



Astro-COLIBRI

COincidence **LIB**rary for **R**real-time **I**nquiry for multi-messenger astrophysics

Fabian Schüssler (IRFU, CEA Paris-Saclay)
on behalf of the Astro-COLIBRI team

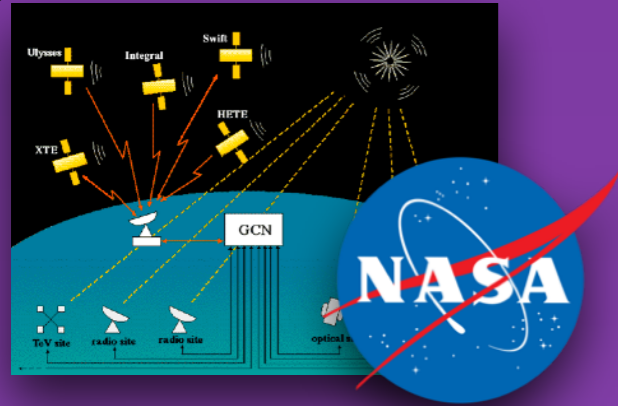




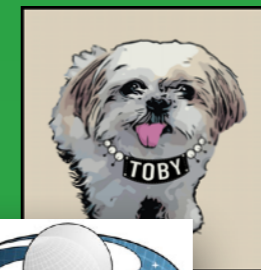
Introduction

- Increasing number of multi-messenger transients + a large variety sources of information (alerts, catalogs, monitoring, etc.)
- Astro-COLIBRI: automatic pipeline providing easy access to
 - main (high-energy) transient (GRBs, FRBs, TDEs, high-energy neutrinos, GWs, etc.)
 - a central API with publicly available endpoints for cone searches, etc.
 - interfaces: <https://astro-colibri.com> + Android + iOS
- Version 1.0 released in August (~300 users at the moment)
- Paper published: P. Reichherzer et al., 2021 ApJS 256 5 ([link](#))

Main idea



...



...



monitoring satellites and observatories

Fermi Swift INTEGRAL Svom IceCube Ligo & Virgo HAWC

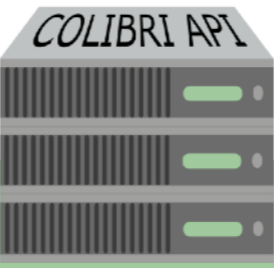
alert

TNS GCN fourπ sky AMON

- creator
- streams
- broker



Astro-COLIBRI pipeline

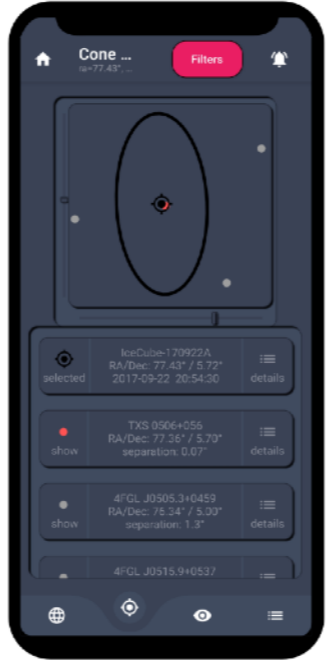


real-time db & APIs

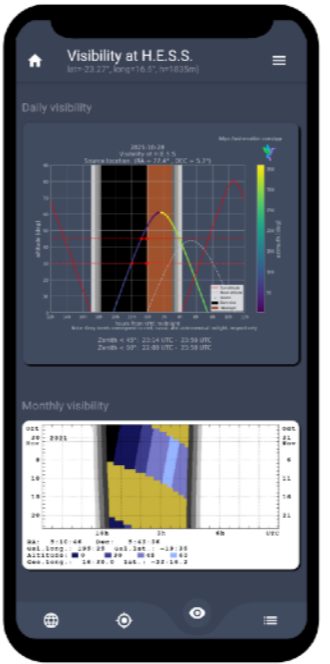
push alerts



cone search



visibility



event info

Selected: IceCube-170922A

RA/Dec: 77.43° / 5.72°

Pastor: 0.57 E: 119.98 TeV

Links to other websites and services: ALADIN, ESA, Fink, SSCD, TOB, FAVA, GCNe, GCNo

multimessenger alert pipeline

Live demo





Astro-COLIBRI

Contact/feedback: astro.colibri@gmail.com

- Web interface: <https://astro-colibri.com>
- API (incl. documentation): <https://astro-colibri.herokuapp.com>

Android Play Store



Apple iOS App Store



Introductions/tutorials on YouTube



Twitter: [@AstroColibri](https://twitter.com/AstroColibri)



Web interface

Astro-Colibri

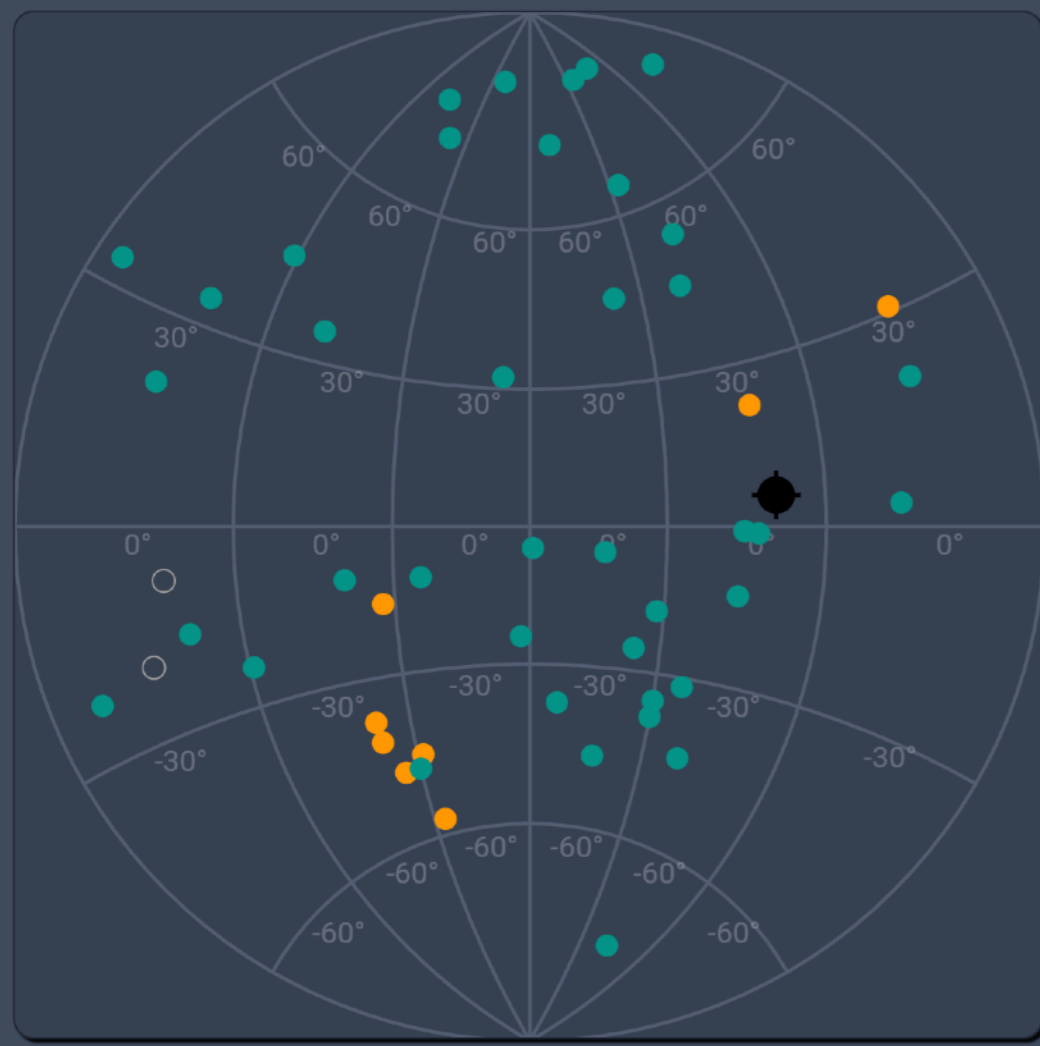
select action **Latest transients** Cone search

personalize

status: **Version 1.0**

Filters From 2017-09-01 to 2017-09-30 ● Swift ● Fermi ● HAWC ● IceCube ● AMON ● Integral ● other

Type of events : FRB TDE GRB burst nuem neutrino



IceCube-170922A
 RA/Dec: 77.43° / 5.72°
 error: 0.8°
 2017-09-22 20:54:30

RA/Dec: 28.01° / 21.02°
 error: 3.94°
 2017-09-29 18:46:16

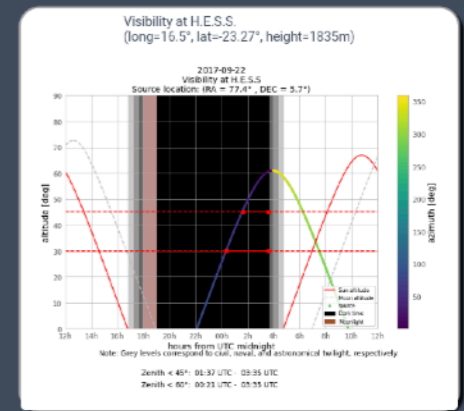
RA/Dec: 192.88° / 32.30°
 error: 2.59°
 2017-09-29 14:18:59

RA/Dec: 277.58° / 35.65°
 error: 10.61°
 2017-09-29 14:08:04

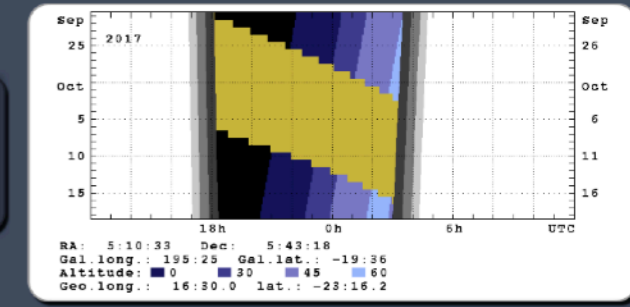
RA/Dec: 102.63° / -44.52°
 error: 5.883°
 2017-09-29 02:15:30

RA/Dec: 82.40° / 80.60°
 error: 15.16°

Detailed info about selected source:
 VoEvent : [Click here](#)
 name: **IceCube-170922A**
 RA / Dec: 5h9m43.2s / 5d43m12s
 observatory: **IceCube**
 P_astro: 0.57 E: 119.98 TeV
 Links : [ALADIN](#) [ESA](#) [SSDC](#) [TOBY](#) [FAVA](#) [GCN-n](#) [GCN-c](#)



Detailed monthly visibility at H.E.S.S.





Latest transients

Astro-Colibri

select action

Latest transients

Cone search

personalize

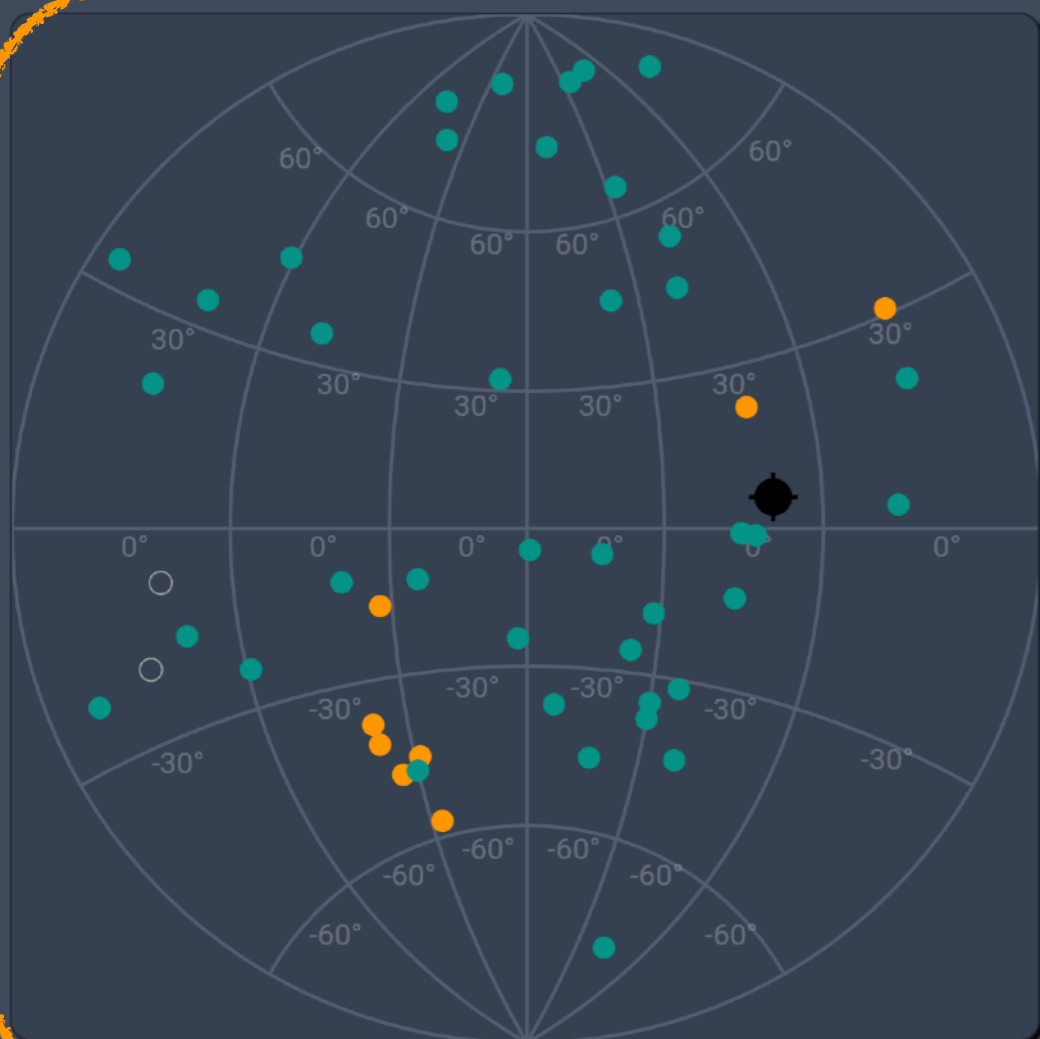


status: Version 1.0



Filters From 2017-09-01 to 2017-09-30 ● Swift ● Fermi ● HAWC ● IceCube ● AMON ● Integral ● other

Type of events : ○ FRB ■ TDE ● GRB □ burst ★ nuem ● neutrino



selected

IceCube-170922A
RA/Dec: 77.43° / 5.72°
error: 0.8°
2017-09-22 20:54:30



cone search



show

RA/Dec: 28.01° / 21.02°
error: 3.94°
2017-09-29 18:46:16



cone search



show

RA/Dec: 192.88° / 32.30°
error: 2.59°
2017-09-29 14:18:59



cone search



show

RA/Dec: 277.58° / 35.65°
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cone search



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RA/Dec: 102.63° / -44.52°
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cone search



show

RA/Dec: 82.40° / 80.60°
error: 15.16°



cone search

Detailed info about selected source:

VoEvent : [Click here](#)

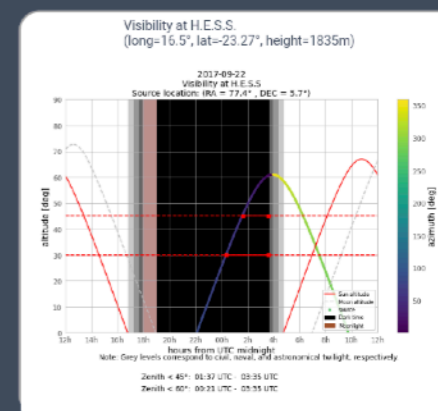
name: IceCube-170922A

RA / Dec: 5h9m43.2s / 5d43m12s

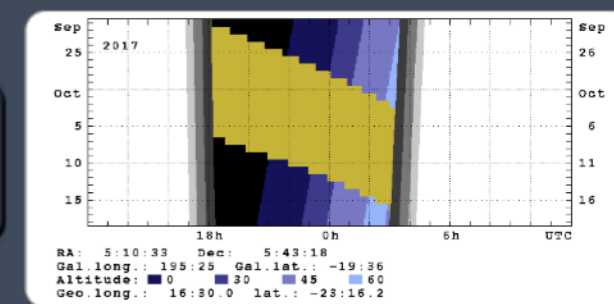
observatory: IceCube

P_astro: 0.57 E: 119.98 TeV

Links : [ALADIN](#) [ESA](#) [SSDC](#) [TOBY](#) [FAVA](#) [GCN-n](#) [GCN-c](#)



Detailed monthly visibility at H.E.S.S.





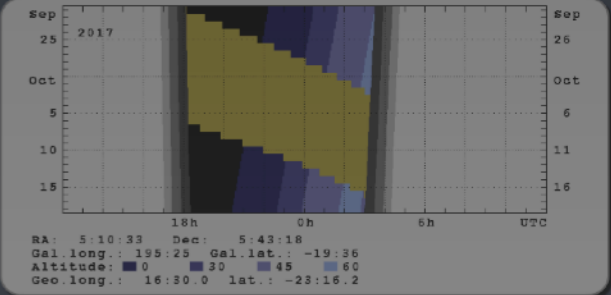
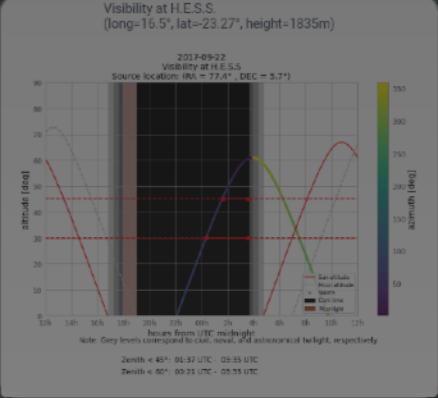
Additional information

The screenshot displays the Astro-Colibri web interface. At the top, there are navigation buttons: "select action", "Latest transients", "Cone search", "personalize", and "status: Version 1.0". Below these are filter buttons for "FRB", "TDE", "GRB", "burst", "nuem", and "neutrino". The main area features a central star map with green arrows pointing to various partner logos: SIMBAD, NED, TNS, GCN, Swift, GraceDB, fourπ sky, ALADIN, esa, Fermi, SSCDC, and TOBY. A detailed info panel on the right provides data for a selected source: "IceCube-170922A" with RA/Dec: 5h9m43.2s / 5d43m12s, observatory: IceCube, P_astro: 0.57, and E: 119.98 TeV. It also lists links for ALADIN, ESA, SSCDC, TOBY, FAVA, GCN-n, and GCN-c. Below this is a "Detailed monthly visibility at H.E.S.S." panel with a graph showing visibility over time.

Detailed info about selected source:

VoEvent : [Click here](#)
name: IceCube-170922A
RA / Dec: 5h9m43.2s / 5d43m12s
observatory: IceCube
P_astro: 0.57 E: 119.98 TeV

Links : [ALADIN](#) [ESA](#) [SSDC](#) [TOBY](#) [FAVA](#) [GCN-n](#) [GCN-c](#)





Customization

The screenshot shows the Astro-Colibri website interface. At the top, there are navigation buttons: "select action", "Latest transients", "Cone search", "personalize" (circled in orange), and "status: Version 1.0". Below these are filters for "IceCube", "AMON", "Integral", and "other", and a "Type of events" section with checkboxes for "FRB", "TDE", "GRB", "burst", "nuem", and "neutrino".

On the left, a "Your Astro-COLIBRI account" modal is open, containing three sections: "login with your account" (with e-mail and password fields and a "login" button), "Reset password for" (with e-mail field and a "reset password" button), and "register a new user account" (with e-mail and password fields and a "register" button). A "close" button is at the bottom right of the modal.

In the center, a source entry for "IceCube-170922A" is shown with RA/Dec: 77.43° / 5.72°, error: 0.8°, and date: 2017-09-22 20:54:30. To its right, a "Detailed info about selected source" panel is visible, with a "Click here" link for "VoEvent".

At the bottom, a "Detailed monthly visibility at H.E.S.S." panel shows a bar chart of visibility over time. Below the chart, coordinates are listed: RA: 5:10:33, Dec: 5:43:18, Gal. long.: 195:25, Gal. lat.: -19:36, Altitude: 0, 30, 45, 60, Geo. long.: 16:30.0, lat.: -23:16.2.

Annotations include a purple arrow pointing from the "personalize" button to the account modal, and another purple arrow pointing from the "personalize" button to the "Information/documentation/etc." text. The "Information/documentation/etc." text is written in orange.

Information/documentation/etc.

After account activation:
request access to private information

<https://astro-colibri.com>



Filtering

Astro-Colibri select action Latest transients Cone search personalize 👤 📍 📄 🔔 status: Version 1.0 ✓

Filters From 2017-09-01 to 2017-09-30 ● Swift ● Fermi ● HAWC ● IceCube ● AMON ● Integral ● other Type of events : FRB TDE GRB burst nuem neutrino

Update your filters

since: 2017-09-01

until: 2017-09-30

Wavelength :

Radio Optical X-rays Gamma rays Multi Messenger

Type of events :

FRB TDE GRBs burst nuem neutrino gw

< Observatories : >

other Integral Swift Fermi HAWC AMON IceCube SVOM

IceCube-170922A
RA/Dec: 77.43° / 5.72°

Detailed info about selected source:

3m12s

3 TeV

TOBY FAVA GCN-n GCN-c

Visibility at H.E.S.S.
(long=16.5°, lat=-23.27°, height=1835m)

2017-09-22
Visibility at H.E.S.S.
(SOURCE location: (RA = 77.43°, DEC = 5.71°))

2017

RA/Dec: 82.40° / 80.60°
error: 15.16°

Gal. long.: 195.25 Gal. lat.: -19.36
Altitude: 0 30 45 60
Geo. long.: 16:30.0 lat.: -23:16.2



Cone searches

Astro-Colibri

select action

Latest transients

Cone search

personalize

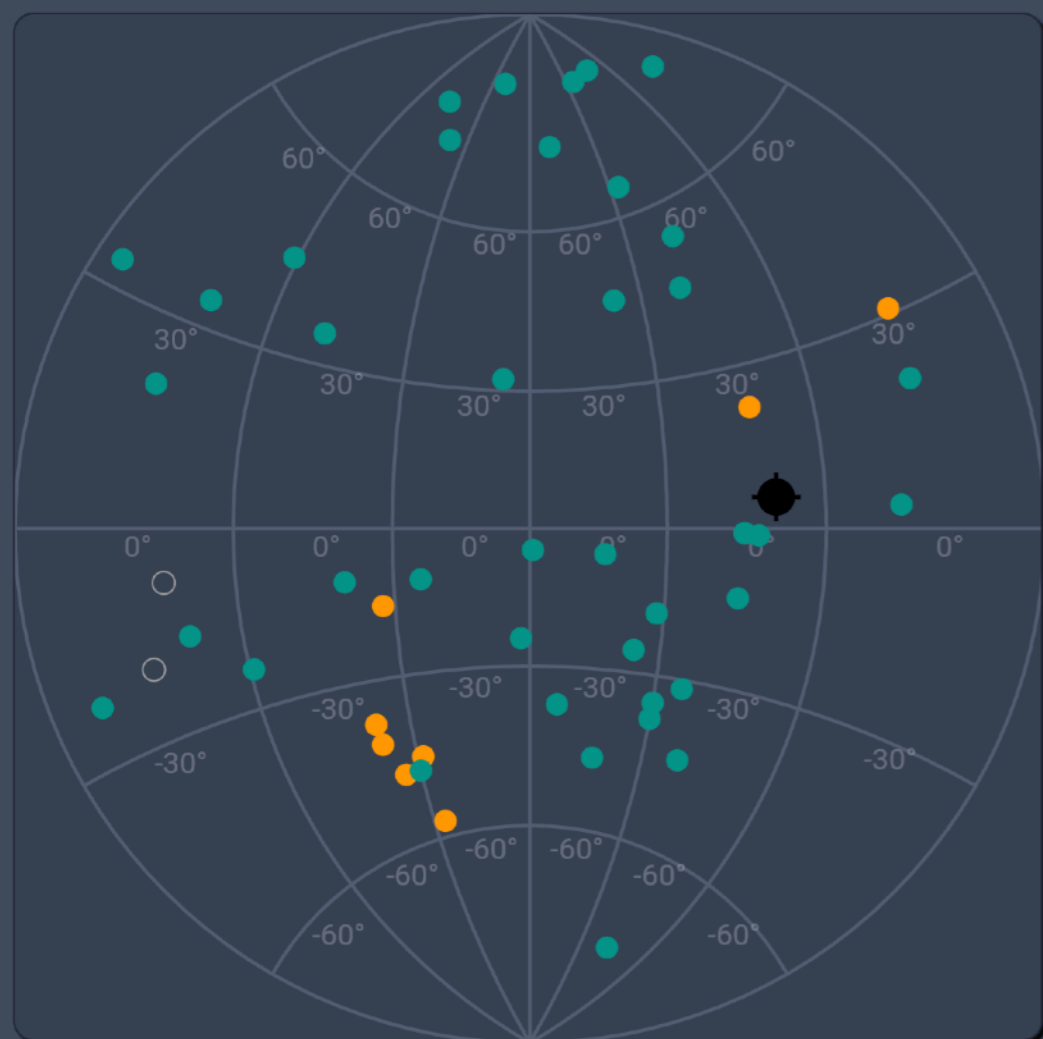


status: Version 1.0



Filters From 2017-09-01 to 2017-09-30 ● Swift ● Fermi ● HAWC ● IceCube ● AMON ● Integral ● other

Type of events : ○ FRB ■ TDE ● GRB □ burst ★ nuem ● neutrino



selected

IceCube-170922A
RA/Dec: 77.43° / 5.72°
error: 0.8°
2017-09-22 20:54:30



cone search

show

RA/Dec: 28.01° / 21.02°
error: 3.94°
2017-09-29 18:46:16



cone search

show

RA/Dec: 192.88° / 32.30°
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cone search

show

RA/Dec: 277.58° / 35.65°
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cone search

show

RA/Dec: 102.63° / -44.52°
error: 5.883°
2017-09-29 02:15:30



cone search

show

RA/Dec: 82.40° / 80.60°
error: 15.16°



cone search

Detailed info about selected source:

VoEvent : [Click here](#)

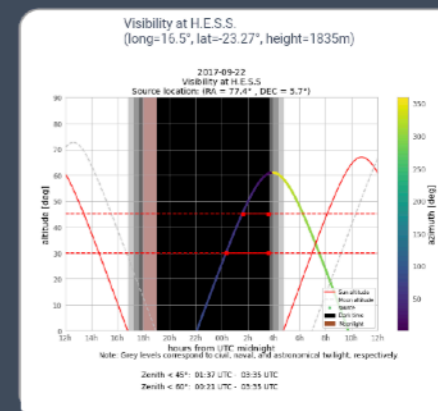
name: IceCube-170922A

RA / Dec: 5h9m43.2s / 5d43m12s

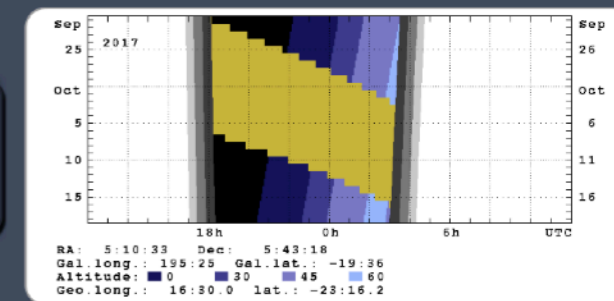
observatory: IceCube

P_astro: 0.57 E: 119.98 TeV

Links : [ALADIN](#) [ESA](#) [SSDC](#) [TOBY](#) [FAVA](#) [GCN-n](#) [GCN-c](#)



Detailed monthly visibility at H.E.S.S.





Cone searches

select action

Latest transients

Cone search

personalize

status: **Version 1.0**

Filters From 2017-09-01 to 2017-09-30

Swift
 Fermi
 HAWC
 IceCube
 AMON
 Integral
 other

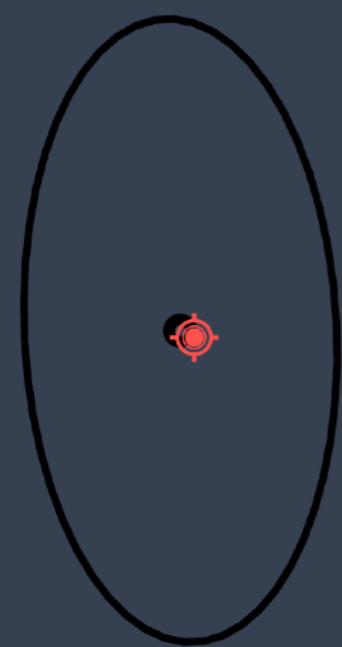
Type of events : FRB TDE GRB burst nuem neutrino

Cone search

RA / Dec: **77.43°** / **5.72°**

source: **IceCube-170922A**

radius: < < **0.8°** > >



	IceCube-170922A RA/Dec: 77.43° / 5.72° error: 0.8° 2017-09-22 22:54:30	
	TXS 0506+056 RA/Dec: 77.36° / 5.70° separation: 0.07°	
	4FGL J0505.3+0459 RA/Dec: 76.34° / 5.00° separation: 1.3°	
	4FGL J0515.9+0537 RA/Dec: 78.99° / 5.62° separation: 1.55°	
	4FGL J0505.6+0415 RA/Dec: 76.40° / 4.27° separation: 1.78°	
	4FGL J0502.4+0609 RA/Dec: 75.62° / 6.16° separation: 1.86°	

Detailed info about selected source:

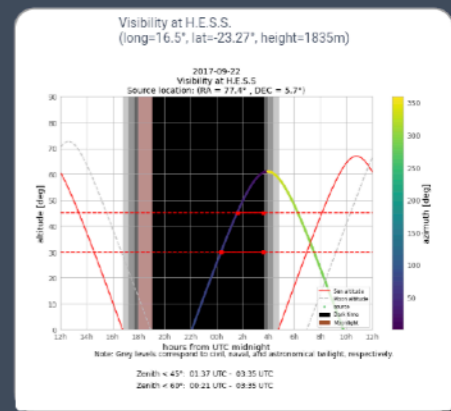
name: **TXS 0506+056**

name FGL: **3FGLJ0509.4+0541**

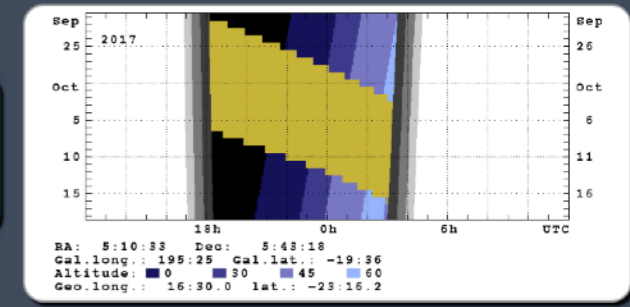
RA / Dec: **5h9m26.16s / 5d42m3.6s**

assoc: **4FGL J0509.4+0542**

Links : [SIMBAD](#) [NED](#) [ALADIN](#) [ESA](#) [SSDC](#) [TOBY](#) [FAVA](#) [TevCat](#)



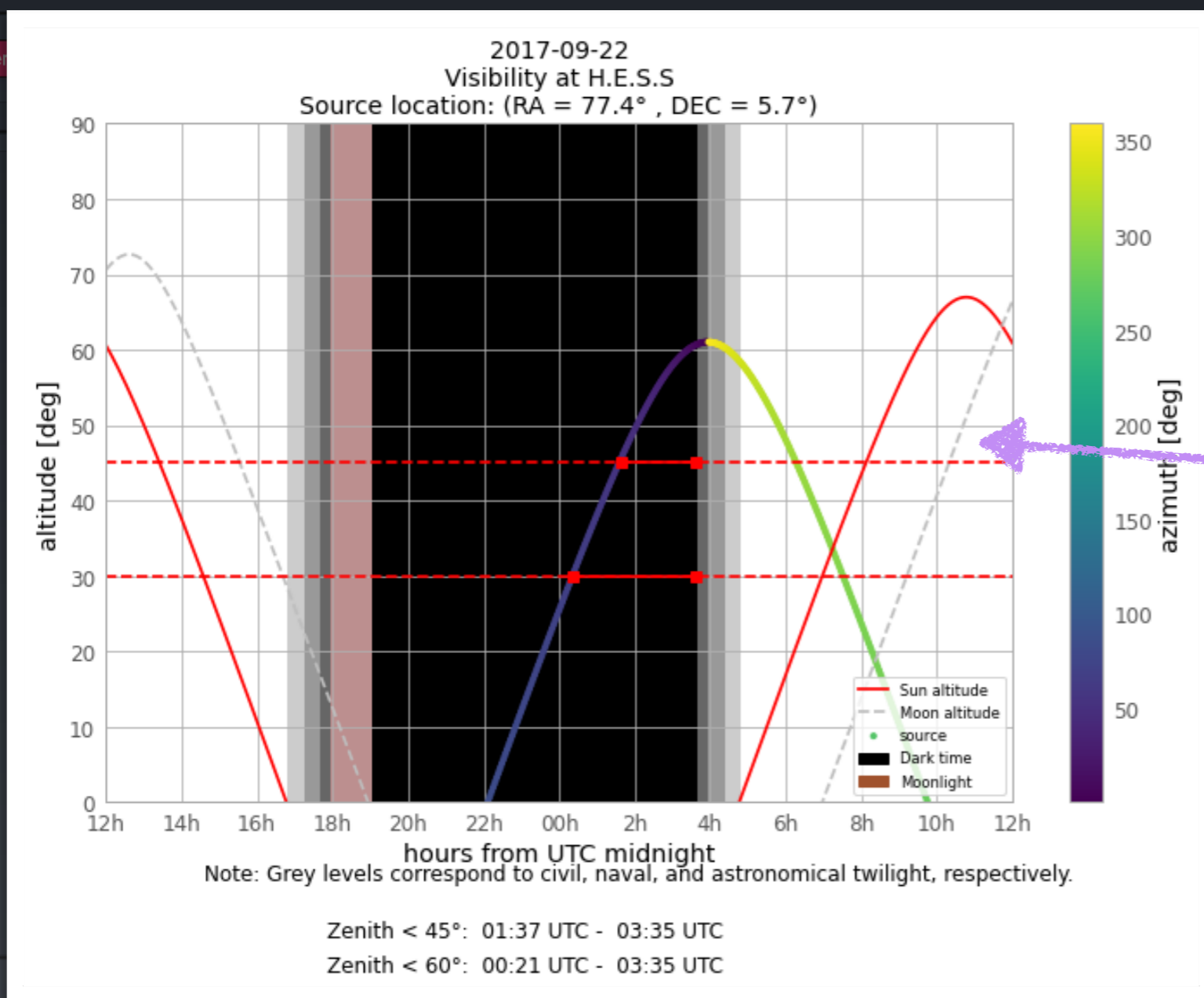
Detailed monthly visibility at H.E.S.S.





Visibility

Astro-Colibri interface navigation bar with buttons: select action, Latest transients, Cone search, personalize, location pin (highlighted), info, notifications, status: Version 1.0



Detailed info about selected source:
name: TXS 0506+056
name: 3FGLJ0509.4+0541
RA / Dec: 5h9m26.16s / 5d42m3.6s
assoc: 4FGLJ0509.4+0542

Links: SIMBAD, NED, ALADIN, ESA, SSCD, TOBY, FAVA, TevCat

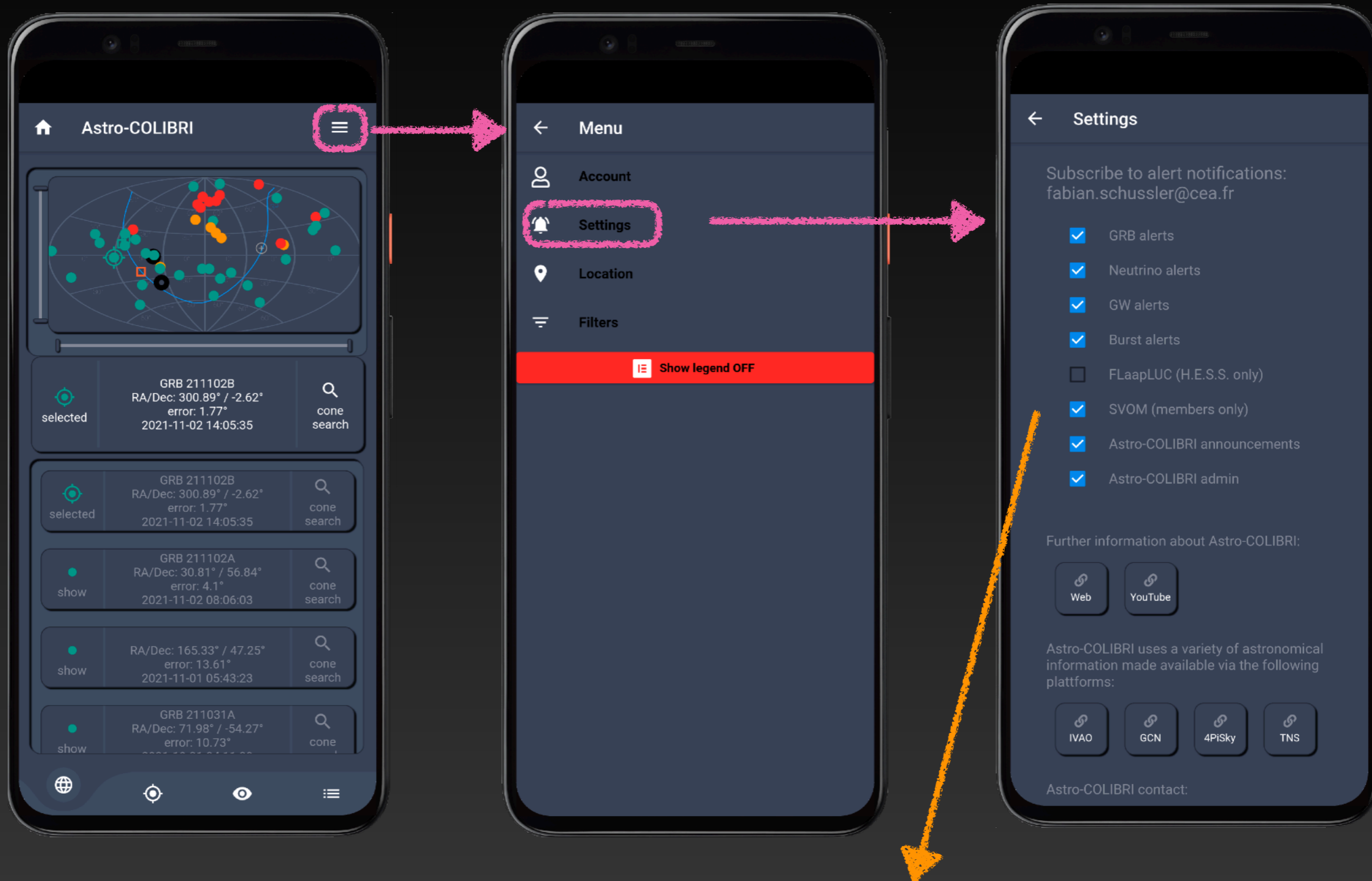
Visibility at H.E.S.S. (long=16.5°, lat=-23.27°, height=1835m)

Detailed monthly visibility at H.E.S.S.

RA: 5:10:38 Dec: 5:43:18
Gal.long.: 195:25 Gal.lat.: -19:36
Altitude: 0 30 45 60
Geo.long.: 16:30.0 lat.: -23:16.2



Android + iOS



Alert notifications in real-time



Astro-COLIBRI

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- API (incl. documentation): <https://astro-colibri.herokuapp.com>

Android Play Store



Apple iOS App Store



Introductions/tutorials on YouTube



Twitter: [@AstroColibri](https://twitter.com/AstroColibri)