

RADIOFOREGROUNDS

The Data Center Platform–DCP-

RADIO

FOREGROUNDS

(presented by J.A. Rubiño-Martin)

H2020-COMPET-2015. Grant agreement 687312: “Ultimate modelling of Radio Foregrounds” (RADIOFOREGROUNDS).

3-year grant 2016-18 (IAC; IFCA; Cambridge; Manchester; SISSA; Grenoble; TREELOGIC).

This project will provide specific products:

- a) state-of-the-art legacy maps of the synchrotron and the anomalous microwave emission (AME) in the Northern sky;
- b) a detailed characterization of the synchrotron spectral index, and the implications for cosmic-rays electron physics;
- c) a model of the large-scale properties of the Galactic magnetic field;
- d) a detailed characterization of the AME, including its contribution in polarization; and
- e) a complete and statistically significant multi-frequency catalogue of radio sources in both temperature and polarization.
- f) specific (open source) software tools for data processing, data visualization and public information.

All maps at common resolution of 1 deg.

- MAPS (QUIJOTE, PLANCK, WMAP,... smoothed to 1deg)
- MODELS. Parametric → predictions at user's specified frequencies.
- CATALOGUES (point sources)

What is the RADIOFOREGROUNDS Data Center Platform–DCP-?

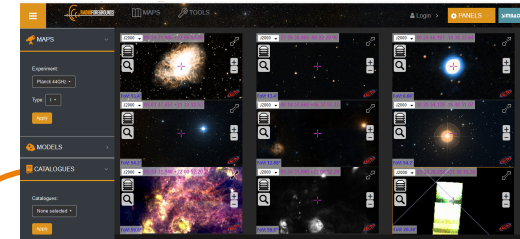
Targeted Users



- Researchers
- Scientists
- Astronomers
- Astrophysicists
- Physicists
- Universities & Research Centres (Research & applied research)
- Organisations interested in analysing the polarized emissions from the microwave domain



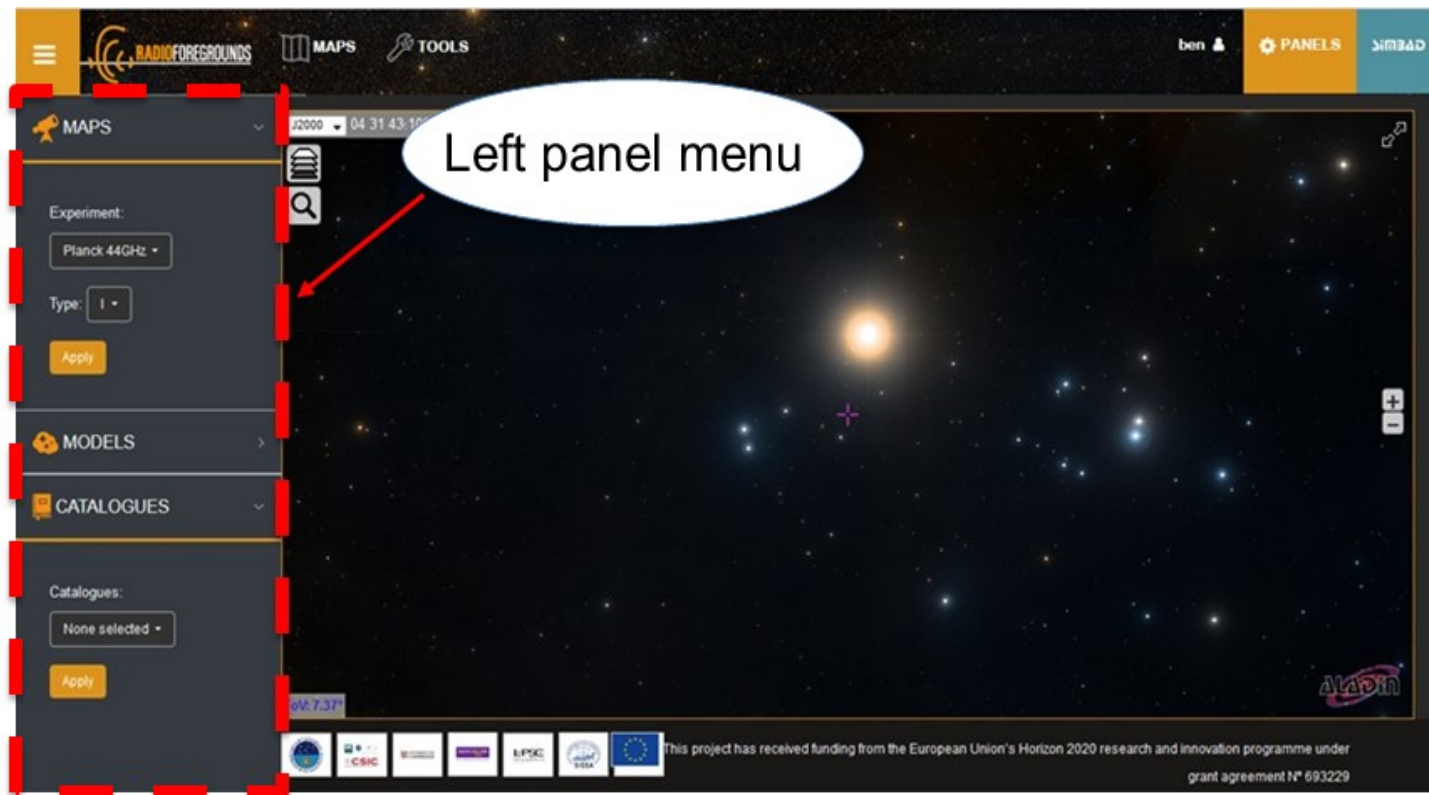
Platform



- RADIOFOREGROUNDS maps (QUIJOTE)
 - Visualize maps
 - Models
 - Creation of new images
 - Prediction, simulation & Analysis
- Process and research on parameters for CMB datasets

What can you do with the RADIOFOREGROUNDS platform?

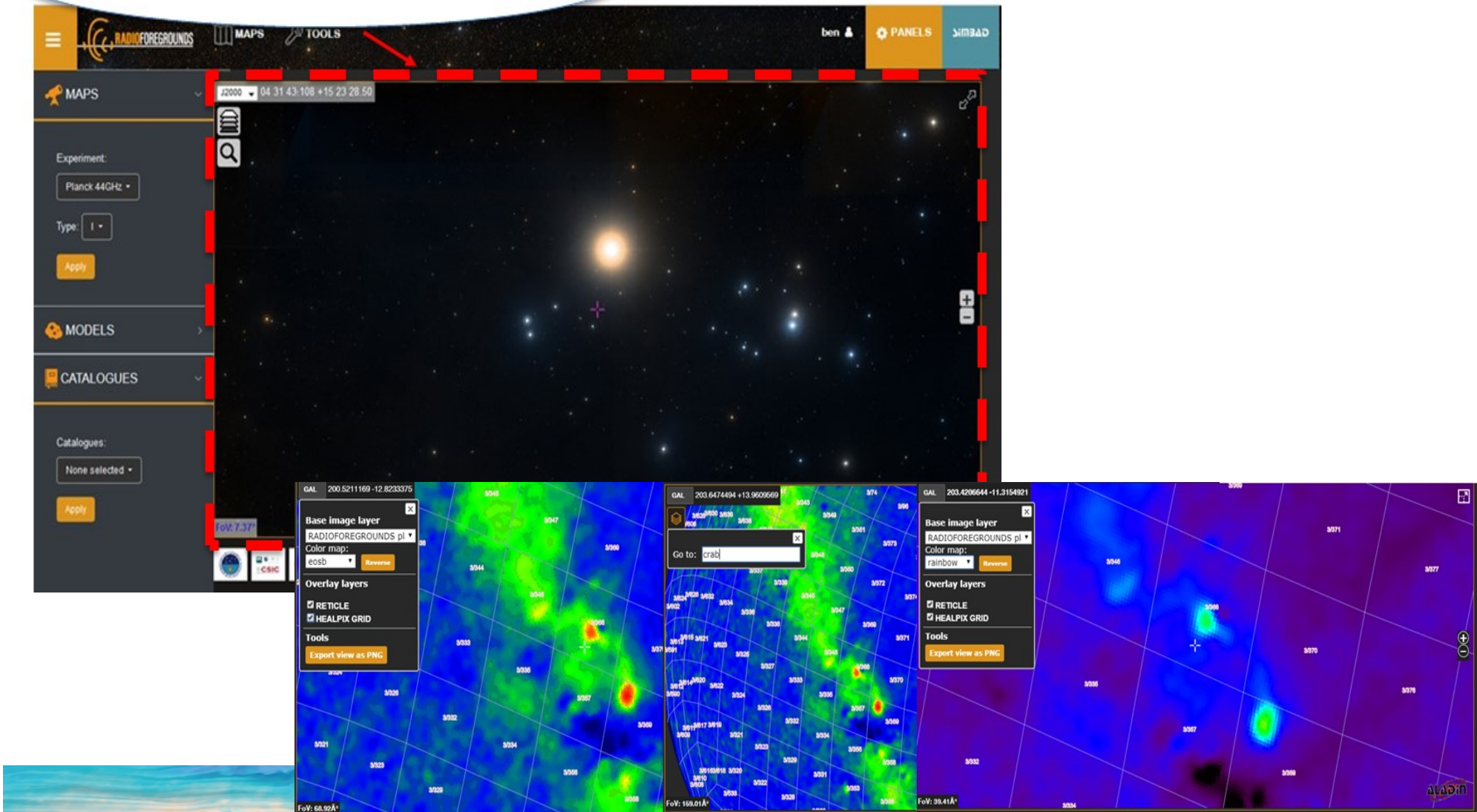
- Visualize maps created and provided by RADIOFOREGROUNDS
- Analyse and visualize maps (up to 9 maps at the same time)
- Create your own maps from análisis and save the maps in your personal área (registered users)
- Re-analyse and work in your own maps



The screenshot displays the RADIOFOREGROUNDS web interface. On the left, a dark grey sidebar menu is highlighted with a red dashed border and labeled "Left panel menu" with a red arrow. The menu contains sections for "MAPS", "MODELS", and "CATALOGUES". Under "MAPS", there is a dropdown for "Experiment:" set to "Planck 44GHz" and a "Type:" dropdown set to "1", with an "Apply" button below. Under "CATALOGUES", there is a dropdown for "Catalogues:" set to "None selected" and another "Apply" button. The main area shows a star map with a bright star and a pink crosshair. The top navigation bar includes "RADIOFOREGROUNDS", "MAPS", "TOOLS", and user information "ben". The bottom of the interface features logos for various institutions and a text box stating: "This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 693229".

What can you do with the RADIOFOREGROUNDS platform?

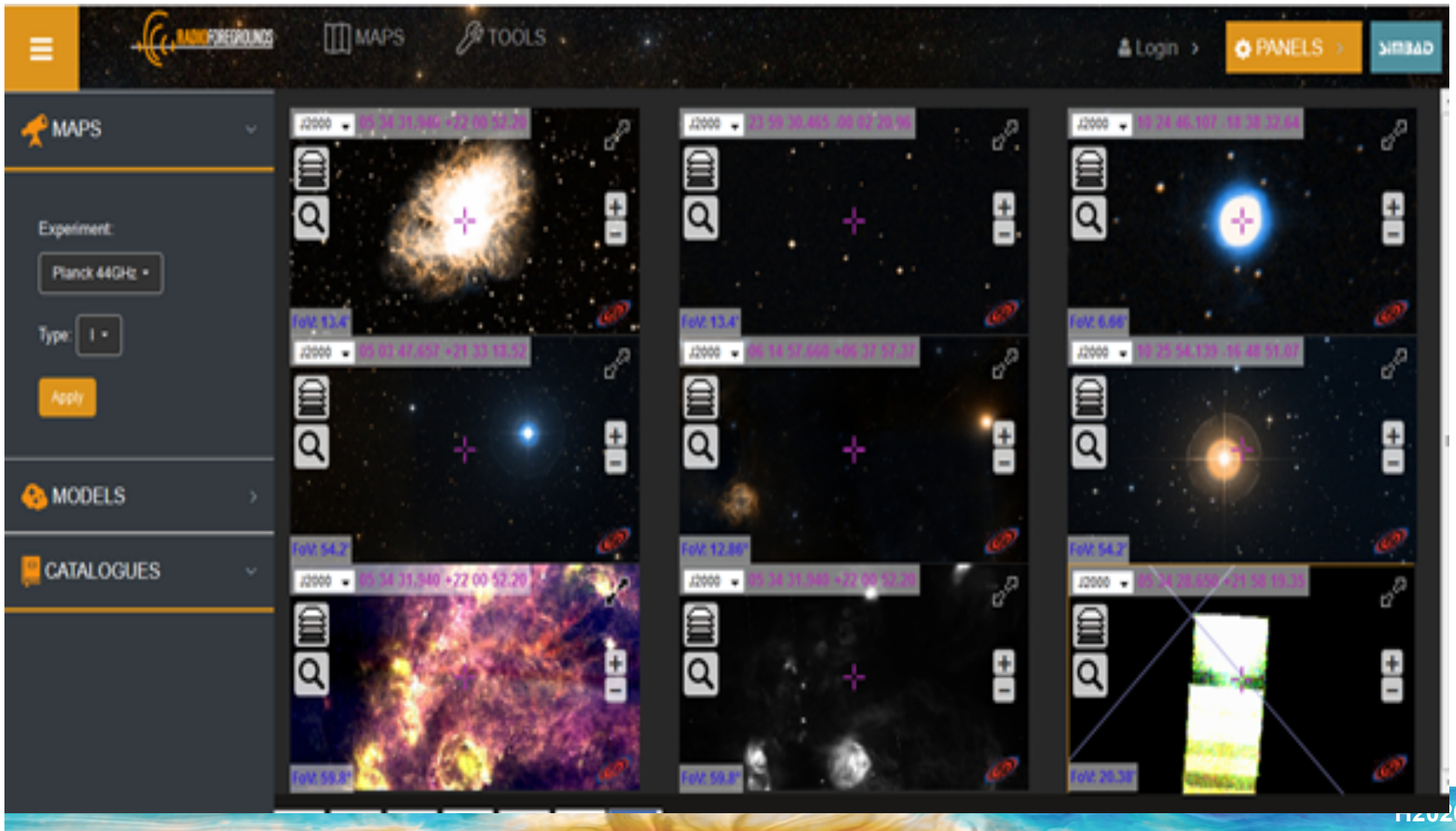
Right panel single map navigation



The screenshot displays the RADIOFOREGROUNDS web interface. The main view is a star field with a central bright star. A red dashed box highlights the right-hand side of the interface, which contains navigation controls for a single map. Below the main view, three zoomed-in panels are shown, each with its own control panel. The first panel is titled 'FoV: 7.37°' and shows a zoomed-in view of a region with a 'Base image layer' control panel. The second panel is titled 'FoV: 169.01A°' and shows a zoomed-in view of a region with a 'Go to: crab' search bar and a 'Base image layer' control panel. The third panel is titled 'FoV: 39.41A°' and shows a zoomed-in view of a region with a 'Base image layer' control panel. The control panels for the zoomed-in views include options for 'Color map' (e.g., eosb, rainbow), 'Overlay layers' (RETICLE, HEALPIX GRID), and 'Tools' (Export view as PNG).

What can you do with the RADIOFOREGROUNDS platform?

Multipannel (independent or synchronized) Navigation

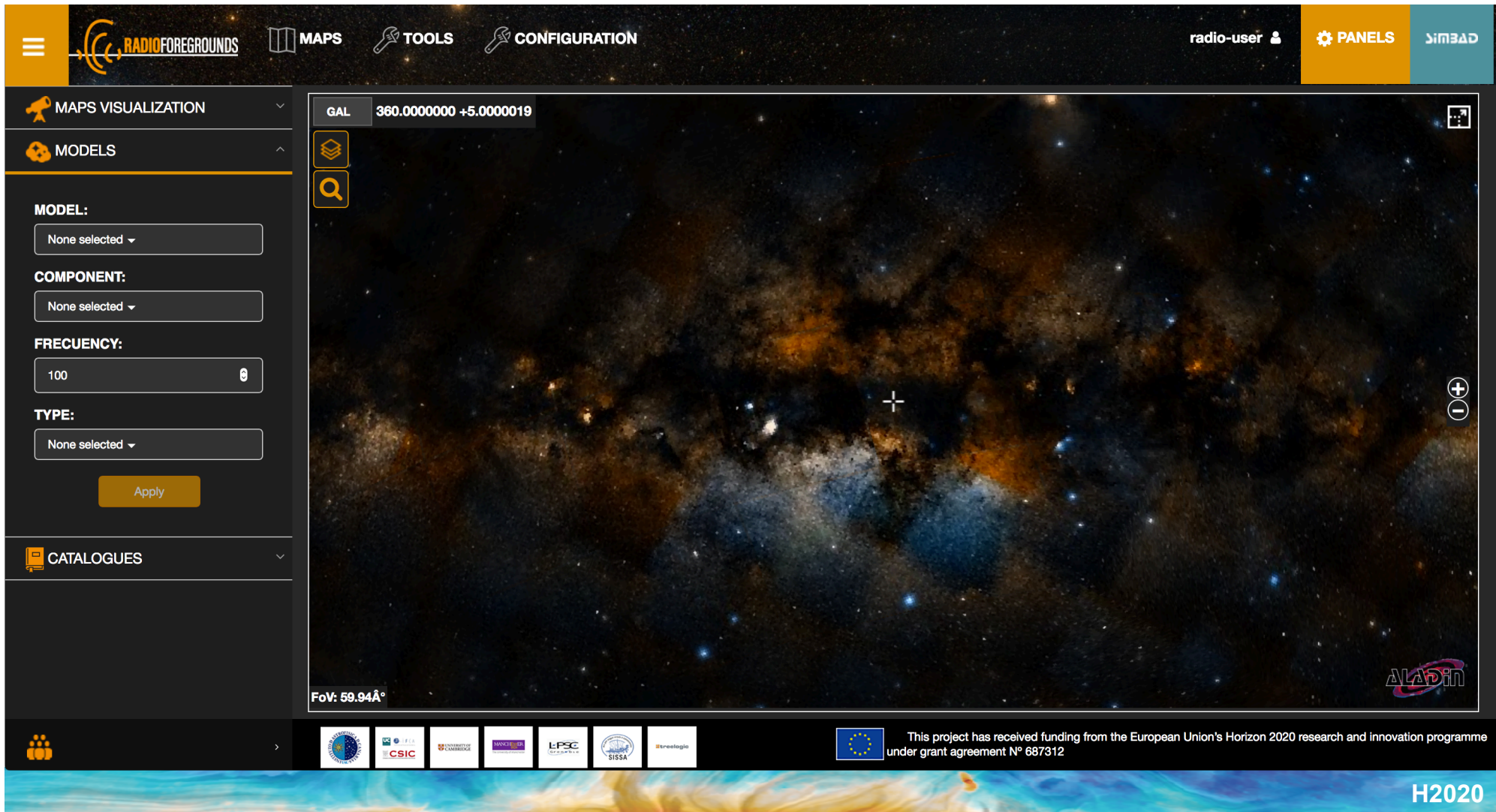


The screenshot displays the RADIOFOREGROUNDS web interface. On the left, a sidebar menu includes 'MAPS', 'MODELS', and 'CATALOGUES'. The 'MAPS' section is active, showing 'Experiment: Planck 44GHz' and 'Type: 1'. The main area is a 3x3 grid of panels. Each panel shows a different astronomical image with a central crosshair and various control icons (magnifying glass, zoom in/out, link). The panels display different frequency channels and fields of view (FoV). The bottom right panel is crossed out with a large 'X'.

Navigation controls include a hamburger menu, 'MAPS', 'TOOLS', 'Login', 'PANELS', and 'SIMBAD' buttons. The interface also shows a 'Type: 1' dropdown and an 'Apply' button.

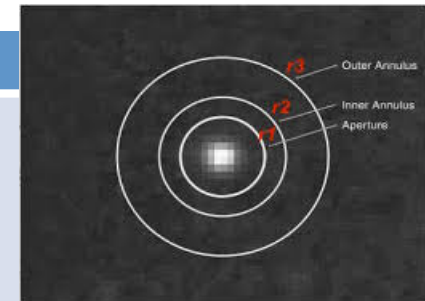
What can you do with the RADIOFOREGROUNDS platform?

Models: all parametric foreground models (synchrotron, dust, AME, free-free) studied in the project.



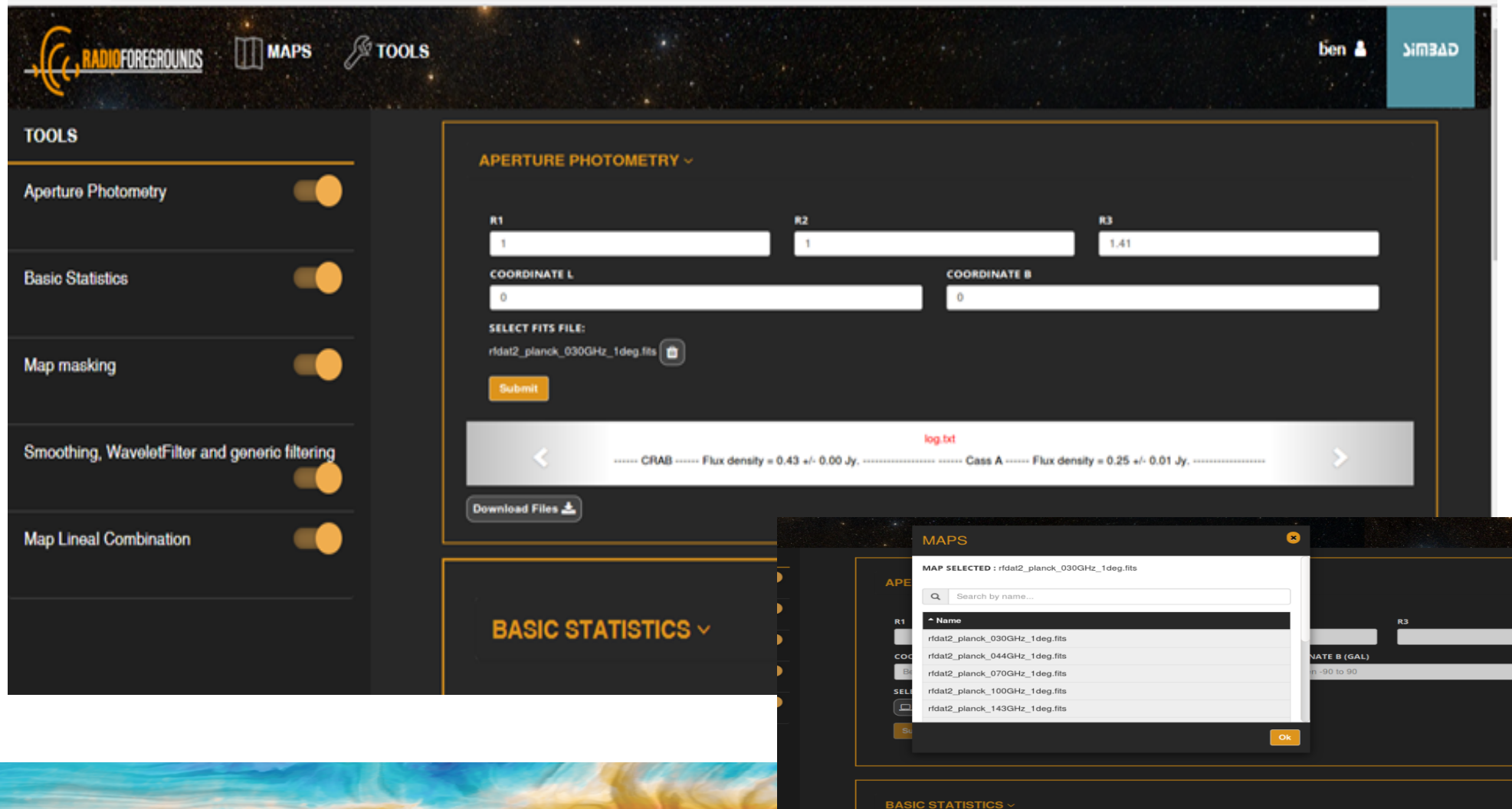
The screenshot displays the RADIOFOREGROUNDS web application interface. The top navigation bar includes a hamburger menu, the RADIOFOREGROUNDS logo, and tabs for MAPS, TOOLS, and CONFIGURATION. The user is logged in as 'radio-user'. On the right, there are buttons for PANELS and SIMBAD. The main content area is divided into a left sidebar and a central visualization panel. The sidebar contains sections for MAPS VISUALIZATION, MODELS, and CATALOGUES. Under the MODELS section, there are dropdown menus for MODEL (None selected), COMPONENT (None selected), and TYPE (None selected), along with a FREQUENCY input field set to 100 and an Apply button. The central panel shows a galactic map with a crosshair at GAL 360.000000 +5.000019. The field of view (FoV) is 59.94°. The bottom of the interface features a row of partner logos, including the European Commission, CSIC, University of Cambridge, MNCU, LPSC, SISA, and @realegio. A footer banner at the bottom right contains the H2020 logo and text stating: 'This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 687312'.

TOOL	DESCRIPTION
<p><u>AperturePhotometry</u> (<u>CRAB</u>)</p>	<p>Computes the flux around a given position, using the aperture photometry method.</p>
<p><u>Smoothing, WaveletFilter</u> <u>and generic filtering</u> (<u>window filter</u>)</p>	<p>Convolve any map in the database with a Gaussian beam specified by the user (by default=, or with a Mexican Hat Wavelet (MHW), or with any generic filter provided by the user</p>
<p><u>BasicStatistics</u> (<u>image statistics</u>)</p>	<p>Computes and returns the basic statistics (mean, standard deviation, skewness, kurtosis) for a given patch of a map, defined by the user.</p>
<p><u>Map Masking</u> (<u>image masking</u>)</p>	<p>Masks an input map, either by appending information on the pixels to be masked or by multiplying the input map by a numerical factor (1 or 0 for non-apodized masks, real numbers in the [0,1] interval for apodized masks</p>
<p>Lineal Combination of models</p>	<p>Multiple linear combinations of two HEALPIX maps, with different models of astrophysical components. The default is the sum of the two maps. The input: Maps to be combined and the coefficient for each map. The output: Combined map</p>



What can you do with the RADIOFOREGROUNDS platform?

Multiparameter analysis over CMB datasets, using our tools



The screenshot displays the RADIOFOREGROUNDS web interface. The top navigation bar includes the logo, 'MAPS', and 'TOOLS' menus, along with a user profile 'ben' and a 'SIMBAD' button. The left sidebar lists several tools: Aperture Photometry, Basic Statistics, Map masking, Smoothing, WaveletFilter and generic filtering, and Map Lineal Combination, each with a toggle switch. The main content area is titled 'APERTURE PHOTOMETRY' and contains input fields for R1 (1), R2 (1), R3 (1.41), COORDINATE L (0), and COORDINATE B (0). A 'SELECT FITS FILE:' section shows a file named 'rdat2_planck_030GHz_1deg.fits' with a file icon. A 'Submit' button is located below the file selection. A results banner displays 'log.txt' and two entries: '----- CRAB ----- Flux density = 0.43 +/- 0.00 Jy.' and '----- Cass A ----- Flux density = 0.25 +/- 0.01 Jy.'. A 'Download Files' button is at the bottom left of the results area. A 'BASIC STATISTICS' modal window is overlaid on the bottom right, showing a search bar and a list of files under the heading 'MAP SELECTED : rdat2_planck_030GHz_1deg.fits'. The list includes: 'rdat2_planck_030GHz_1deg.fits', 'rdat2_planck_044GHz_1deg.fits', 'rdat2_planck_070GHz_1deg.fits', 'rdat2_planck_100GHz_1deg.fits', and 'rdat2_planck_143GHz_1deg.fits'. An 'Ok' button is at the bottom right of the modal.


What can you do with the RADIOFOREGROUNDS platform?

Multiparameter analysis over CMB datasets, using our tools


APERTURE PHOTOMETRY

R1: R2: R3:

COORDINATE L (GAL): COORDINATE B (GAL):

SELECT FITS FILE:
rdat2_planck_044GHz_1deg.fits 

----- CRAB ----- Flux density = 0.16 +/- 0.00 Jy, ----- Cass A ----- Flux density = 0.08 +/- 0.00 Jy, -----

[Download Files](#) 

HEALPIX PIXEL

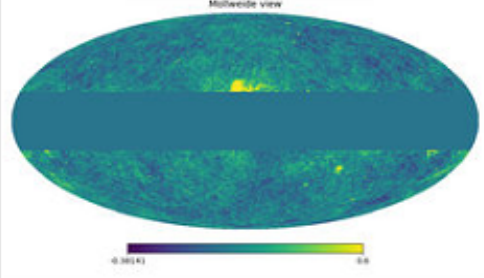
HEALPIX INFO

Name	Size	Type
average band coverage of the Planck satellites	100.0000000	coverage

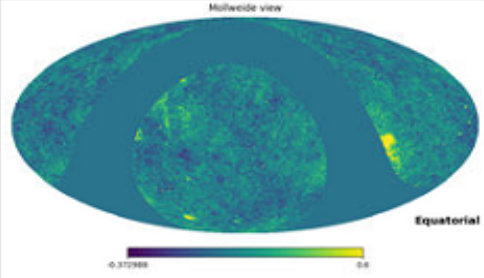
HEALPIX INFO

Name	Size	Type
average temperature analysis mask of the Planck satellites	26.1000000	mask

Mollweide view

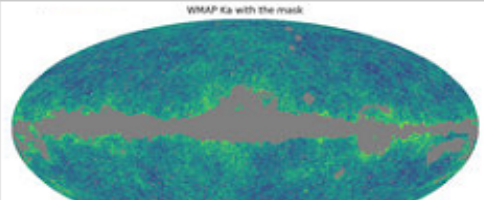



Mollweide view



Equatorial

WMAP Ka with the mask





- * Tool to be publicly released by the end of the year.
- * Will contain 1-deg smoothed maps for QUIJOTE and others experiments. Catalogues of radiosources.
- * Linked to the main web page of the project:
www.radioforegrounds.eu

THANK YOU!