntry->{Target_Name}=  " VO-Paris-MAMA-ESOR$row-
        >{numfield}";
        $dataEntry->{Instrument_Name} = $row->{telescope}.$row->{numfield};
        $dataEntry->{Observational_Date_Julian} = $row->{julianday};
        $dataEntry->{NB_AXES} = "2";
        $dataEntry->{FORMAT} = "$SIA::params::FORMAT";
        $dataEntry->{COOR_REF} = "FK5";
        $dataEntry->{COOR_EQUINOX} = $row->{equinox};
        $dataEntry->{COOR_PROJ} = "TAN";
        $dataEntry->{COOR_PIXVAL} = "$row->{crval1} $row->{crval2}";
        $dataEntry->{COOR_MATRIX} = "$row->{cd1_1} $row->{cd1_2} “.
          “$row->{cd2_1} $row->{cd2_2}";
        $dataEntry->{SCALE_DEG} = abs($row->{cd1_1})." ".
          abs($row->{cd2_2});
        $dataEntry->{NB_PIX_AXES} = "$row->{naxis1} $row->{naxis2}";
        $dataEntry->{FileSize} = $size*2+2880;
        $dataEntry->{COOR_PIX} = "$row->{crpix1} $row->{crpix2}";
        $dataEntry->{RA}=$ra;
        $dataEntry->{DEC} = $dec;
        $dataEntry->{URL} = "http://voplus.obspm.fr/cgi-bin/cutout.pl?url=".
          $row->{file}."&naxis=".$row->{naxis1}."%20".$row->{naxis2}.
          "&crpix=".$row->{crpix1}."%20".$row>{crpix2}.
          "&format=".$SIA::params::FORMAT;
        push @{$dataArr},$dataEntry;
      }
      SIA::gis::finish;
      return $dataArr;
}
```

SIA in use (1/4)

http://www.cai-mama.obspm.fr/mama/



SIA in use (2/4)

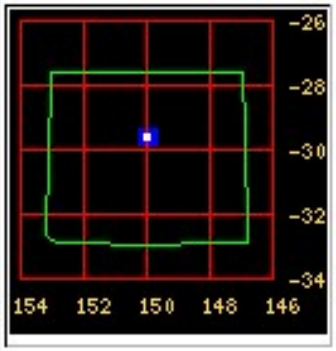
http://voplus.obspm.fr/cgi-bin/sia.pl

```
<TABLE>
  <FIELD ID="ObsId" ucd="OBS_ID" datatype="char" arraysize="*"/>
  <FIELD ID="Target_Name" ucd="VOX:Image_Title" datatype="char" arraysize="*"/>
  <FIELD ID="Instrument_Name" ucd="INST_ID" datatype="char" arraysize="*"/>
  <FIELD ID="Observational_Date_Julian" ucd="VOX:Image_MJDateObs" datatype="double"/>
  <FIELD ID="RA" ucd="POS_EQ_RA_MAIN" datatype="double"/>
  <FIELD ID="DEC" ucd="POS_EQ_DEC_MAIN" datatype="double"/>
  <FIELD ID="NB_AXES" ucd="VOX:Image_Naxes" datatype="int"/>
  <FIELD ID="NB_PIX_AXES" ucd="VOX:Image_Naxis" datatype="int" arraysize="*"/>
  <FIELD ID="SCALE_DEG" ucd="VOX:Image_Scale" datatype="double" arraysize="*"/>
  <FIELD ID="FORMAT" ucd="VOX:Image_Format" datatype="char" arraysize="*"/>
  <FIELD ID="COOR_REF" ucd="VOX:STC_CoorRefFrame" datatype="char" arraysize="*"/>
  <FIELD ID="COOR_EQUINOX" ucd="VOX:STC_CoorEquinox" datatype="double"/>
  <FIELD ID="COOR_PROJ" ucd="VOX:WCS_CoordProjection" datatype="char" arraysize="3"/>
  <FIELD ID="COOR_PIX" ucd="VOX:WCS_CoordRefPixel" datatype="double" arraysize="*"/>
  <FIELD ID="URL" ucd="VOX:Image_AccessReference" datatype="char" arraysize="*"/>
  <FIELD ID="FileSize" ucd="VOX:Image_FileSize" datatype="int"/>
  <FIELD ID="COOR_PIXVAL" ucd="VOX:WCS_CoordRefValue" datatype="double" arraysize="*"/>
  <FIELD ID="COOR_MATRIX" ucd="VOX:WCS_CDMatrix" datatype="double" arraysize="*"/>
  <FIELD ID="BandPass_ID" ucd="VOX:BandPass_ID" datatype="char" arraysize="*"/>
  <FIELD ID="BandPass_Unit" ucd="VOX:BandPass_Unit" datatype="char" arraysize="*"/>
  <FIELD ID="BandPass_RefValue" ucd="VOX:BandPass_RefValue" datatype="double"/>
  <FIELD ID="BandPass_HiLimit" ucd="VOX:BandPass_HiLimit" datatype="double"/>
  <FIELD ID="BandPass_LoLimit" ucd="VOX:BandPass_LoLimit" datatype="double"/>
  <DATA>
    <TABLEDATA>
      <TR>
        <TD>ESO Schmidt</TD>
        <TD> VO-Paris-MAMA-ESOR435</TD>
        <TD>ESO Schmidt435</TD>
        <TD>2446465.7235</TD>
        <TD>149.988934823485</TD>
        <TD>-29.6175974116292</TD>
        <TD>2</TD>
        <TD>2674 2669</TD>
        <TD>0.0001874241134 0.0001874241134</TD>
        <TD>image/fits</TD>
        <TD>FK5</TD>
        <TD>J2000</TD>
        <TD>TAN</TD>
        <TD>1375 -2050.5</TD>
        <TD>http://voplus.obspm.fr/cgi-bin/cutout.pl?url=eso435R.fits&amp;naxis=2674%2026696&amp;crpix=1375%20-2050.5&amp;format=image/fits</TD>
        <TD>14276692</TD>
        <TD>149.9727428 -30.25200236</TD>
        <TD>-0.0001874241134 0 0 0.0001874241134</TD>
        <TD/>
        <TD/>
        <TD/>
        <TD/>
        <TD/>
      </TR>
    </TABLEDATA>
  </DATA>
</TABLE>
```

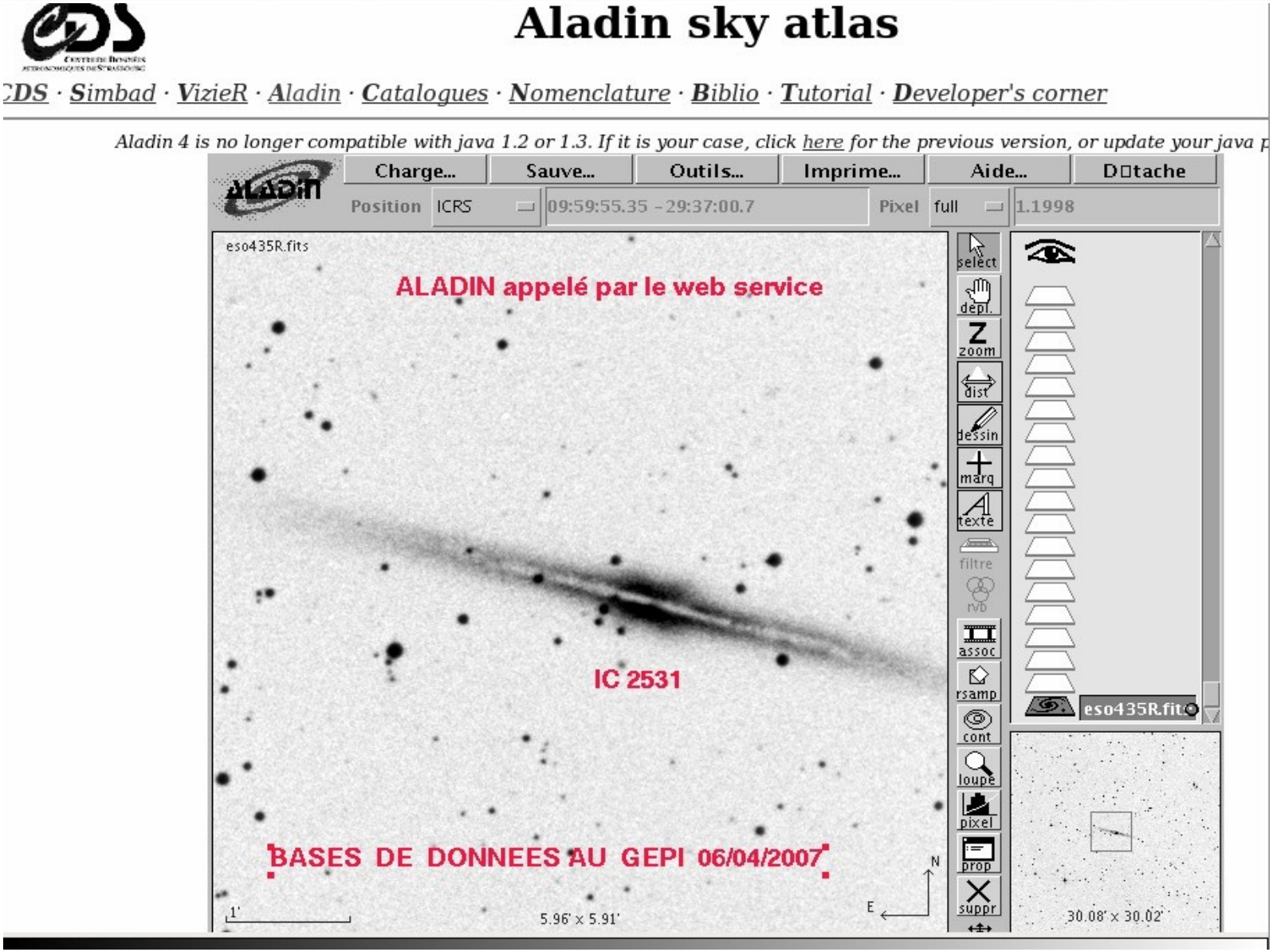
SIA in use (3/4)

Virtual Observatory services
Centre d'Analyse des Images

CAI

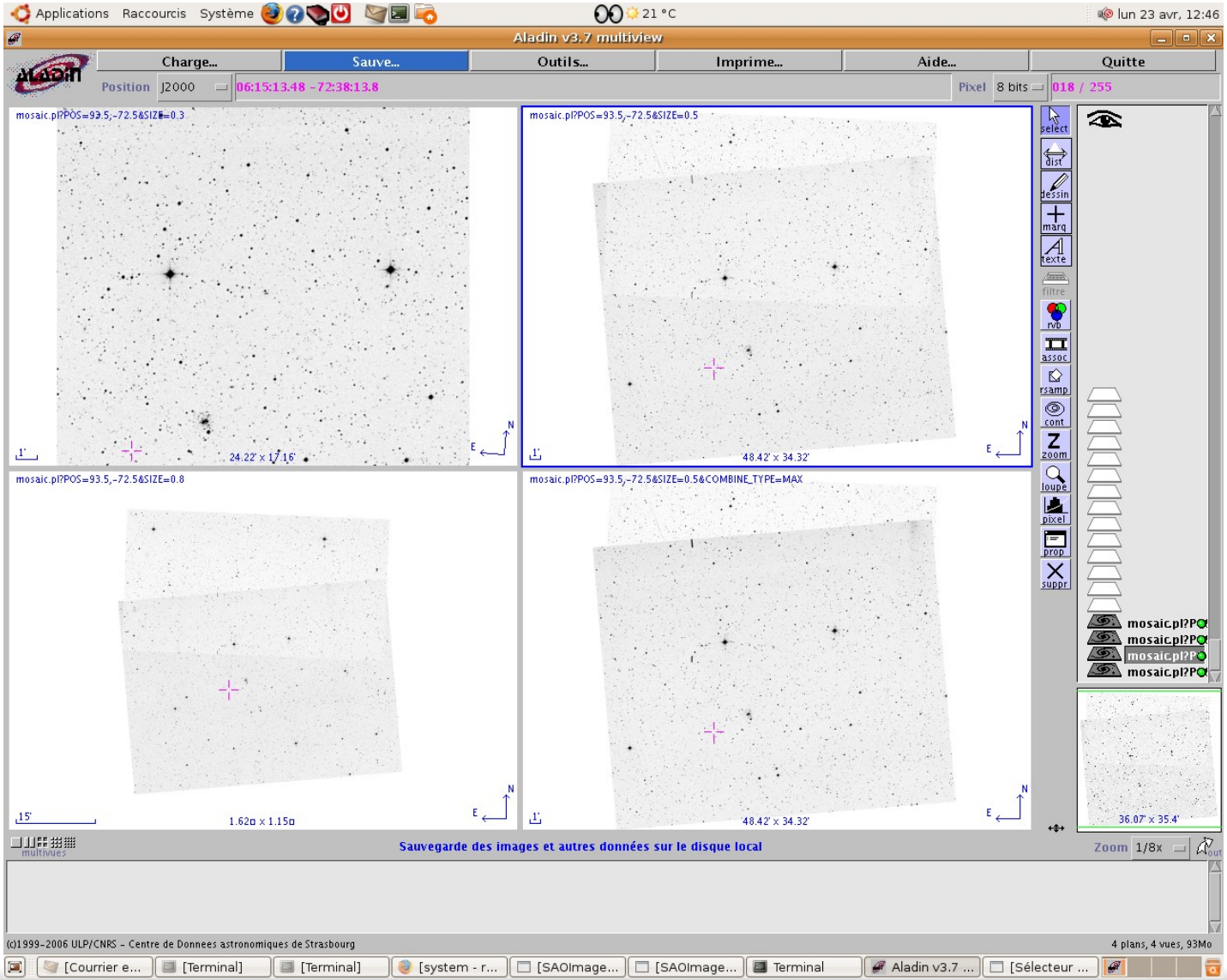
View	Preview of center	ID	Julian date	Alpha	Delta	Equinox	NX x NY	ScaleX x ScaleY	File Size	Projection	Tools
		ESO Schmidt435	2446465.7235	149.9809	-29.6176	J2000	2674 x 2669	0.0001874241134 x 0.0001874241134	14.277 Mo	TAN	Aladin

SIA in use (4/4)


Aladin sky atlas
CDS · Simbad · VizieR · Aladin · Catalogues · Nomenclature · Biblio · Tutorial · Developer's corner
Aladin 4 is no longer compatible with java 1.2 or 1.3. If it is your case, click here for the previous version, or update your java p
Charge...
Sauve...
Outils...
Imprime...
Aide...
Détache
Position
ICRS
09:59:55.35 -29:37:00.7
Pixel
full
1.1998
eso435R.fits
ALADIN appelé par le web service
IC 2531
BASES DE DONNEES AU GEPI 06/04/2007
select
depl.
zoom
dist
dessin
marq
texte
filtre
rvb
assoc
rsamp
cont
loupe
pixel
prop
suppr
5.96' x 5.91'
30.08' x 30.02'

SIA mosaic example

http://voplus.obspm.fr/cgi-bin/mosaic.pl



Evolution and future

- evolve to support new IVOA standard
  - perl SSA/SIA module
    - SIA 1.0 to SIA 2
    - SSA 1.0
  - validator
    - support SSA 1.0
    - no SIA validator ==> Ray plane will do it ?
- Investigate resampling image
  - project of tool to do “image cube”
    - resample SIA images for a position
  - mosaic possibilities
    - combine parameters
    - weightmaps

Thanks for your attention