**UCS Satellite Database Interactive Visualization User Guide**

The dashboard contains five main controls:

* Date Range Selection
* Country Selection
* User Type Selection
* Class of Orbit Selection
* Purpose Selection

## 1. Date Range Selection

* Contains Start Date and End Date inputs.
* Start Date: Earliest date allowed is 11/15/1975.
* End Date: Latest date allowed is 12/28/2022.
* Program visualizes data between the selected dates.
* Visualizations update dynamically if the date range changes.

## 2. Country Selection

* "Select All Countries" is checked by default.
* To select specific countries:
* 1. Uncheck 'Select All Countries'.
* 2. Remove default countries (5 shown initially) by clicking the textbox and pressing Backspace.
* 3. Type in the countries you want to visualize.
* Line Plot Limit: Displays a maximum of 10 countries for readability.
* First 10 entered countries appear on the graph.
* Map updates for more than 10 countries.
* If no countries are selected and 'Select All' is unchecked:
* - Map will be blank.
* - Graph will display: "Error: 'from' must be a finite number".

## 3. User Type Selection

* Default: "All" (visualizes all user types).
* Options: Civil, Commercial, Government, Military.
* Selecting a type filters and visualizes only that user type's data.

## 4. Class of Orbit Selection

* Default: All orbit classes selected.
* Classes:
* - Elliptical: 1,000 km (lowest) to 35,756 km (highest) altitude.
* - GEO (Geostationary Orbit): Satellites move east–west along Earth’s equator.
* - LEO (Low Earth Orbit): Altitude under 2,000 km, within Van Allen belt protection; no fixed path.
* - MEO (Medium Earth Orbit): Altitude 8,000–20,000 km; no fixed path.
* Users can select/deselect orbit classes.
* If none are selected, an error will appear instructing the user to select at least one orbit class.

## 5. Purpose Selection

* Default: "Select All Purposes" checked.
* To filter:
* 1. Uncheck the box.
* 2. Use the textbox to add/remove satellite purposes.
* If no purposes are selected and 'Select All' is unchecked:
* - Map will be blank.
* - Graph will display: "Error: 'from' must be a finite number".

## Additional Features

* Date Format Conversion: Original dataset uses day-month-year format; script converts it to month/day/year for easier input.
* Country Name Mapping: Recognizes multiple variations of a country’s name (e.g., UK, United Kingdom, Great Britain, England/UK → UK) to prevent data loss.
* Dynamic Updates: Any change in input instantly refreshes visualizations.
* Example: Changing User Type to Commercial and Orbit Classes to MEO + LEO may cause a short delay while data is re-filtered.

Sources:

* <https://www.satnow.com/community/what-is-an-highly-elliptical-orbit>
* <https://www.esa.int/Enabling_Support/Space_Transportation/Types_of_orbits#MEO>
* <https://www.cst.gov.sa/en/ntn/Pages/space-borne.aspx>
* <https://www.kaggle.com/datasets/sujaykapadnis/every-known-satellite-orbiting-earth>