## VAPE Virtual observatory Aided Publishing for Education

http://ia2-edu.oats.inaf.it:8080/vape

VAPE is an application for the publication of educational data in the Virtual Observatory (VO). VAPE has been developed by IA2 (<u>http://ia2.oats.inaf.it</u>). Thanks to VAPE, institutes managing educational telescopes can publish their data in the VO without facing the complexity of (more complete) professional tools. The creation of an educational data archive will a) provide teachers performing observations with an educational telescope to easily store and access their observations, b) make observations available to teachers that have otherwise no access to a telescope. An added advantage of the publication in VO is the availability of many free tools for displaying and/or analyzing data.

The main steps for the service generation and data publication are: a) user (institute) registration, b) telescope(s) and instrument(s) registration, c) insertion of the information about the service to be linked to the telescope and d) the submission of a test file. After service generation it will be possible to proceed with image publication and data querying through VO tools.

| VAPE Home Contact us |   | You are not logged in |
|----------------------|---|-----------------------|
| W                    | elcome to the VAPE website  | e                     |
|                      | Please sign in or sign up<br>Username or e-mail address<br>Password<br>Sign in Forgotten password |                       |
| enozor (             | ( <u>)</u>  | A 14                  |

<u>Step 1</u>: **Register the institute** (e.g. Astronomical Observatory of ...) through sign up.

Insert the requested information in the registration window. Attention: the *username* can not be modified.

| VAPE Home Contact us |   |                        | You are not logged in |
|----------------------|---|------------------------|-----------------------|
|                      | Please provide t  | he necessary data      |                       |
|                      | Arthur Dent<br>Osservatorio Astronomico Galassia di Andromeda |                        |                       |
|                      | OA_M31  |                        |                       |
|                      | arthur.dent@oa-m31.and  | arthur.dent@oa-m31.and |                       |
|                      | Planeta 2014-1b, Braccio a Spirale 2, Andromeda               |                        |                       |
|                      | (+00) 123 456 789   |                        |                       |
|                      | Sign up   | Cancel                 |                       |
|                      |   |                        |                       |
|                      |   |                        |                       |
|                      |   |                        |                       |
|                      |   |                        |                       |
|                      |   |                        | WICKET AJAX DEBUG     |

Send the information and wait for the confirmation e-mail. After having received the

confirmation e-mail, you may sign-in for the first time. By clicking on the username in the top right corner of the window you will open the *User* administrator page, where you will be able to modify/save your own data.

| VAPE Home Contact us | Ŀ   | ogg d in as OA_M31   Logout |
|----------------------|---|-----------------------------|
|                      | User administration page                        |                             |
| supervisor           | Arthur Dent                                     |                             |
| fullname             | Osservatorio Astronomico Galassia di Andromeda  |                             |
| username             | OA_M31  |                             |
| email                | giulia.lafrate@gmail.com                        |                             |
| address              | Pianeta 2014-1b, Braccio a Spirale 2, Andromeda |                             |
| telephone            | (+00) 123 456 789                               |                             |
|                      | Save metadata Change password Cancel            |                             |
|                      |   |                             |
|                      |   |                             |
|                      |   |                             |
|                      |   |                             |
|                      |   | A 40                        |
|                      | ω (👳 ) 🚈  |                             |

<u>Step 2</u>: add a new telescope. In the VAPE main window select Add new telescope.

| VAPE Home About Contact us                 | Logged in as OA_M31   Logout   |
|--|--|
| TELESCOPES AND INSTRUMENTS                 |  |
| SERVICES Add new telescope Add new service | Entity details<br>Please use the navigation list on the left to select an entity |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  | <u>به</u> ک  |

Insert the requested information. Attention: the shortname can not be modified.

| VAPE Home About Contact us        |             | Logged in as OA_M31   Logout |
|-----------------------------------|-------------|------------------------------|
| TELESCOPES AND INSTRUMENTS        |             | New telescope                |
| SERVICES                          | name        | Newton 150cm                 |
| Add new telescope Add new service | shortname   | N_150                        |
|                                   | description | Telescopio Newton Cupola Est |
|                                   |             | Save metadata                |
|                                   |             |                              |
| EUROZOF UROZOF                    |             | 💽 🚈 👱                        |

<u>Step 3</u>: **add a new instrument**. A telescope can have more than one instrument, e.g. a camera for imaging and a spectrograph. The telescope created in step 2 appears in the left column of VAPE, by selecting it, it is possible to add a new instrument through *Add new instrument*.

| VAPE Home About Contact us        |             |                                  | Logged in as OA_M31   Logout |
|-----------------------------------|-------------|----------------------------------|------------------------------|
| Newton 150cm                      |             | Newton 150cm                     |                              |
| SERVICES                          | name        | Newton 150cm                     |                              |
|                                   | shortname   | N_150                            |                              |
| Add new telescope Add new service | description | Telescopio Newton Cupola Est     |                              |
|                                   |             | Save metadata Add new instrument |                              |
|                                   |             |                                  |                              |
|                                   |             |                                  |                              |
|                                   |             |                                  |                              |
|                                   |             |                                  |                              |
|                                   |             |                                  |                              |
|                                   |             |                                  |                              |
|                                   |             |                                  |                              |
| Euriozor Ulis                     |             |                                  |                              |

Insert the requested information and save them through *Save metadata*. Attention: the *shortname* can not be modified.

| VAPE Home About Contact us                 |             |   | Logged in as OA_M31   Logout |
|--|-------------|---|------------------------------|
| TELESCOPES AND INSTRUMENTS<br>Newton 150cm |             | New instrument                          |                              |
| SERVICES                                   | name        | AHRG                                    |                              |
| Add new telescope Add new service          | shortname   | AHRG                                    |                              |
|  | description | Andromeda High Resolution Galaxy camera |                              |
|  |             | Save metadata                           |                              |
|  |             |   |                              |
|  |             |   |                              |
|  |             |   |                              |
|  |             |   |                              |
|  |             |   |                              |
|  |             |   |                              |
|  |             |   |                              |
|  |             |   |                              |
| EUROZOT UM                                 |             |   |                              |

At the end a window with the confirmation of the instrument addition appears.

| VAPE Home About Contact us                         | Logged in as OA_M31   Logout     |
|--|----------------------------------|
| TELESCOPES AND INSTRUMENTS<br>Newton 150cm<br>AHRG | Operation successful             |
| SERVICES   | Instrument created successfully. |
| Add new telescope Add new service                  |                                  |
|  |                                  |
|  |                                  |
|  |                                  |
|  |                                  |
|  |                                  |
|  |                                  |
|  |                                  |

<u>Step 4</u>: setting up the service. In the left column select Add new service and insert the requested information.

- *VO Title*: title of the service, with clear references to institute, telescope, instrument, aim (educational), etc;
- VAPE Shortname and VO Shortname can be the same;
- *VO Description*: detailed description of the educational activity, with information on methods, instruments, user (students, teachers, ...), etc.;
- *protocolType*: at the moment only SIAP (simple image access protocol) is available, in the future SSAP (simple spectra access protocol) will be added;
- VO Subject: some keywords of the service, separated by "#";
- VO ReferenceUrl: web site with the description of the educational activity.

| VAPE Home About Contact us                         |                        | Logged in as OA_M31   Logout   |
|--|------------------------|--|
| TELESCOPES AND INSTRUMENTS<br>Newton 150cm<br>AHRG | New service            |  |
|  | VO Title               | OA_M31 AHRG educational slap service   |
| SERVICES   | VAPE Shortname         | AHRG_siap  |
| Add new telescope Add new service                  | VO Shortname           | AHRG_siap  |
|  | VO Description         | Il telescopio robotico didattico dell'Osservatorio Astronomico della Galassia di Andromeda<br>offre ai ragazzi andromediani la posibilità di riprendere immagini di altri mondi, andromediani e<br>alieni (terrestri).<br>Gli strumenti a disposizione sono, ecc., ecc., |
|  | Protocol Type          | siap   |
|  | VO Subject             | educational#stars#galaxies#planets#aliens  |
|  | VO Reference URL       | http://www.oa_m31.and/edu  |
|  | Connected instruments: | 2 AHRG   |
|  |                        | Save metadata  |
| Eurozor (Chui                                      | )                      | 🐋 💒  |

Save the information by clicking on *Save metadata*. VAPE moves to the next window where a test FITS file is requested in order to proceed with the service creation.

| VAPE Home About Contact us                         | Logged in as OA_M31   Logout   |
|--|--|
| TELESCOPES AND INSTRUMENTS<br>Newton 150cm<br>AHRG | OA_M31 AHRG educational siap service                                 |
| SERVICES<br>OA_M31 AHRG educational slap service   | Service metadata Service schema descriptor History of uploaded files |
| Add new telescope Add new service                  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| EURO 107   |  |

At this point you have to verify that your FITS files are acceptable for publication in the VO through VAPE and, if not, to modify them according to the rules below:

- 1) verify with FITS Verify (<u>http://fits.gsfc.nasa.gov/fits\_verify.html</u>) that files fit the standards of FITS format
- 2) if the following keywords are not already present, insert them in the FITS header OBJECT observed object

OBJ\_TYPE object type: *astro* for stars, deep sky, etc; *sun* for the Sun; *planetary* for the Solar System objects

| OBSERVER | observer (you or the class)                                   |
|----------|---|
| TELESCOP | telescope used for observations - this keyword must match the |
|          | telescope shortname previously inserted in VAPE               |
| INSTRUME | instrument used for observations - this keyword must match    |
|          | the instrument shortname previously inserted in VAPE and      |
|          | linked to the service   |
| INSTITUT | institute performing the observations                         |
| PURPOSE  | "edu" in order to tag observations as educational             |

Once your FITS files satisfy the above requirements, you may proceed uploading the test file. Specify for each of the following variables RA, DEC, Date, Image ID and Pixel Scale the corresponding keyword of your file header. If needed modify the information using arithmetical operations and/or constants.

Tips&Tricks: in order to perform arithmetical operations insert the desired function (from the list menu *functions*) and then insert inside it the keywords (from the list menu *Fits keys*) and/or the constants (from the list menu *Constant*). To delete a field use *Undo*.

| VAPE Home About Contact us                         |                            | Logged in as OA_M31   Logout                       |
|--|----------------------------|--|
| TELESCOPES AND INSTRUMENTS<br>Newton 150cm<br>AHRG | OA_N                       | M31 AHRG educational siap service                  |
|  | Service metadata Ser       | ervice schema descriptor History of uploaded files |
| SERVICES   |                            |  |
| OA_M31 AHRG educational siap service               |                            | Fits keys   Functions   Constant Undo              |
| Add new telescope Add new service                  | RA [deg] =                 | OBJCTRA  |
|  |                            | Fits keys - Functions - Constant Undo              |
|  | DEC [deg] =                | OBJCTDEC   |
|  |                            | Fits keys • Functions • Constant Undo              |
|  | Date [MJD] =               | ( JD - 2400000.5 )                                 |
|  |                            | Fits keys • Functions • Constant Undo              |
|  | Image ID =                 | OBJECT   |
|  |                            | Fits keys • Functions • Constant Undo              |
|  | Pixel Scale - X [deg/px] = | ( PIXSCALE / 3600 )                                |
|  |                            | Fils keys   Functions  Constant Undo               |
|  | Pixel Scale - Y [deg/px] = | ( PIXSCALE / 3600 )                                |

At the end save the metadata: a confirmation page appears. An email message will confirm the activation of the service.

<u>Step 5</u>: **upload the images to be published**. Select your service in the VAPE main window. A window will pop-up where you will be able to modify title, description, keywords and reference web site of the service. In order to upload new images select *Upload new files*.

| VAPE Home About Con                                   | ntact us               | Logged in as OA_M31   Logout   |  |  |
|---|------------------------|--|--|--|
| TELE SOORE 5 AND IN BRUNKENTS<br>Newton 150mn<br>AHRG |                        | OA_M31 AHRG educational siap service   |  |  |
|   | Service metadata Ser   | rvice schema descriptor History of uploaded files  |  |  |
| OA_M31 AHRG educational siap service                  | status                 | approved   |  |  |
| Add new telescope Add new service                     | vrTitle                | OA_M31 AHRG educational siap service   |  |  |
|   | shortname              | AHRG_slap  |  |  |
|   | vrShortname            | AHRG_slap  |  |  |
|   | vrldentifier           | ivo://is2.insf.it/edu/OA_M31/AHRG_piap   |  |  |
|   | vrDescription          | Il telescojo rokoto diditiso diditiso diditiso diditiso di anti anti anti anti di anti anti anti anti anti anti anti ant |  |  |
|   | protocolType           | siap   |  |  |
|   | vrSubject              | educational#stars#galaxies#planets#aliens  |  |  |
|   | vrreferenceURL         | http://www.oa_m31.and/edu  |  |  |
|   | vrType                 | archive  |  |  |
|   | vrContentievel         | educational  |  |  |
|   | accessURL              | Waiting for VO-Dance   |  |  |
|   | dataquality            |  |  |  |
|   | schemaname             | Set by NADIR   |  |  |
|   | tableorview            | AHRG_siap_view   |  |  |
|   | Connected instruments: | AHR6 Hest Sove Endeds Uplead reve Trice  |  |  |
|   |                        |  |  |  |

A pop-up window will confirm the end of the upload procedure.

| VAPE Home About Contact us                         |   | Logged in as OA_M31   Logout |
|--|---|------------------------------|
| TELESCOPES AND INSTRUMENTS<br>Newton 150cm<br>AHRG | Upload finished<br>1 files out of 1 successfully sent |                              |
| services<br>OA_M31 AHRG educational slap service   | Succesfully uploaded files:<br>• m15_andromeda.fit    |                              |
| Add new telescope Add new service                  |   |                              |
|  |   |                              |
|  |   |                              |
|  |   |                              |
|  |   |                              |
|  |   |                              |
|  |   |                              |

During the upload, files are renamed according to the schema OBJECT\_OBS\_DATE.fits and a new keyword with the original file name is added to the file header.

N.B.: when a service is approved its state changes from *requested* to *approved*. Even if approved by VAPE, the service has to be registered in the VO registries before images become available in the VO. Wait until the URL appears in the field *accessURL*.

<u>Step 6</u>: access the images. Images published with VAPE enter the Virtual Observatory – VO (<u>http://www.euro-vo.org</u>) and are accessible through VO tools, e.g. Aladin (free download from <u>http://aladin.u-strasbg.fr</u>).

Some examples on how to use Aladin for educational purposes are available on the web site <u>http://wwwas.oats.inaf.it</u> in the download section.

How to access the images of a specific service (e.g. SVAS of INAF OATs) using Aladin:

Open Aladin

File -> Load astronomical image -> Aladin image server

Select the *all\_VO* tab and insert in the field *Object* the name or the coordinates of the object you want to search for.

In order to get all images published by a specific service insert 0:0:0 0:0:0 in the field *Object* and 180° in the field *Radius*.

Select Images only (deselect Catalogs and Spectra) and open the Detailed list.

| 🧭 Server sele    | ctor   | . 🗆 🗙              |
|------------------|--|--------------------|
|                  | Others Others States States  | ]                  |
| Image<br>servers | ○ VO discovery tool ⑦  | Catalog<br>servers |
| Aladin<br>images | Target (ICRS, name)         0:0:0 0:0:0         Grab coord           Radius         180°         180°         180° |                    |
|                  |  | Burveys            |
|                  |  | <b>W</b> sions     |
| Sloan            |  | JIN SAD            |
| 055              |  |                    |
|                  |  | SkyBot             |
| Archives         |  | Others             |
| Others           |  |                    |
|                  | Press it to stop the processing => Stop it   |                    |
|                  | Reset Clear SUBMIT Close ?   |                    |

A window with the list of all available services which have images of the searched object appears.

| <i>@</i> Se  | erver list  |  |  |  |
|--|---|--|--|--|
| Check/uncheck the servers concerned by the ALL VO discovery mode |   |  |  |  |
|  | Select all Unselect all Filter: Go Reset                      |  |  |  |
| Image servers  |   |  |  |  |
| 1)   | The Aladin image server (CDS/Strasbourg) - DSS/MAMA/2MASS/I ? |  |  |  |
| 2)   | The UKIRT DR9 Infrared Deep Sky Survey                        |  |  |  |
| 3)   | SDSS DR7 images   |  |  |  |
| 4)   | W Multimission Archive at STScI (MAST)                        |  |  |  |
| 5)   | W Hubble Legacy Archive Footprint Data (HLA)                  |  |  |  |
| 6)   |   |  |  |  |
| 7)   | ✓ Hubble press release images     ?                           |  |  |  |
| 8)   | VO-Paris Southern Atlas (VOPSAT)                              |  |  |  |
| 9)   | 🕼 Generic SIA query   |  |  |  |
|  | SUBMIT Close  |  |  |  |

Insert the name (or a part of it) of the desired service (i.e. SVAS) in the field *Filter* and click *Go*.

| Ø Server list  | • ×   |  |  |  |  |  |
|--|-------|--|--|--|--|--|
| Check/uncheck the servers concerned by the ALL VO discovery mode |       |  |  |  |  |  |
| Select all Unselect all Filter: SVAS Go                          | Reset |  |  |  |  |  |
|  |       |  |  |  |  |  |
| Image servers  |       |  |  |  |  |  |
| 1) 🕡 INAF-OATs SVAS Educational Images SIAP service              | ?     |  |  |  |  |  |
| Catalog servers  |       |  |  |  |  |  |
|  |       |  |  |  |  |  |
| Spectra servers  |       |  |  |  |  |  |
|  |       |  |  |  |  |  |
|  |       |  |  |  |  |  |
|  |       |  |  |  |  |  |
| SUBMIT Close   |       |  |  |  |  |  |

The botton "?" shows the information about that service inserted in VAPE. Select the service, submit and close the window.

The list of images provided by the selected service appears in the server selector window.

| Server selector            |   |            |                    |  |
|----------------------------|---|------------|--------------------|--|
|                            | Others Office Stiller Stiller   | Tools      |                    |  |
| Image<br>servers           | • VO discovery tool 👔   |            | Catalog<br>servers |  |
| Aladin<br>images           |   | Grab coord | <b>W</b> IZIER     |  |
| SkyView                    |   |            | Burveys            |  |
|                            | Π   | *          | <b>W</b> issions   |  |
| Sloan                      | INAF-OATS SVAS Educational Images SIAP service     Inaf 50.0" x 37.6"                 |            |                    |  |
| D\$S                       | — m31 50.0" x 37.6"<br>— m57 50.0" x 37.6" ≡  |            |                    |  |
|                            | PSN_ngc5936 50.0" x 37.6"<br>PSN_ugc10313 50.0" x 37.6"<br>PSN_ugc10313 50.0" x 37.6" |            |                    |  |
| Archives                   |   |            |                    |  |
| Others                     | sn2013df 50.0" x 37.6"  |            |                    |  |
|                            | Press it to stop the processing => Stop it  |            |                    |  |
| Reset Clear SUBMIT Close ? |   |            |                    |  |

Double click on a image name in order to visualize the information saved in the file header. Select an image and submit to load it in Aladin.

