ARTEMIX / YAFITS

Michel Caillat, Yaye Awa Ba, Nicolas Moreau, Philippe Salomé
(LERMA)

Archive, Data Mining et Visualisation

ASOV 2021

ARTEMIX

Service

Visualisation distante de
l'archive scientifique ALMA

ADASS 2017 (Trieste)

Astronomical Data Analysis Software and Systems XXVI
ASP Conference Series, Vol. 521
Marco Molinaro, Keith Shortridge, and Fabio Pasian, eds.
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ARTEMIX - Alma RemoTE MIning eXperiment

Philippe Salome,[1] Nodar Kasradze,[1] and Michel Caillat[1]

[1]*LERMA, Observatoire de Paris, France,* philippe.salome@obspm.fr

Abstract. Even if not yet in full operation mode, the ALMA observatory has already delivered huge amounts of data. Those data are accessible to download via the ALMA science archive portal from their parent project id. We present here ARTEMIX (Alma RemoTE MIning eXperiment), a development from the Paris Observatory that aims at exploring new tools for metadata and datacube remote visualisation. ARTEMIX does not reprocess the calibrated data. It is thought as a collection of display facilities which aim is to ease the definition of trans-project subsamples. Future developments, like automated subsample selection via higher-level data analysis are possible, but require the access to fully imaged data-cubes that are not provided yet.

YAFITS

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Visualisation rapide

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ARTEMIX and YAFITS : Remote Viewer Experiments

P. Salomé,[1] M. Caillat,[1] N. Moreau,[1] and Y.–A. Ba[1]

[1]*LERMA, Observatoire de Paris, F-75014 Paris, France;*
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Objectifs

- Recherche par produit plutôt que par configuration instrumentale
- Faire des requêtes multi-projets (ie sources connues)
- Avoir une idée rapide du contenu (fichiers fits)

Moyens

- Previews des configurations d’observation ALMA(meta-data)
- Preview des cubes ALMA (science products QA2)

Contexte

Développé au LERMA à l'Observatoire de Paris, dans le cadre de l'AA-ANO3

Utilisation de cubes de données et de métadonnées publics

N'utilise pas les standards de codage ESO.

Serveur web NodeJS, base de données MongoDB, serveur pour les fichiers FITS bottle (python)

Résultat d’une recherche

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Show all data. *.pbcor.fits and *.pbcorr.fits *.image.fits *.clean.fits *.cont.fits and *.line.fits

All Info | Metadata — Available fits file(s) for selected metadata : 20

Show 10 entries — Search:

Metadata										
#	Target	Band	RA	DEC	Res (")	Freq. Range (GHz)	Proj. code	Release Date	PI name	Search Alma Fits
1	m83	3	13:37:0.92	-29:51:56.74	1.5277	85.6 --- 87.48; 87.46 --- 89.33; 97.54 --- 99.42; 99.4 --- 101.27	2015.1.01177.S	2017-07-25	Longmore, Steven	search
2	m83	3	13:37:0.92	-29:51:56.74	0.3632	85.6 --- 87.48; 87.46 --- 89.33; 97.54 --- 99.42; 99.4 --- 101.27	2015.1.01177.S	2017-11-07	Longmore, Steven	search
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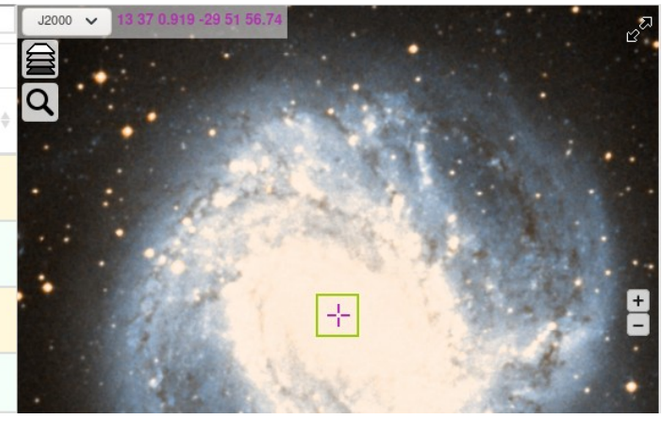
4	m83	3	13:37:0.92	-29:51:56.74	56.6285	94.83 --- 96.83; 96.83 --- 98.83; 106.9 --- 108.9; 108.82 --- 110.82	2015.1.01593.S	2017-05-05	Hirota, Akihiko	search



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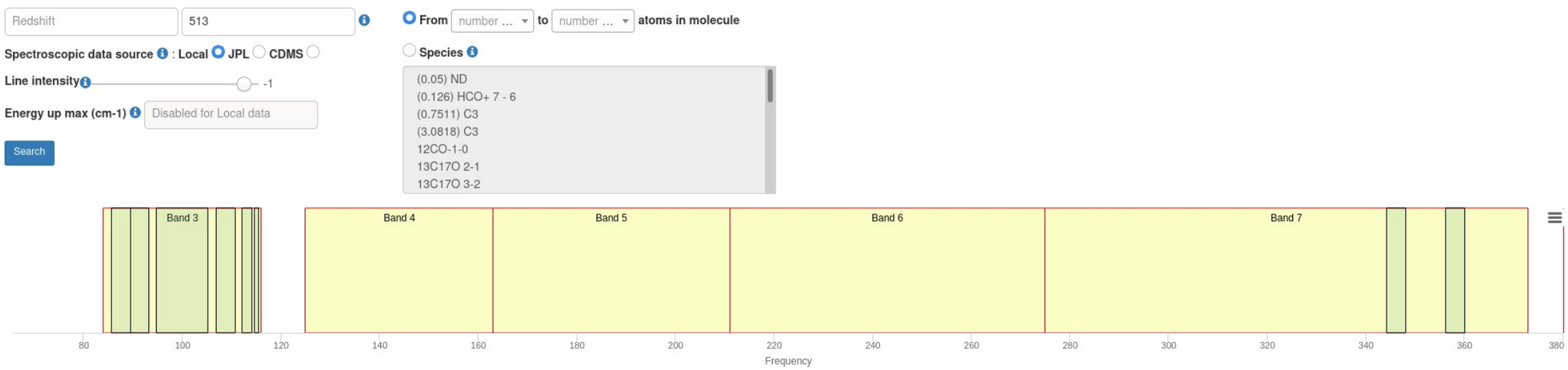

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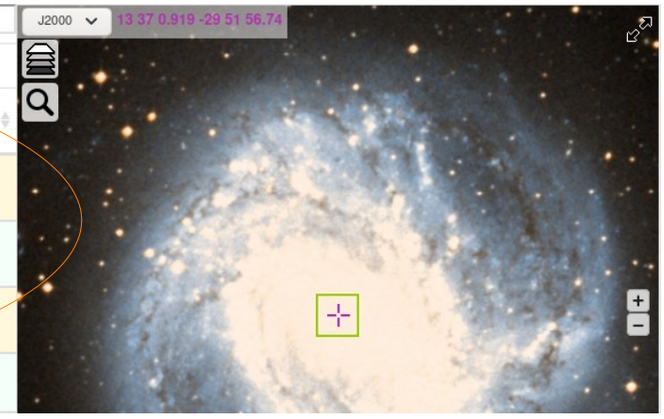


Tableau de métadonnées

Résultat d’une recherche

Redshift 513

Spectroscopic data source : Local JPL CDMS

Line intensity -1

Energy up max (cm-1) Disabled for Local data

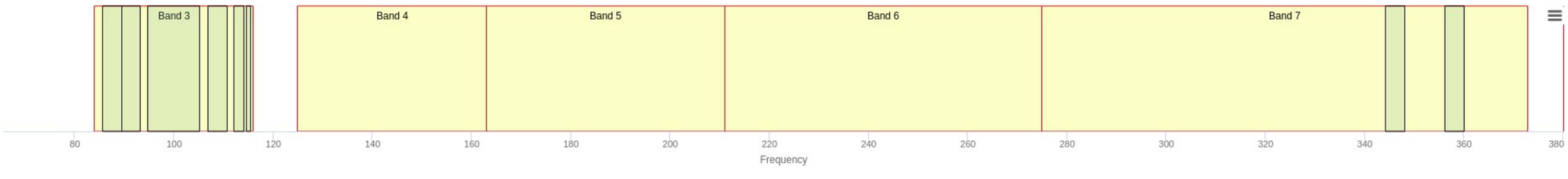
Search

From number … to number … atoms in molecule

Species

(0.05) ND
(0.126) HCO+ 7 - 6
(0.7511) C3
(3.0818) C3
12CO-1-0
13C17O 2-1
13C17O 3-2

Raies spectrales dans la bande de fréquence



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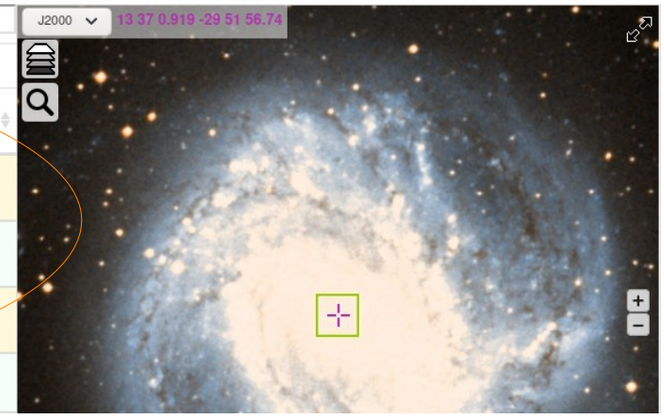


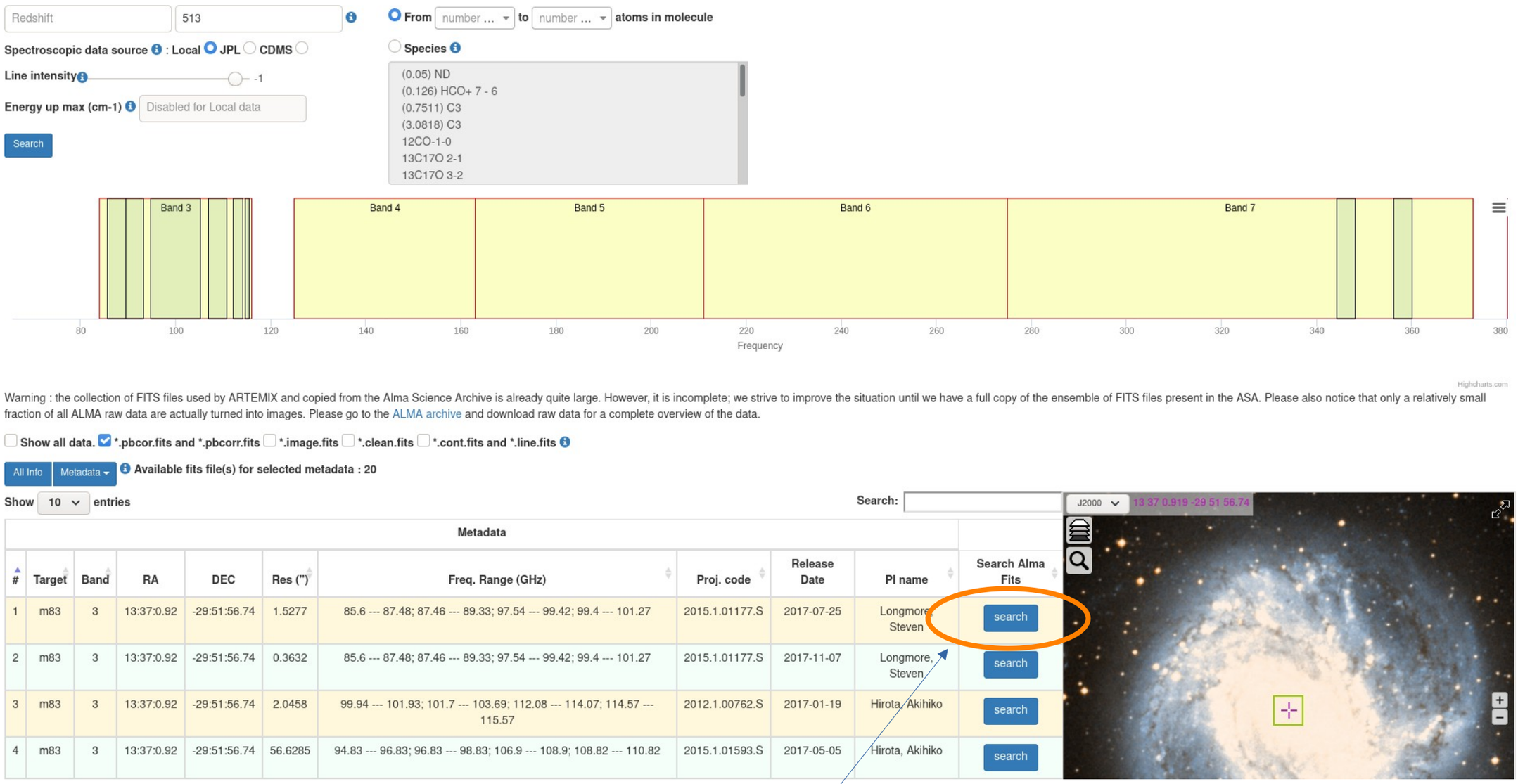
Tableau de métadonnées

Récupération des données ALMA

- Téléchargement automatique depuis l'archive publique ALMA
- Toutes ne sont pas récupérées car le volume serait trop important
- Restriction en fonction de la taille des fichiers
- Pour compléter la base de données, nous avons mis en place un service qui récupère les fichiers manquants à la demande de l'utilisateur.

- Service web qui permet :
  - l'affichage de l'ensemble des fichiers sur l'interface web
  - la possibilité de lancer les téléchargements de fichiers dans le système de fichiers d'Artemix
  - la récupération des fichiers fits par l'utilisateur sur sa propre machine

Téléchargement à la demande



Recherche par project code et mousId

Téléchargement à la demande

Fichier en cours de téléchargement

List of fits coming from ALMA (experimental phase)

Science Pbcor

Id	Url	Size (MB)	Local download script	Download / Preview on Artemix
1	https://almascience.eso.org//dataPortal/member.uid___A001_X2f6_X44d.m83_spw0-line.image.pbcor.fits	1210.435	Local download Script	Waiting to be downloaded
2	https://almascience.eso.org//dataPortal/member.uid___A001_X2f6_X44d.m83_spw0123-cont.image.pbcor.fits	2.661	Local download Script	Download/Preview on Artemix
3	https://almascience.eso.org//dataPortal/member.uid___A001_X2f6_X44d.m83_spw1-line.image.pbcor.fits	1236.187	Local download Script	Download/Preview on Artemix
4	https://almascience.eso.org//dataPortal/member.uid___A001_X2f6_X44d.m83_spw2-line.image.pbcor.fits	1086.465	Local download Script	Download/Preview on Artemix
5	local://m83.image.line_SPW2_6_uvtaper.image.pbcor.fits	500.197	Local download Script	Visit the fits
6	local://m83.image.continuum_uvtaper.image.pbcor.fits	6.446	Local download Script	Visit the fits
7	local://member.uid___A001_X2f6_X44b.m83.image.continuum_uvtaper.image.pbcor.fits	6.446	Local download Script	Visit the fits
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9	local://m83.image.H59gamma_uvtaper.image.pbcor.fits	500.191	Local download Script	Visit the fits
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Fichier déjà téléchargé

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Script python pour téléchargement local

Nouveauté 2020 : Accès aux archives ALMA via TAP

- L’ESO a changé son service d’accès aux archives publiques ALMA.
- Les données sont désormais accessibles via le protocole TAP à travers la librairie Astroquery
- Nous y avons recours pour :
  - le téléchargement des fichiers FITS
  - la mise à jour des metadata des fichiers FITS
- Scripts python effectuant requêtes ADQL basées sur le modèle de données ObsCore

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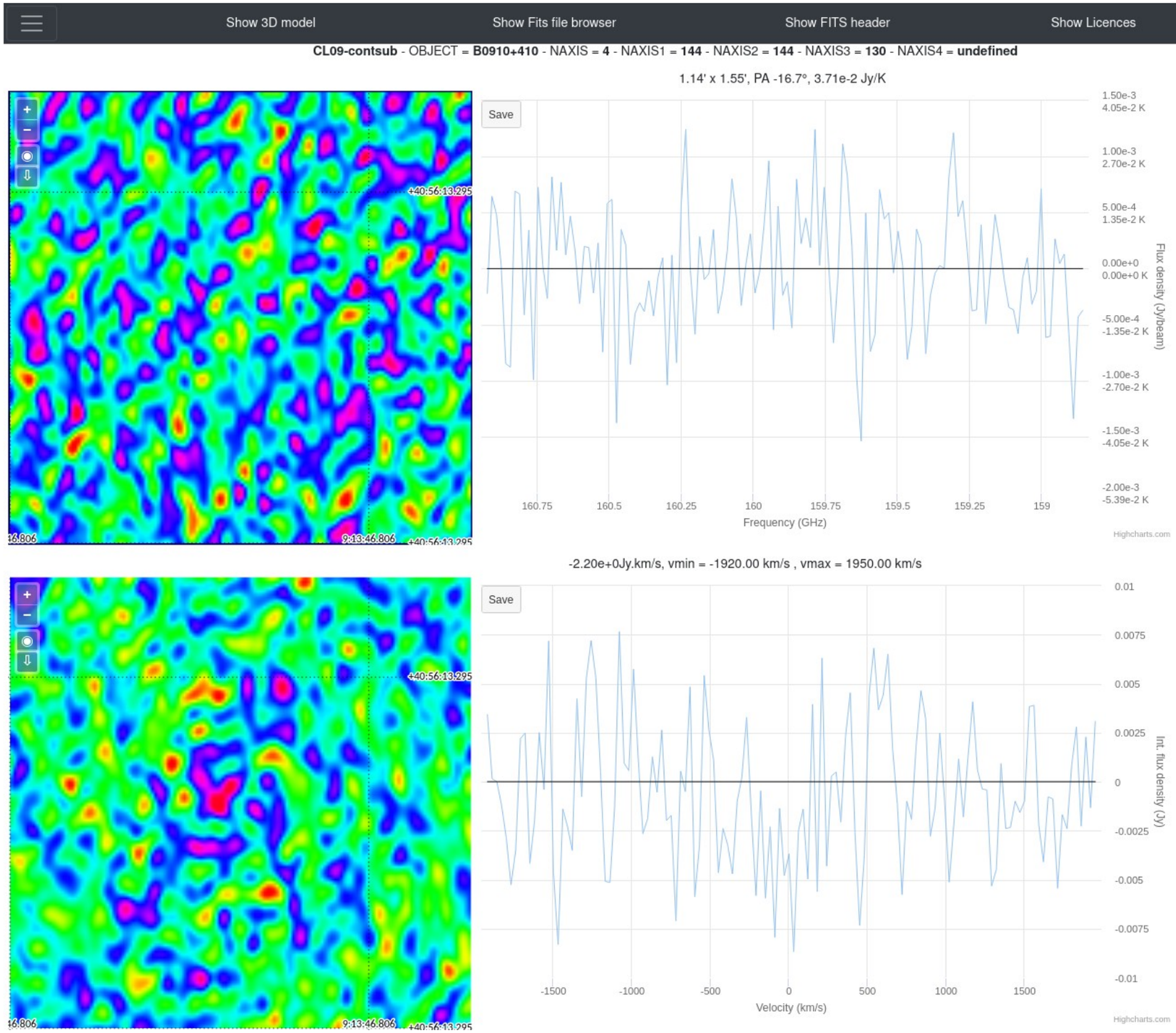
YAFITS

- Outil de visualisation, reprenant l’apparence de Gildas/Go view
- Conteneur Docker – Installation et configuration faciles
- Librairies : Highcharts (spectres) and Openlayers (images)
- Accède au système de fichiers contenant les fichiers FITS
- Destiné aux cubes de données de radio astronomie (tient compte des beam-sizes)
- Testé avec des données MUSE, SITELLE, ALMA, NOEMA
- Collaboration avec l’IRAM pour que Yafits devienne l’outil de visualisation de leur archive

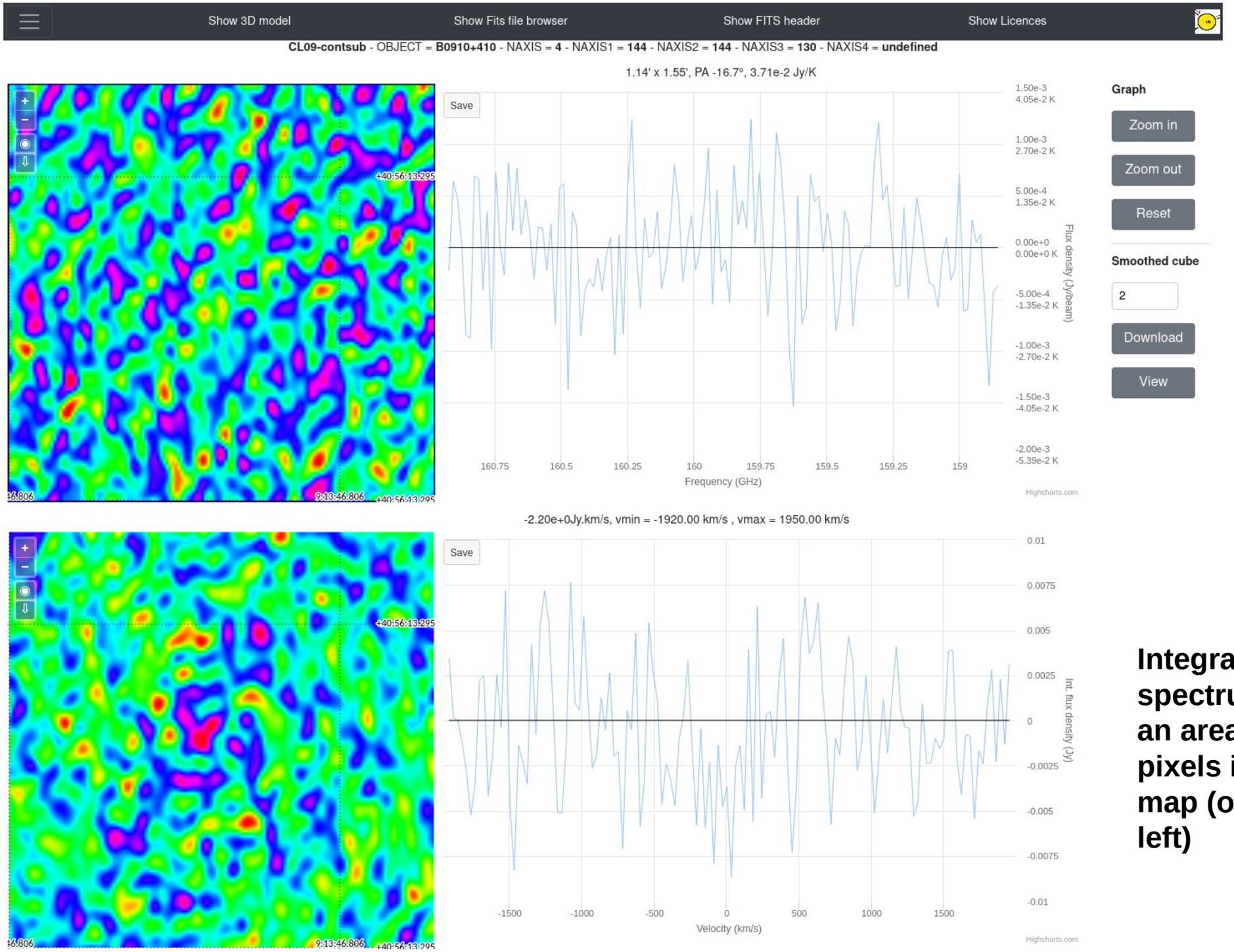
Interface données 3D

Channel-map



Pixel-based spectrum

Interface données 3D



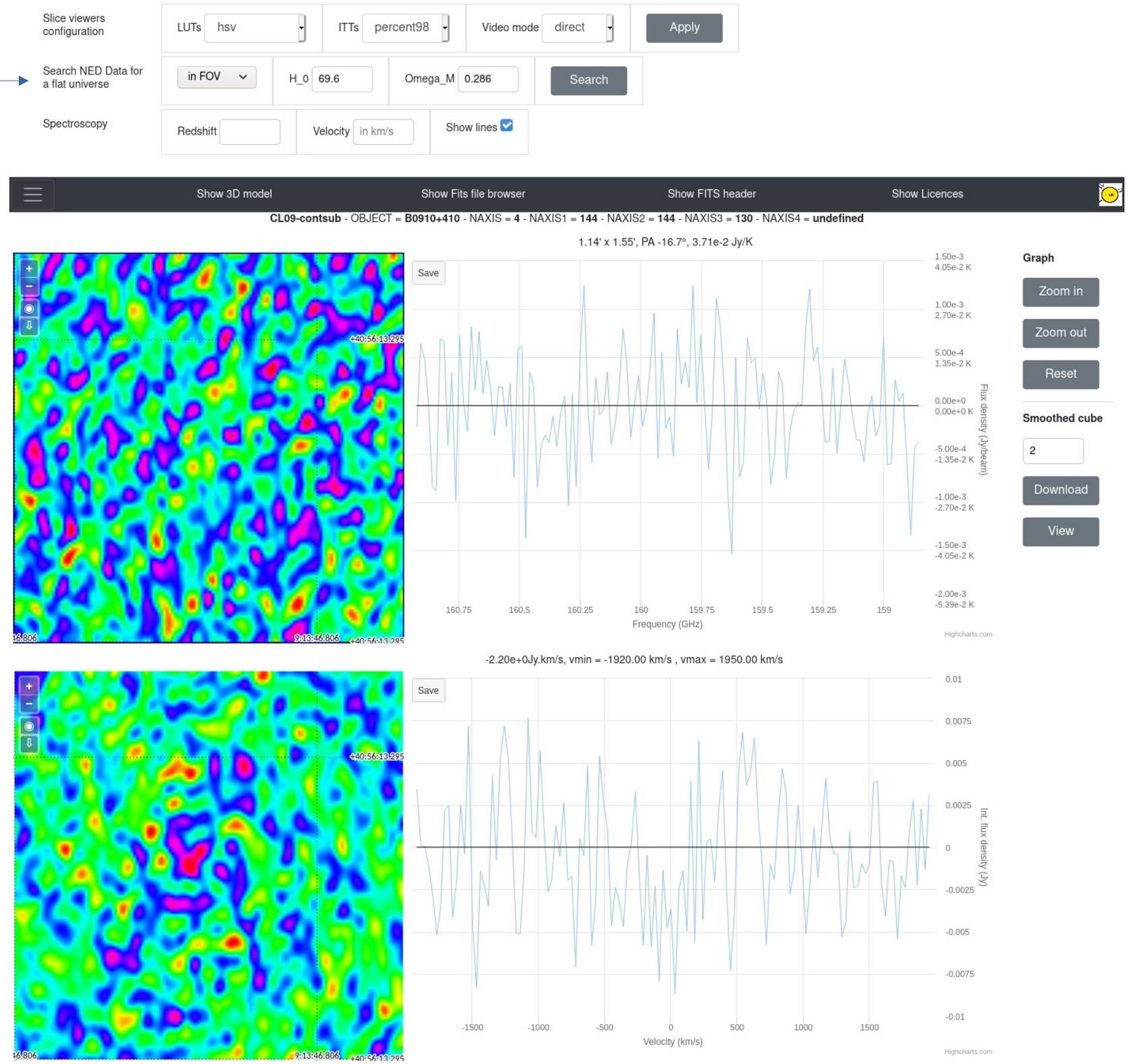
Moment-map integrated over a interactively selected range of channels (in the graph on the right)

Integrated spectrum over an area of pixels in the map (on the left)

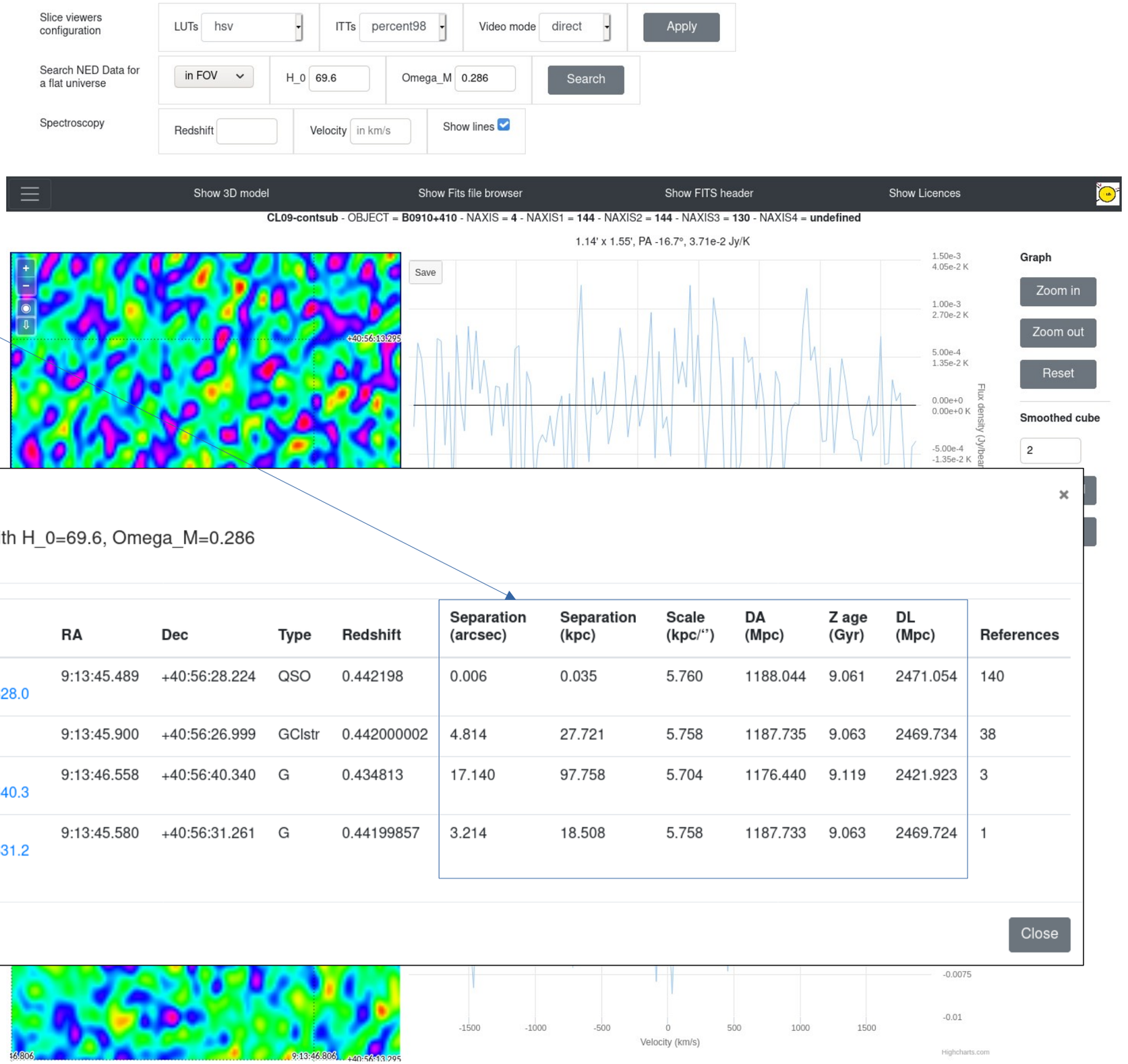
Recherche du redshift de la source

Requête TAP dans NED

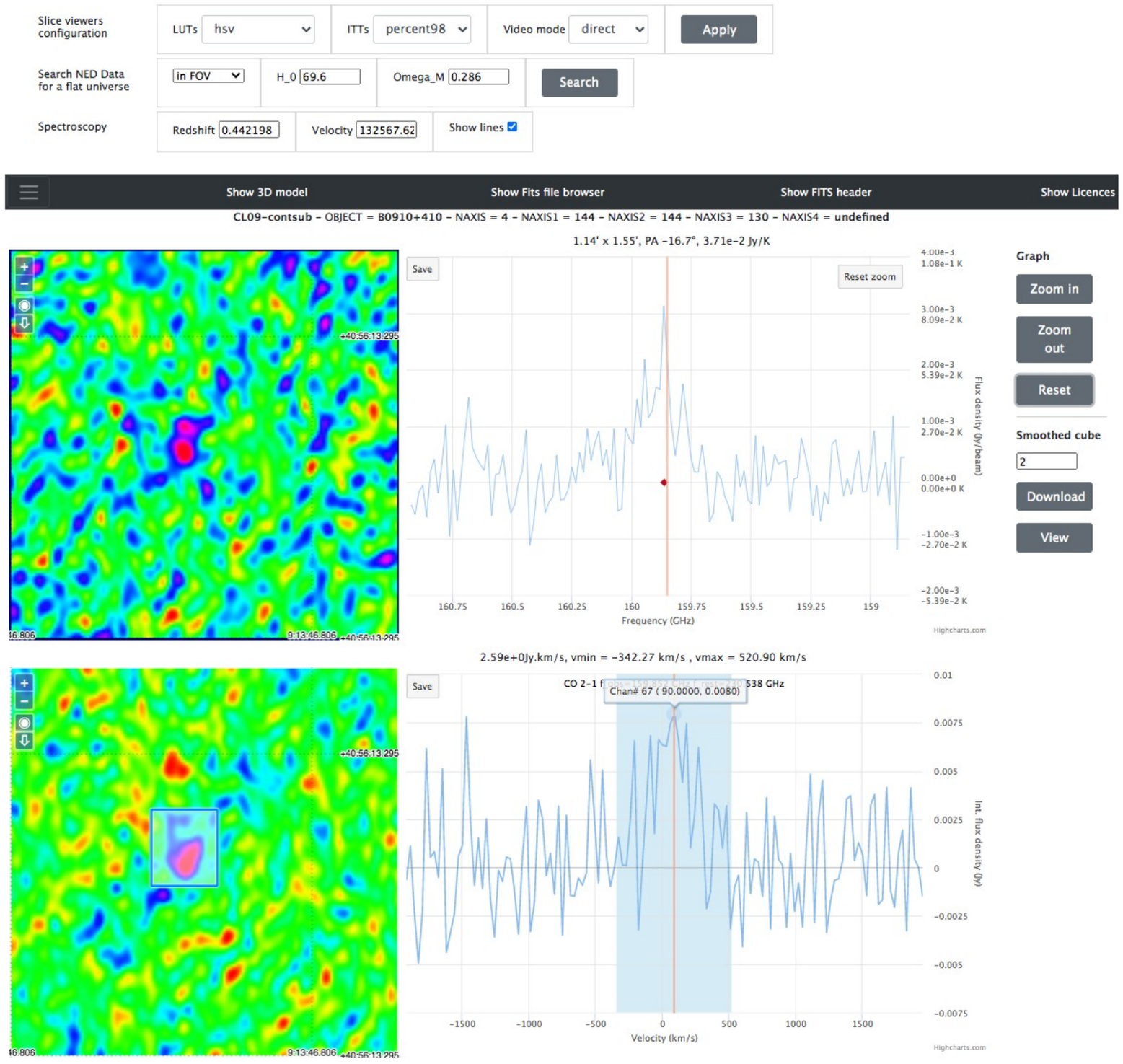
- **RA, DEC selon fichier source**
- **Radius défini par l'utilisateur**



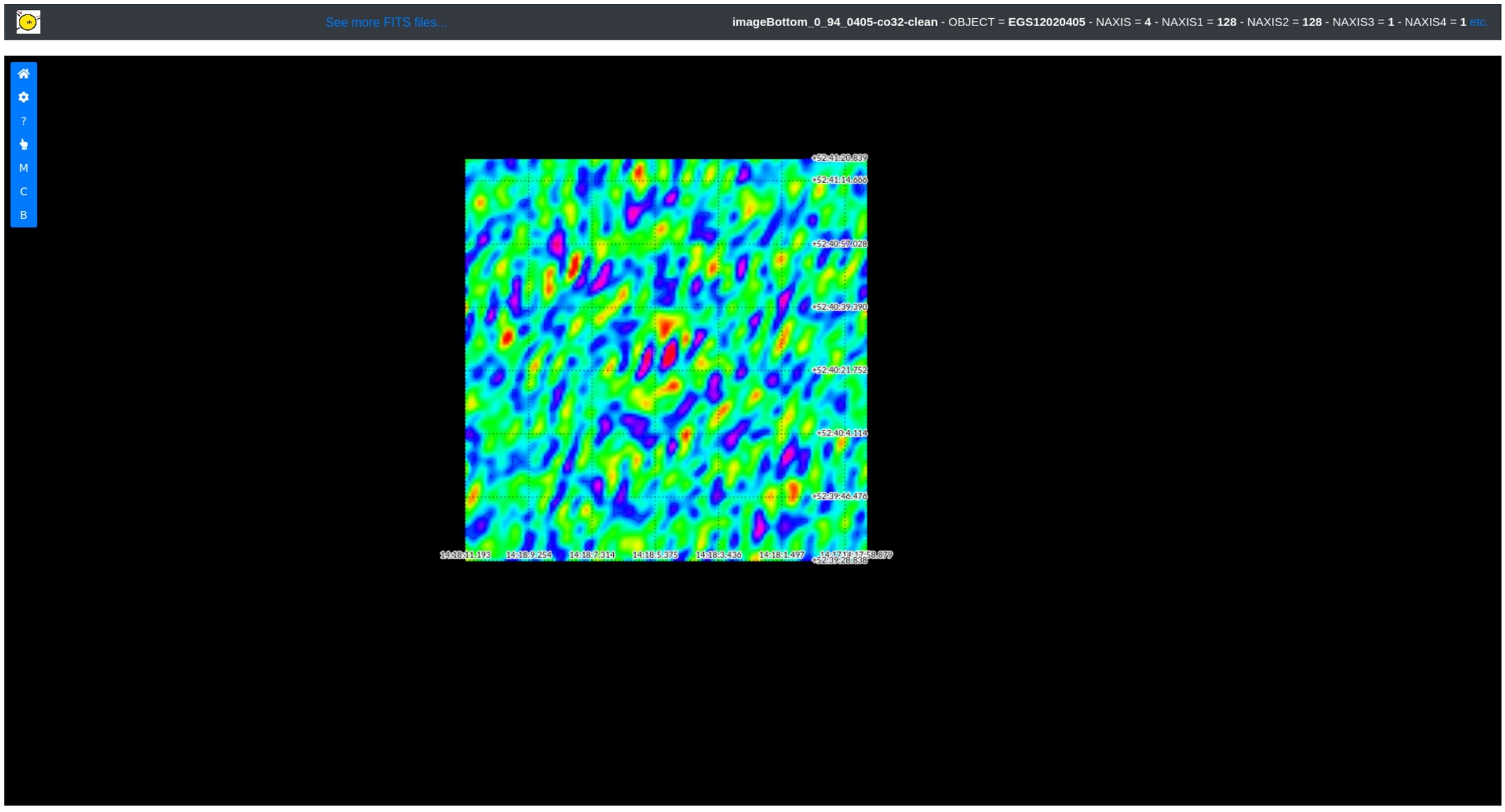
H_0 et Omega_M utilisés pour calculer des valeurs qui ne sont pas retournées directement dans le résultat de la requête



Affichage des raies spectrales



Interface données 2D



Nouvelles fonctionnalités dans Yafits

- Création de fichiers FITS smoothés à partir d’un cube pour augmenter le rapport signal bruit
- Fait mieux ressortir les objets de faible luminosité
- Possibilité de les visualiser et de les télécharger en local, réutilisation dans d’autres applications (GILDAS ...)
- Créations de fichiers FITS téléchargeables à partir des images visualisées, affichage dans l’interface 2D
- Création de fichiers FITS téléchargeables à partir des spectres affichés.

Yafits à l'IRAM

- Discussions en cours depuis quelques mois pour faire de Yafits l'outil de visualisation des cubes de l'IRAM
- Réunions de travail mensuelles
- Test d'installation du conteneur Yafits à l'IRAM l'été dernier
- Quelques adaptations de l'interface pour les besoins IRAM

Perspectives

- Intégration de coordonnées gnomoniques dans la visualisation 2D
- Adaptation de Yafits aux données Nenufar et SKA
- Ajout d’une fonction de cutout dans les cubes de données

Merci !