	Submitting SC2 Sequence Data to GISAID using Theiagen's Terra 2 GISAID Workflow	
	Document TG-GISAID-01, Version 2	
	Date:	Workflow Versions:
	4/3/2024	PHB v2

1. PURPOSE/SCOPE

To automate the process of uploading SARS-CoV-2 assembly data to GISAID from within the Terra platform using Theiagen's Terra_2_GISAID_PHB workflow. Acceptable data types include FASTA files prepared using the Mercury Prep and Batch workflow.

2. REQUIRED RESOURCES

- Computer
- Internet connection: at least 10 and 5Mbps for download and upload speeds, respectively
- Internet browser
  - Google Chrome, Firefox, or Edge
- Google account
- Terra account, linked to Google account
- FASTA files in Terra workspace
- Terra_2_GISAID_PHB workflow in Terra, see TG-TER-03 appendix 9.2

PRIOR STEPS ARE REQUIRED!
- Request client ID from GISAID at clisupport@gisaid.org
- Contact Theiagen to link GISAID user credentials to the Terra workflow at support@theiagen.com
- FASTA output files in Terra workspace
- Mercury Prep N Batch workflow run on FASTA files to be uploaded

3. RELATED DOCUMENTS

Document Number	Document Name
TG-TER-03	Uploading Local or SRA NGS Data & Creating a Results Metadata Table in Terra

4. PROCEDURE

4.1 RUNNING THE TERRA_2_GISAID WORKFLOW

1. In Terra, navigate to the *workflows* tab within the workspace containing SC2 data
2. Select the *Terra_2_GISAID_PHB* workflow (Fig 1)
3. Run *the latest version of v2* of the workflow (Fig 2, a) or the version used for internal validation
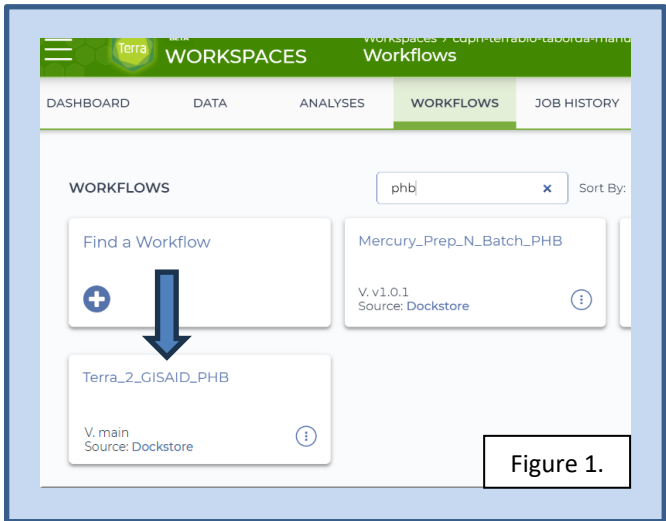4. Select the second bullet to *run workflow(s) with inputs defined by data table* (Fig 2, b)

Figure 1.

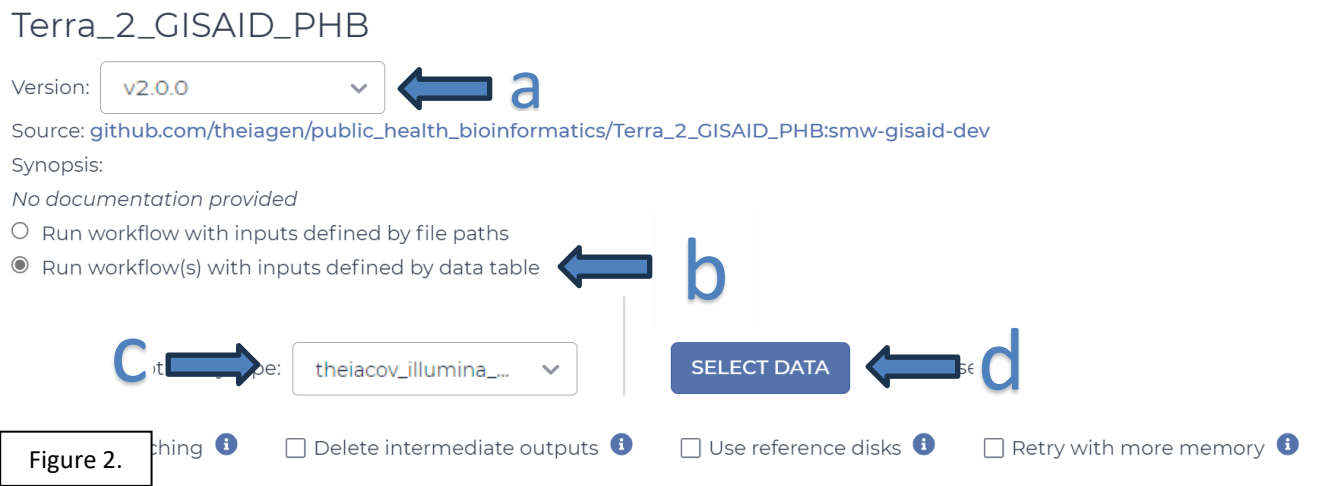5. Select the relevant *set-level data table* under the select *root entity type* dropdown (Fig 2, c)

Figure 2.

6. Click *select data* (Fig 2, d)

7. In the pop-up window, select the *second bullet* to process an existing set of samples (Fig 3)
   a. **NOTE**: the Mercury Prep and Batch workflow must be run prior to submitting to GISAID
   b. *Select the checkbox* to select the sample set to submit to GISAID (Fig 3)
   c. Scroll to the bottom and click *ok*

Figure 3.

8. In the *inputs tab*, set the first three attributes in the table to the following, respectively (Fig 4):
   a. The *client_id* will have to be requested from clisupport@gisaid.org
   b. *this.gisaid_fasta*
   c. *this.gisaid_metadata*
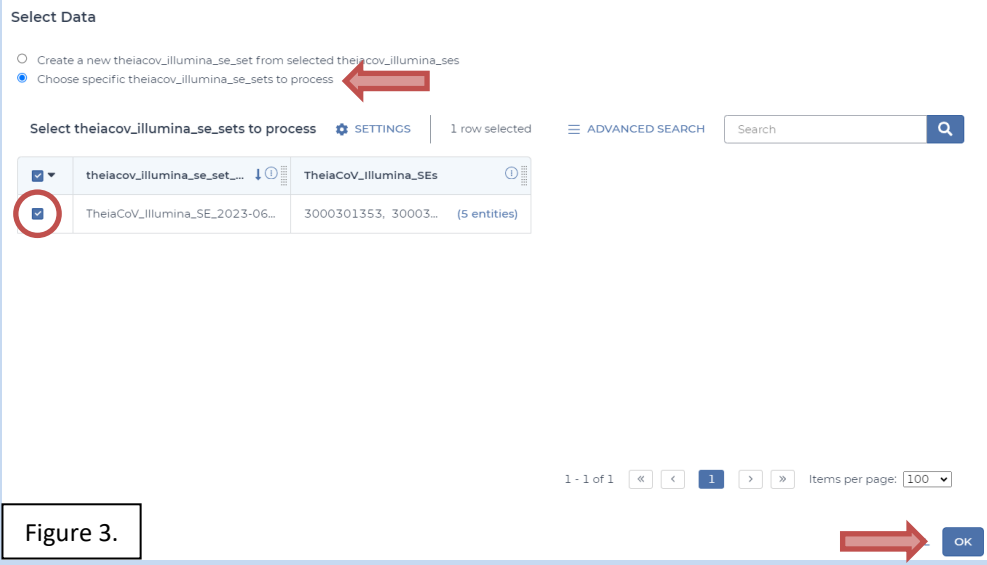
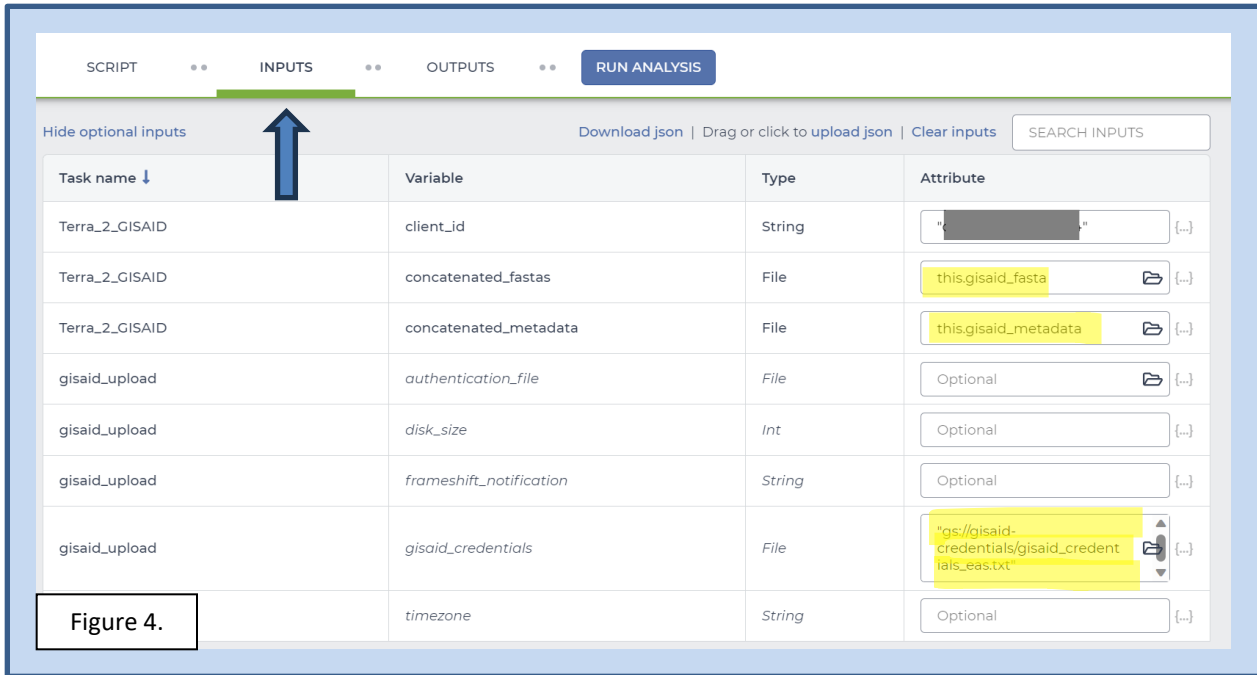9. For initial submissions, *contact support@theiagen.com* to set up user credentials for GISAID

Figure 4.

10. Set up GISAID credentials in Terra
    a. In a new notepad file, type the user's *gisaidusername*, hit *tab*, and type the user *password*; save as a *normal text file (*.txt)* titled *gisaid_credentials_[userinitials]* (Fig 5)
        i. Using the numbers in the left sidebar, ensure the file only contains one line; remove extra lines (Fig 5, red circle)
    b. To upload this file to Terra without security permissions, see appendix 10.1
        i. *Paste* the file link into the gisaid_credentials attribute field
    c. To secure credential files for viewing only permissible by the credentialed user, see appendix 10.2

11. Specify outputs by clicking on the *outputs* tab and *use defaults* (Fig 6)

12. Click *save*

13. Launch the workflow by clicking *run analysis*; enter desired comments and click *launch*

Figure 5.
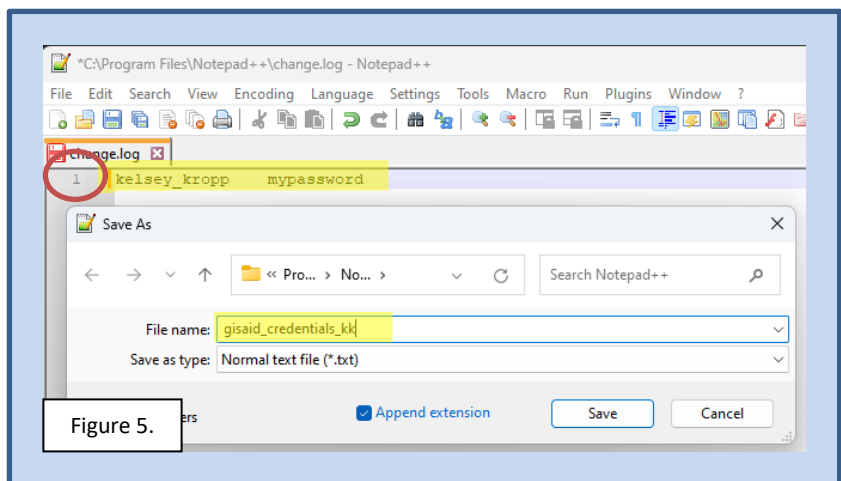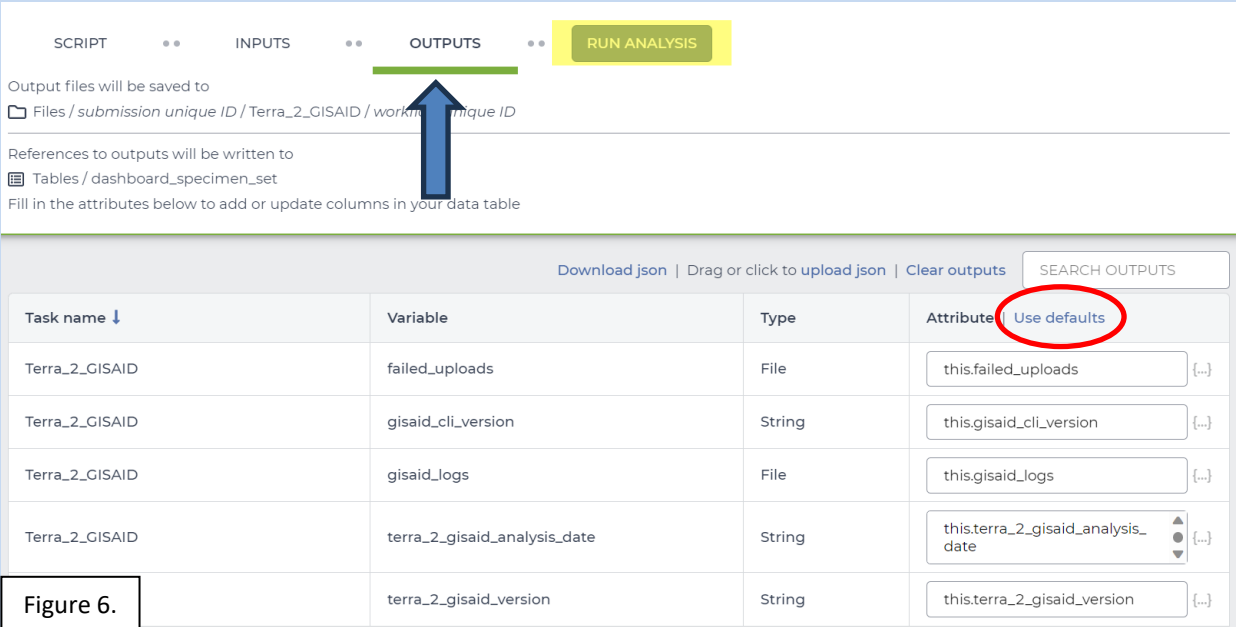
Figure 6.

4.2 VERIFY SUBMISSIONS WERE SUCCESSFUL

1. Navigate to the job history tab within the Terra workspace; successful and failed job submissions will be highlighted green and red, respectively, while jobs in progress are represented in blue
2. Sample submission can also be checked by logging into the user's GISAID account and viewing the submission history

5. QUALITY RECORDS
- Sample FASTA files
- Sample metadata files

6. TROUBLESHOOTING
- Consult with internal staff familiar with this procedure or contact support@theiagen.com for troubleshooting inquiries
- For document edit requests, contact support@theiagen.com

7. LIMITATIONS
- Users must have a valid GISAID client ID with credentials linked in Terra workspace
- Terra_2_GISAID workflow requires pre-processing of samples using Mercury_Prep_N_Batch workflow

8. REFERENCES

None

9. REVISION HISTORY

Revision	Version	Release Date
Document creation	1	10/2023
Updated some figures; clarification as SET-level workflow; updated appendix 10.3	2	4/2024

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10. APPENDICES

10.1 UPLOADING LOCAL FILES TO TERRA

1. Navigate to the *Terra workspace* where analyses are run
2. Open the *Files* tab in the bottom left of the workspace (Fig 7)
   a. Click *upload*
   b. Once the upload is complete, *right click* on the file name and click *copy link*
3. Proceed with

Figure 7.

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10.2 SECURELY UPLOAD CREDENTIAL FILES TO GOOGLE CLOUD BUCKET

1. Sign in to Google and navigate to the desired *Google cloud storage bucket* (www.console.cloud.google.com)
2. Click *upload files* (Fig 8), *select the relevant file*, and click *open* (Fig 9)
3. *Open the file* in the cloud by clicking on the file name (Fig 8) and click *edit access* (Fig 10)

Figure 8.
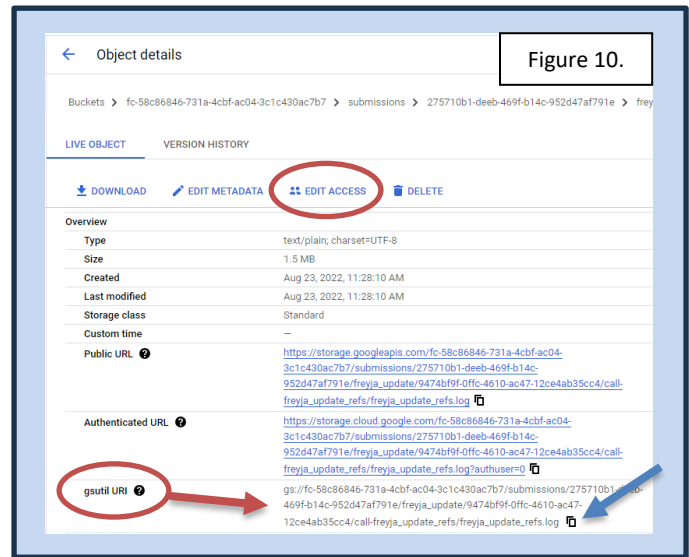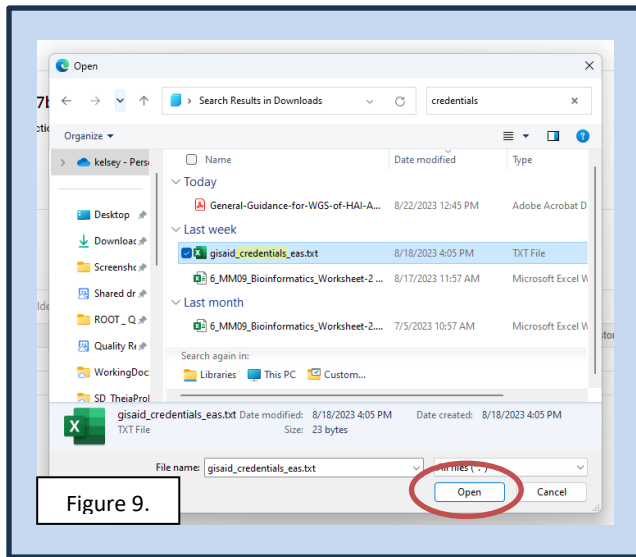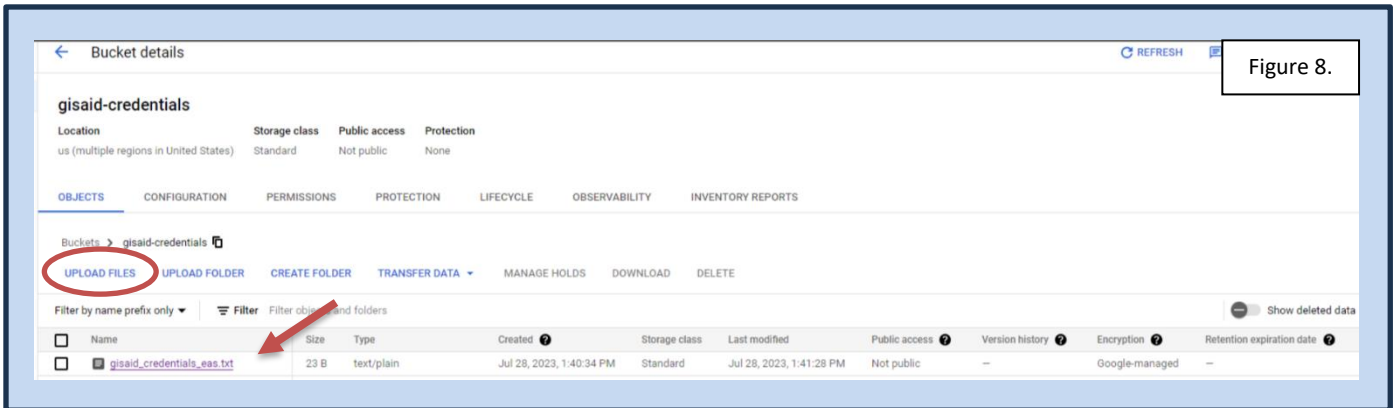
Figure 9.

Figure 10.

4. *Edit access permissions*, as desired (Fig 11)
   a. For credentialed user access only:
      i. If permissions are set for owners, editors, and viewers (Entities 1-3) as in Figure 11, delete them
      ii. *Click add entry* and create similarly to Entity 4 in Figure 11
         1. *Name 4* will be the credentialed user's email
      iii. Click *add entry* to add the Terra account

1. Set the new entity to *user*
2. In Terra, select the hamburger icon and click *profile* under the user name (Fig 12)
3. *Copy* the proxy group string (Fig 13)
4. *Paste* the proxy group string to the new name # within the Google file permissions window
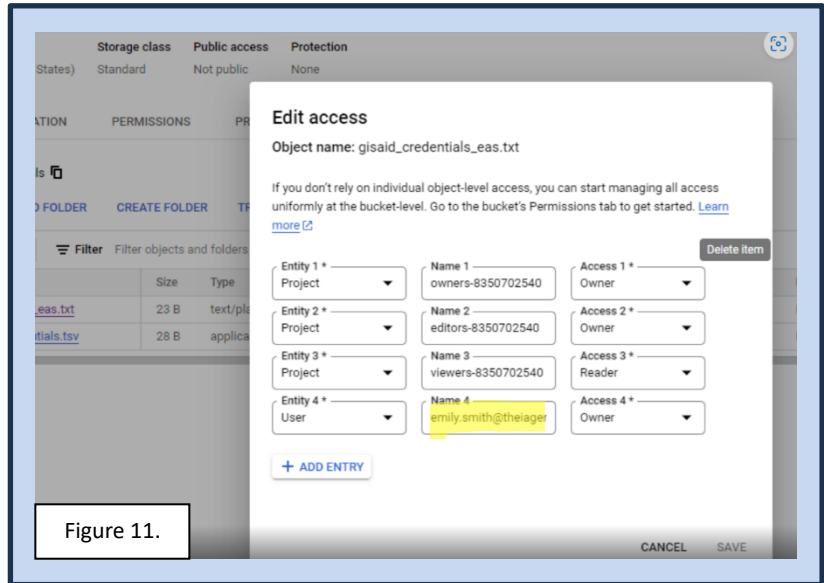5. Set the new entity access to *owner*
   b. Click *save*
5. Copy the gsutil URI by clicking the *copy to clipboard* button (Fig 10, blue arrow)
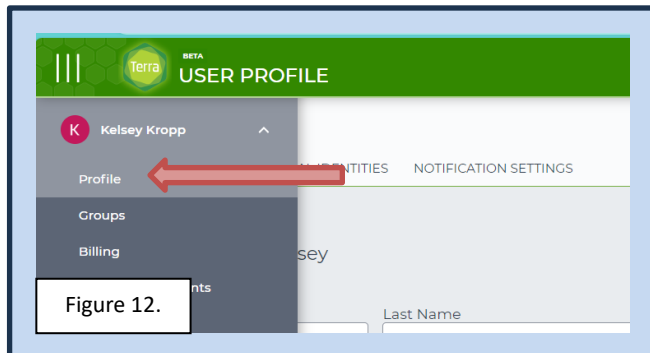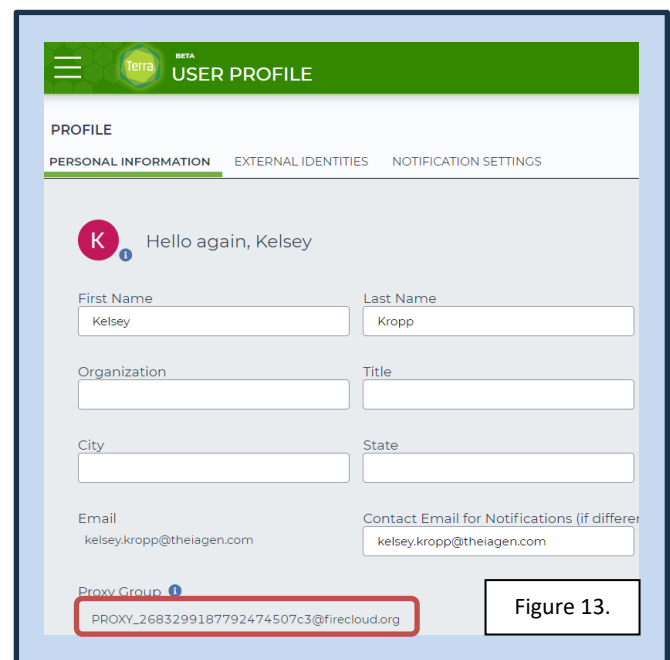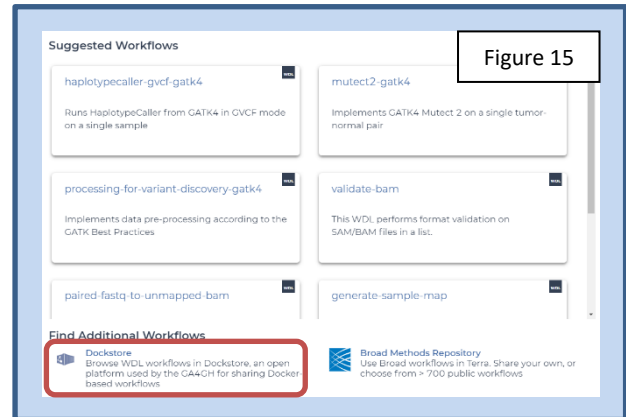6. Proceed with section 4.1.10.b.i

Figure 11.

Figure 12.

Figure 13.

10.3 IMPORTING THE TERRA_2_GISAID WORKFLOW FROM DOCKSTORE

Figure 14

Figure 15
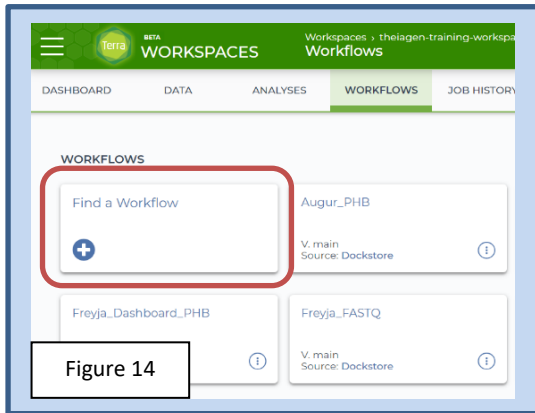
1. In the *Terra workspace* of interest, open the *workflows* tab and click *find a workflow* (Fig 14)
2. In the pop-up window, click *dockstore* (Fig 15)
3. To find the Theiagen Terra_2_GISAID workflow, type *Terra_2_GISAID* in the search bar (Fig 16)

Figure 16
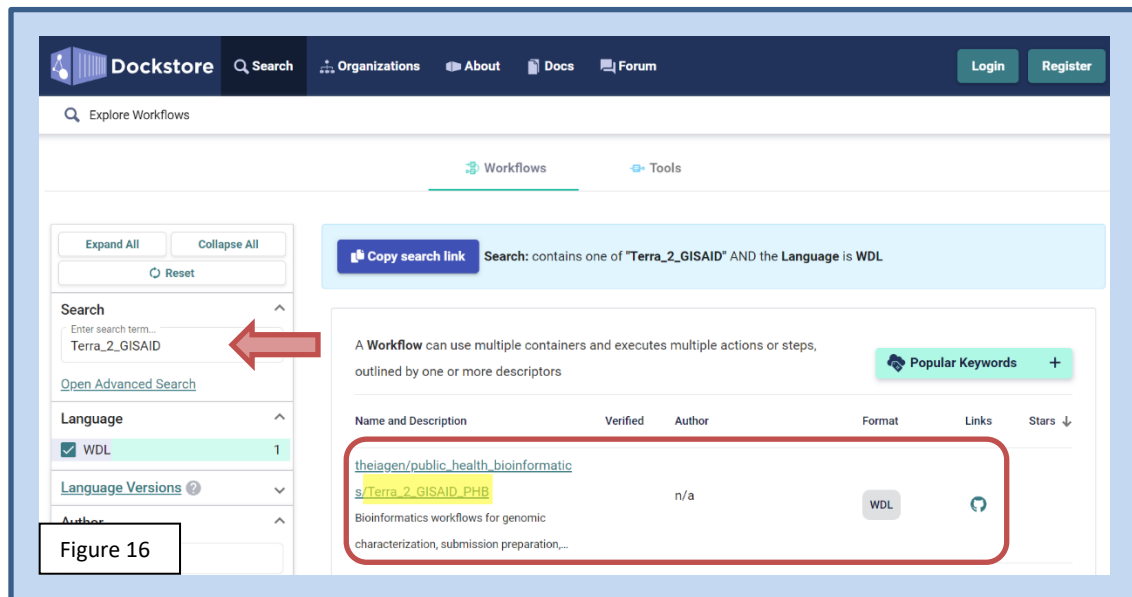
4. In the left hand sidebar, scroll down to Organization and select "*theiagen*" (Fig 17)
5. Find the workflow by looking at the file path suffix; click the name to *open the workflow* (Fig 16)
6. Click *Terra* to launch the workflow in Terra (Fig 18)
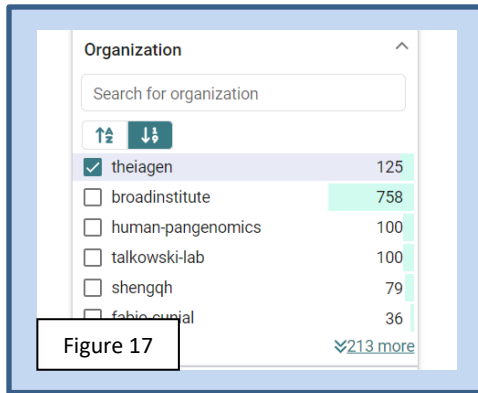7. Choose the *destination workspace* in the dropdown and click import or create a new workspace (Fig 19)

Figure 17

Figure 18

Figure 19