**Data for designing GUI:**

Polygon + file names. Consumer looks for concentrations, and starts to look for anomalies. Careful with conclusion: should be advice, rather than being 100% sure.

Coordinates (Longitude, latitude) and likelihood/ probability of the point to be an anomaly (0 - 100%). Depends on type of anomaly detection algorithm. Probability of anomaly, satellite image + points is nice to have.

**JDL level 5 should be implemented here., add consumer part to GUI!**

Pixel is 7x7KM’s, is this the resolution of TROPOMI?

The producer will have input of the rectangle and date, or even range of dates. And: it automatically downloads the data. Q is how to get coordinates, maybe maps..

L1 which one is methane/ aerosol etc. cannot be found

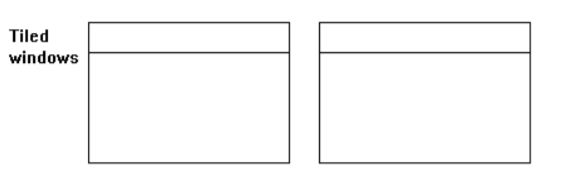
L2: feature methane is extracted, so we can use it

Q1: which are the relevant parameters for monitoring in GUI?

1. Coordinates (longitude and latitude)
2. Likelihood a datapoint is anomaly

Q2: which standards should be used?

1. JTC1/SC18/WG9 and TC159/SC4 (user system interfaces and symbols) are developing standards for minimum levels of user performance and monitoring the use interface implications of other standards: <https://ieeexplore-ieee-org.nlhhg.idm.oclc.org/stamp/stamp.jsp?tp=&arnumber=197769>  
   <https://ieeexplore.ieee.org/document/197769>
   1. Cursor control: In such a system an input device called a "mouse" is employed by an operator (user) to move a cursor (pointer) symbol about a CRT display screen in order to generate control commands. The mouse is provided with a button to allow the operator to generate control commands to signal the selection of option choices and to perform other control functions. Option choices are made by positioning the cursor on various "menus" which are called up and presented on the screen. Individual items within a menu are selected by operating the mouse button when the cursor is positioned on the selected item.
2. ISO TC159/SC4: standards or minimum levels of user performance which permit complete freedom of implementation:
   1. Menus

* Give options to users: Relevant options to toggle between leakages from recent and previous day.
* While formatting the menu options, First letter of each word must be caps.
* Avoid too many drop downs and subdirectories, keep it simple.
* Use only one word for each menu item ( FIle , Edit, Tools, Help)
* Use a single line menu bar.
* Use separator bars in the drop down list based upon the functions assigned in the list.
* Avoid multi level cascading.
* Each menu option should atleast have one related function   
  1. Coding and formatting
* Use as much visual coding as possible. Users understand and grasp visual information more than text or tabular information.
* Use bar graphs for depicting the leakage data over a certain time, like a week’s data and use line graphs to show the trend of increase or decrease in the leakage.
* Use proper scaling irrespective of whatever graphical information you provide.
* Use proper labelling for the graphs
  1. User guidance
* Buttons should be labelled carefully, according to industry-standard labels for pushbuttons. The use of ‘OK’ can be replaced by another name, to give more meaning to the button. We will use ‘apply’ and ‘cancel’ labels to guide the user through the GUI;
* Buttons should be grouped together, when they have similar functions. In our case, we will have a ‘apply’ and ‘cancel’ button. Since they have similar functionality, they will be grouped together;
  1. Visual display ergonomics:
* use tiled windows to display one map with all anomalies, and another map which zooms in on biggest anomaly:
* Use a font which looks modern, so the graphical user interface looks like it has been made in the 21st century;
* Highlight important text information in the GUI;
* Implement closing the application function, place it logically;
* Use different display types for specific information: i.e. a graph for visualising data, titles for important information, text for additional information;

<http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lecturenotes/DA308/GUI-design-guide.pdf>

<https://ieeexplore-ieee-org.nlhhg.idm.oclc.org/Xplore/home.jsp>

Q3: How to incorporate the JDL model in the GUI?

*The JDL model is a model for the fusion of data, sensor and information. According to the JDL Level 5 fusion model, the user interface is the key to allowing users to take control over the collected data and fusion processing. Once a user sets its requirements for the interface, a good GUI transforms these requirements into display elements and organises them in a compatible way that makes the user to have a clear perception of the utilization of the information. Thus, these constitute some of the vital principles that the model proposes to follow while designing a GUI.*

***Consistency***: Conform to work convention, the interface should be consistent with experience which will facilitate reasoning and for the minimization of error in information retrieval, navigation and action execution. The converse of this dimension is that the way the system looks and works should be consistent at all times.

***Visually pleasing composition***: In this concept the inclusion of the visual techniques such as symmetry, balance, predictability, economy, simplicity, grouping, unity, proportion, sequentially and regularity will augment visual pleasing composition of the user screen. Visually pleasing composition draws users’ attention inherently and also makes a positive impact on the users mind.

***Grouping***: This aspect of designing the user interface asks the developer to implement the principles of proximity, similarity, common region, connectedness, continuity and closure. For our model of design, we think that similarity and common region and connectedness are relevant and can be incorporated while designing the “Menu”.

***Amount of information***: This is another important feature in designing a GUI. The interface shouldn’t have an overload of information which can create confusion and also the interface shouldn’t have too little information as it can make it less user friendly. It has been studied that one can digest around 5 to 9 items in a short term memory. Thus, using this approach, the screen can have more relevant information.

***Meaningful ordering***: All parts in the GUI are organized according to a logical flow of the user selections. In the top part of the GUI, the user can read the function of the GUI, as well as a description of the actions which will happen after a button has been pressed. After the user gives the user input, the results are shown in figures in the bottom part of the GUI.

***Distinctiveness***: All objects (such as buttons and input fields) should be distinguishable from each other, and the background. This means a color scheme should be chosen in such a way all parts of the GUI can be easily distinguished from each other, by color, size and position. In our GUI, this is done by a black and yellow color scheme.

***Focus and emphasis***: The user interface objects (such as buttons and input fields) should reflect the importance of the GUI. This means that all elements of the GUI clearly indicate why they are included in the GUI. In our GUI, all buttons have clear labels, and text used is descriptive.

**Q4: Use cases how a user can use the GUI: who are the users, what is the purpose of the GUI users?**

* Researchers: use GUI to analyze TROPOMI data, no further actions required;
* Students: use GUI to analyze TROPOMI data, no further actions required;
* Teachers: use GUI to analyze TROPOMI data, no further actions required;
* Professionals: use GUI to analyze TROPOMI data, if leaks are identified these are tracked;
* Companies: use GUI to analyze TROPOMI data, if leaks are identified these are tracked;

Since there are 2 groups of users, with two goals, the GUI will have extra functionality for the orange group: a list of companies who produce products related to methane will be provided. Before this, the parties have to agree to confidentiality for example.

Since there are multiple users, a login-feature can be supplied, so all types of users can login with different accounts. The ‘green’ account gives the users basic functionality, while the ‘orange’ account also gives access to more advanced features, such as a list with coordinates of methane-related companies.