ACC-Dar Borehole Monitoring Database

This technical note provides information to facilitate use of the ACC-Dar Borehole Monitoring Database (BMD).

After downloading the database (ACCDAR official BMD) from the link http://www.planning4adaptation.eu/042_Maps.aspx, you can open the file with MS Access.

The monitoring network is made up of 79 boreholes. Through the BMD, technical and historical chemical-physical data on the boreholes can be accessed and updated according to information gathered through present and future survey activities.

The ACC-Dar BMD structure is presented in Figure 1.

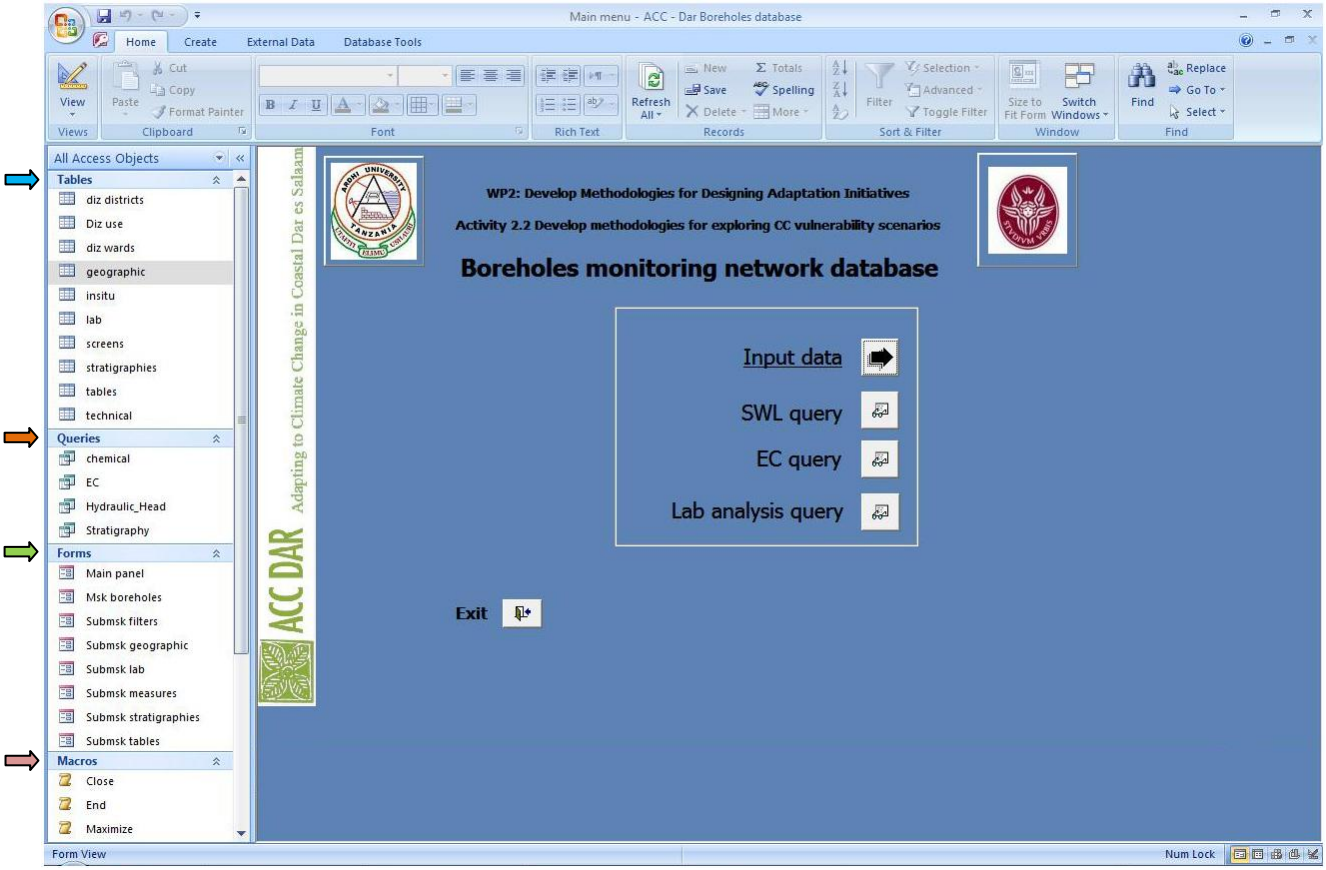


Figure 1: ACC-Dar BMD main page

The **Main Panel** is displayed in the middle of the ACC-Dar BMD main page, while the left-hand menu lists all the other items in the database:

➡ **Tables**: data are organized in tables, related to each other through a system of primary keys (in this case, the borehole ID, which consists of the first three characters of the district in which it is located and a code number).

The tables contain data relating to:

- Diz district (Ilala, Kinondoni and Temeke)
- Diz Use (land cover)
- Diz wards
- Geographic (Borehole ID, District, Ward, Latitude, Longitude, Area, DDCA ID, Owner, Address, Phone)
- In situ (Date, SWL, DWL, Q, T, pH, EC, TDS)
- Lab (Concentration value for lab parameters expressed in mg/l)
- Screens

- Stratigraphies
- Tables
- Tecnichal (Year of construction, Ground level, Depth, Well bottom level, h wellhead, Diameter, Depth of pump, Water use, Yield)

➡ **Query**: some specific queries have been built to quickly recover the most interesting data:

- Chemical (chemical analysis)
- EC (electrical conductivity)
- Hydraulic head (static water levels)
- Stratigraphy

➡ - **Masks**: are the elements that allow the user to interact with the data in the tables or queries

- Main panel
- Msk boreholes
- Submsk filters
- Submsk geografic
- Submsk lab
- Submsk measures
- Submsk stratigraphies
- Submsk tables

➡**Macro**: are instruction sequences.

1. Input data

Click Input data (Figure 2) to view all the information related to a selected borehole

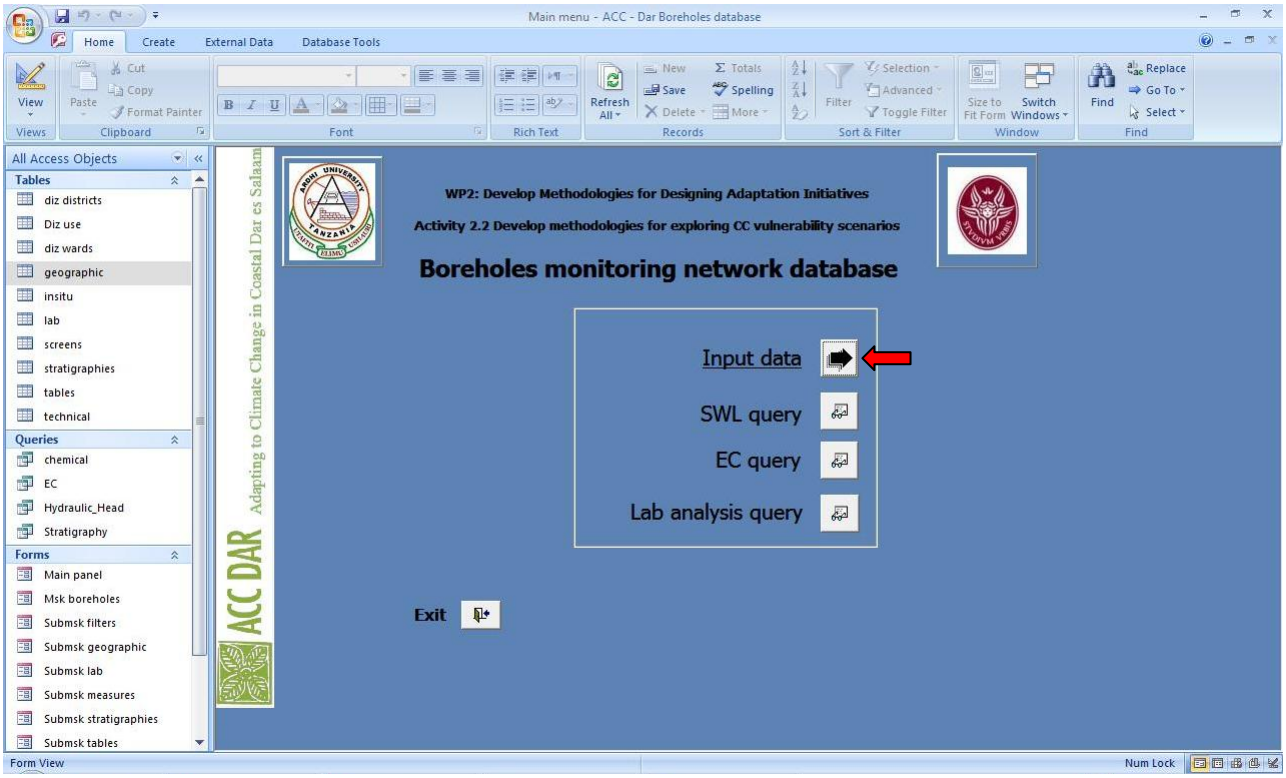


Figure 2: ACC-Dar BMD main page - Input data

To select a borehole, type its ID number in the field ID borehole or scroll through the records with the arrows at the bottom left of the screen (Figure 3).

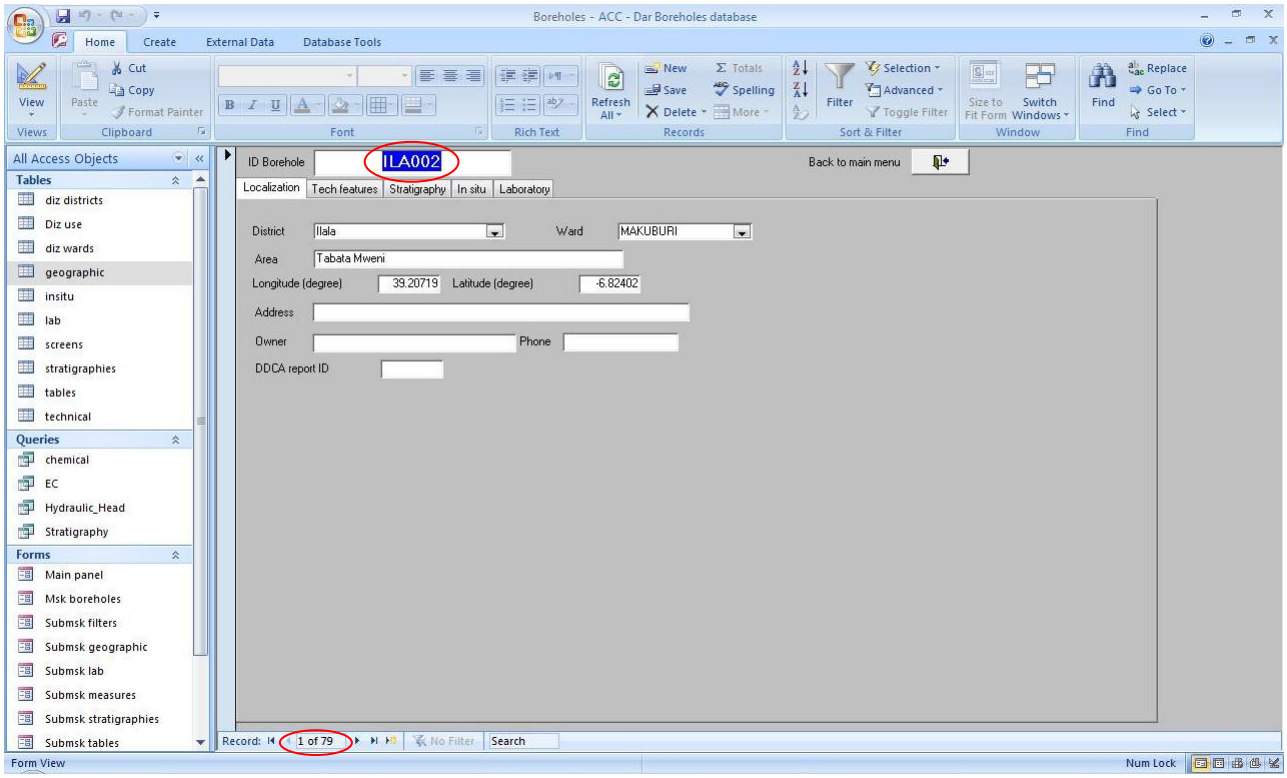


Figure 3: Input data – ID Borehole

Mask Input data show information about localization, technical characteristics, stratigraphy, in situ measurements, and chemical analysis of the selected well.

- **Localization**: District, Ward, Area, Latitude and Longitude, Address, Owner, Phone and DDCA Report ID (Figure 4).

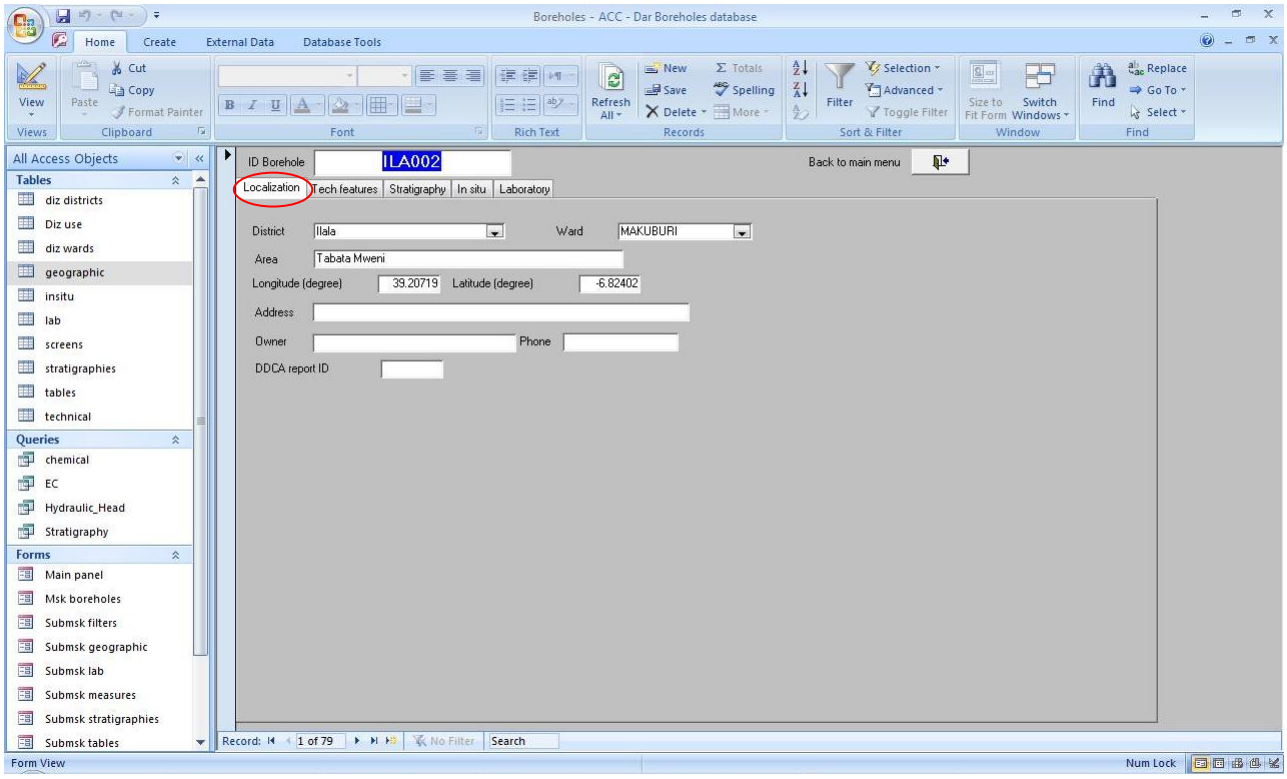


Figure 4: Input data – Localization

- **Tech features**: Year of construction, Ground level, Depth, Well bottom level, h wellhead, Diameter, Depth of pump, Water use, Yield (Figure 5).

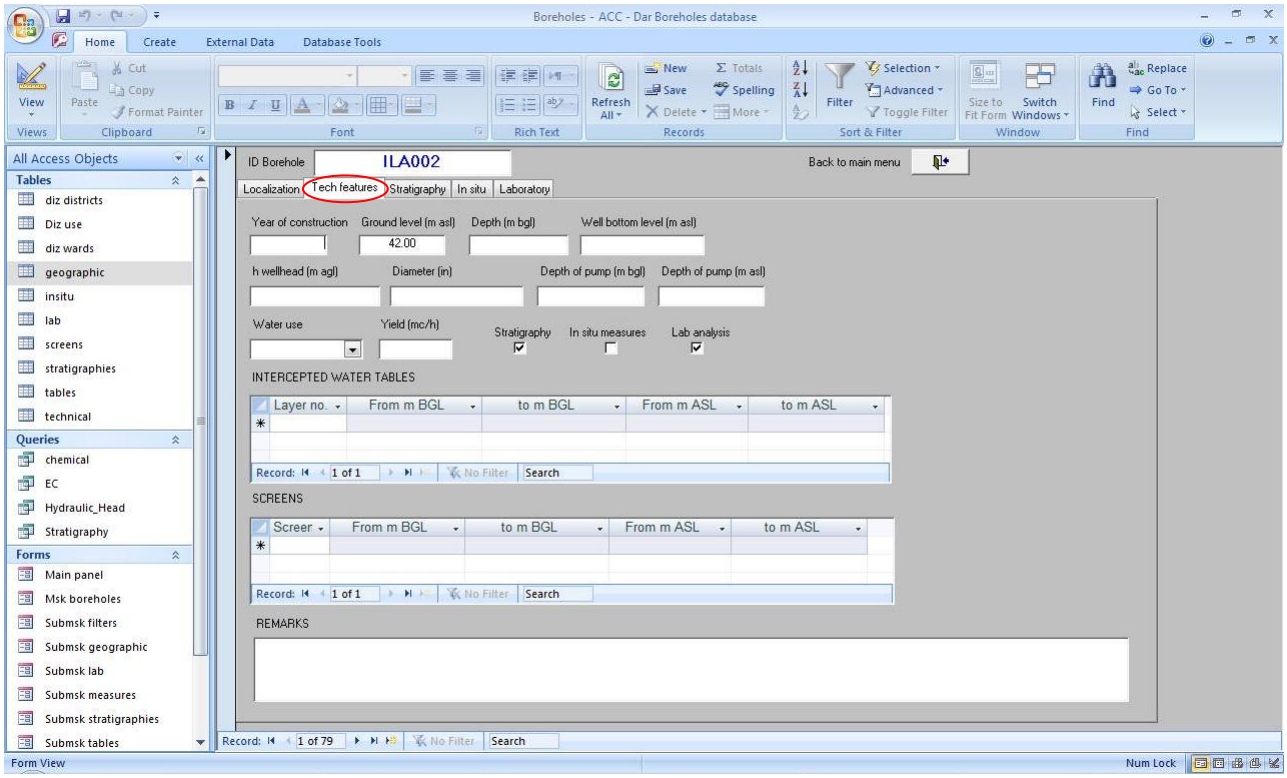


Figure 5: Input data - Tech features

- **Stratigraphy**: contains the description of the stratigraphic report and the thickness of any lithological type (Figure 6).

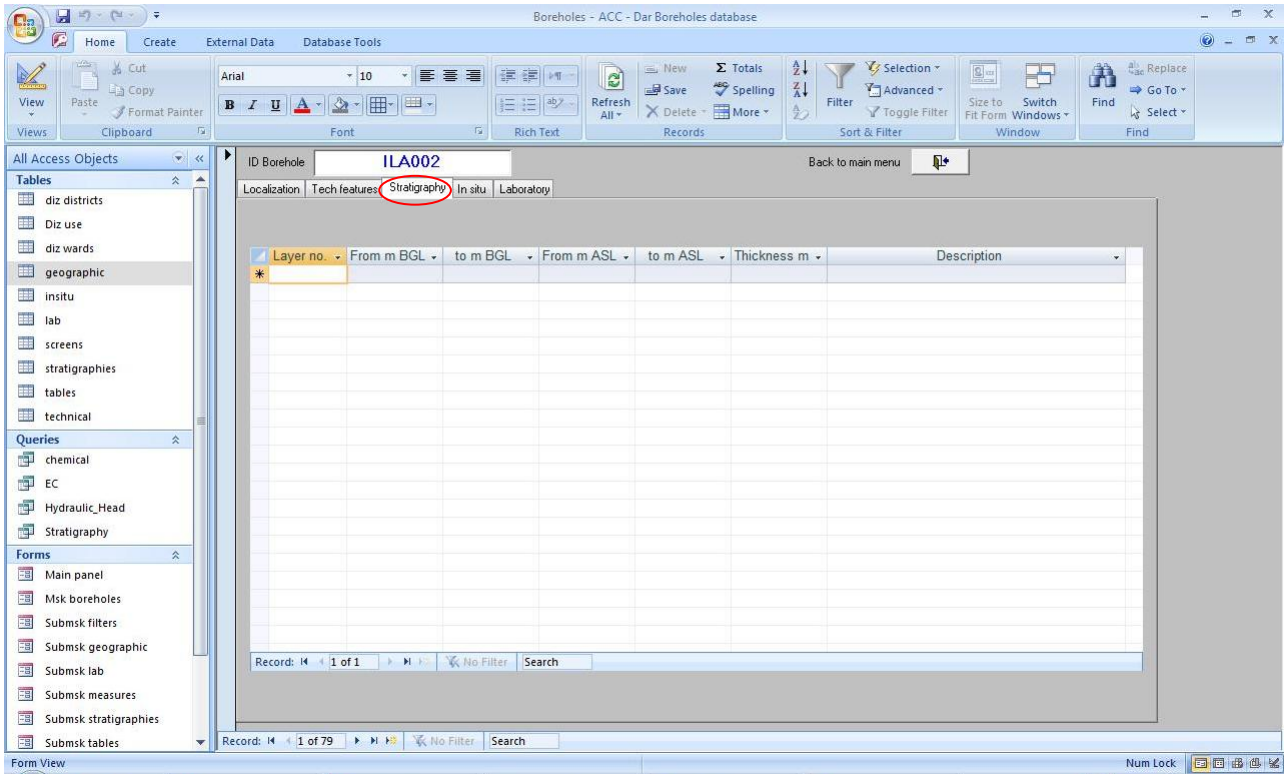


Figure 6: Input data - Stratigraphy

- **In situ**: static and dynamic water level, piezometric levels, yield, temperature, pH, electrical conductivity, TDS - Total Dissolved Solids (Figure 7).

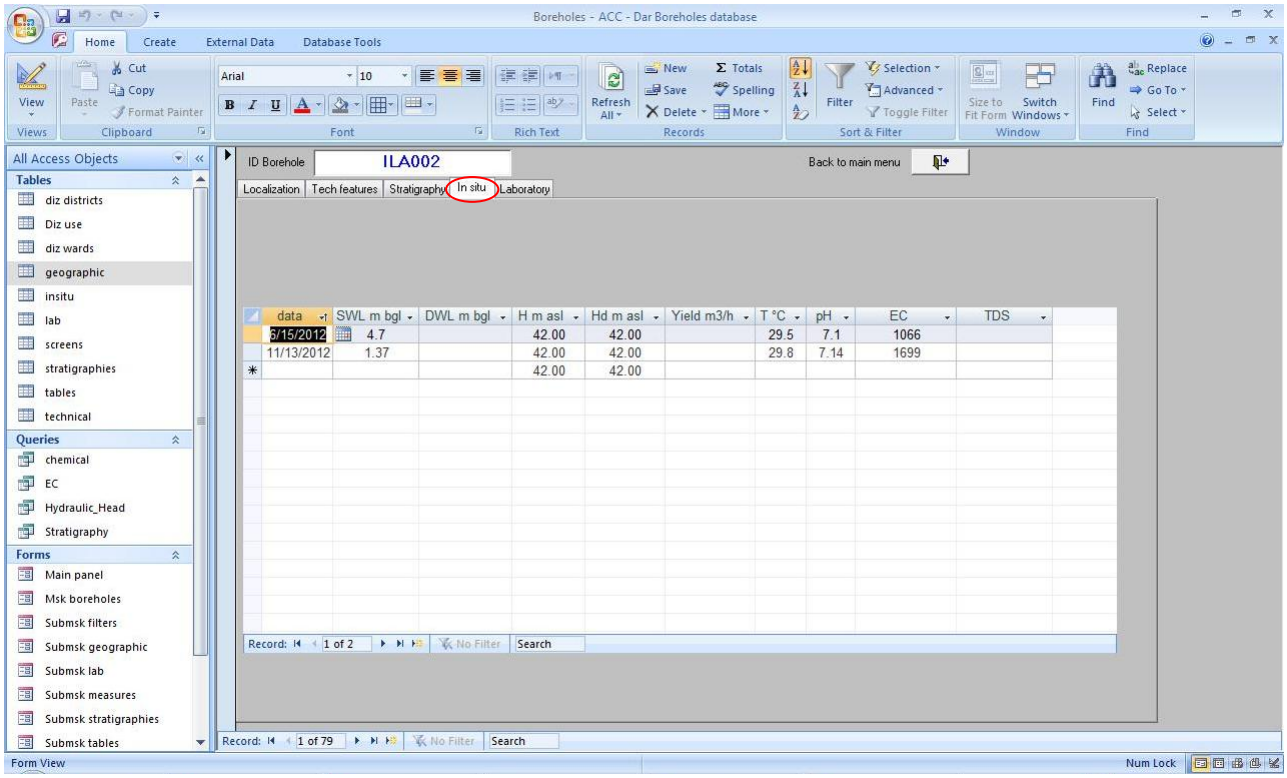


Figure 7: Input data – In situ

- **Laboratory**: concentration value for lab parameters expressed in mg/l (Figure 8).

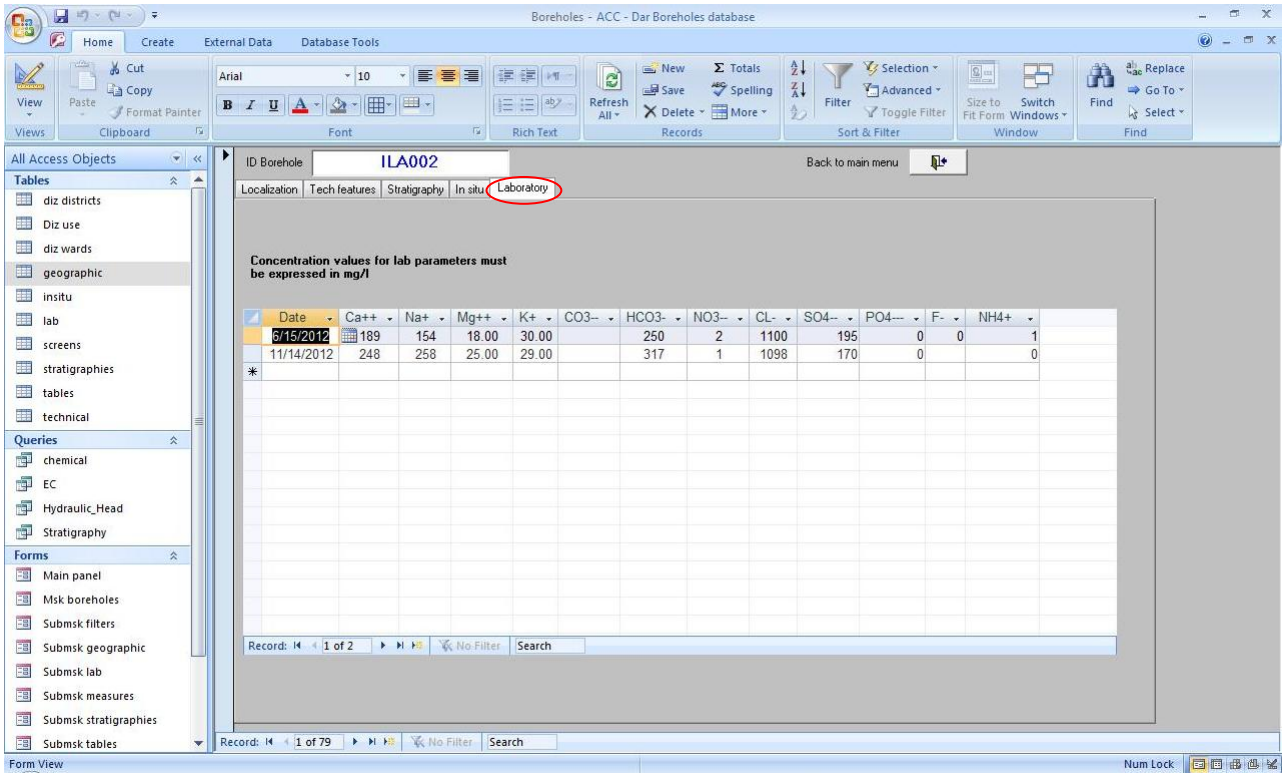


Figure 8: Input data - Laboratory

To return to the main menu Click Back to main menu.

2. SWL query

Click SWL query (Figure 9) to display geographic coordinates (Latitude and Longitude) and measures of the static level (SWL) (Figure 10) for all the wells available.

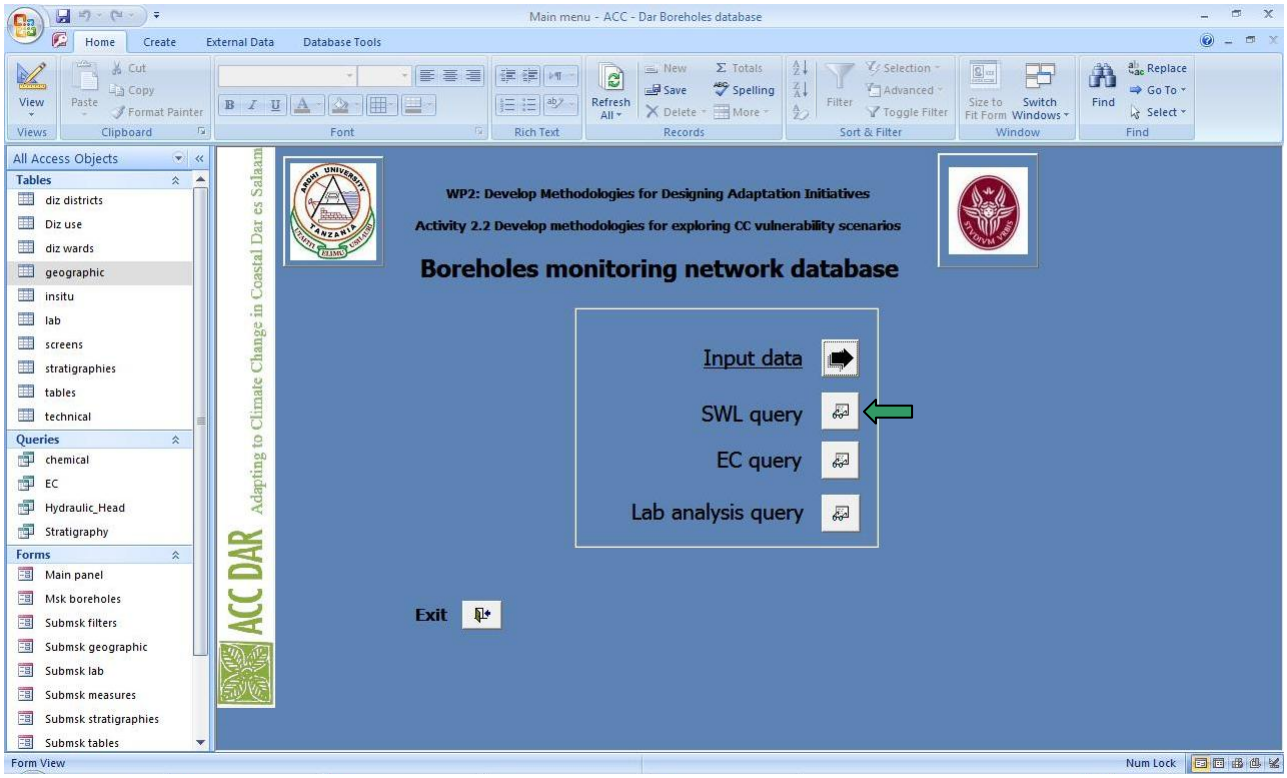
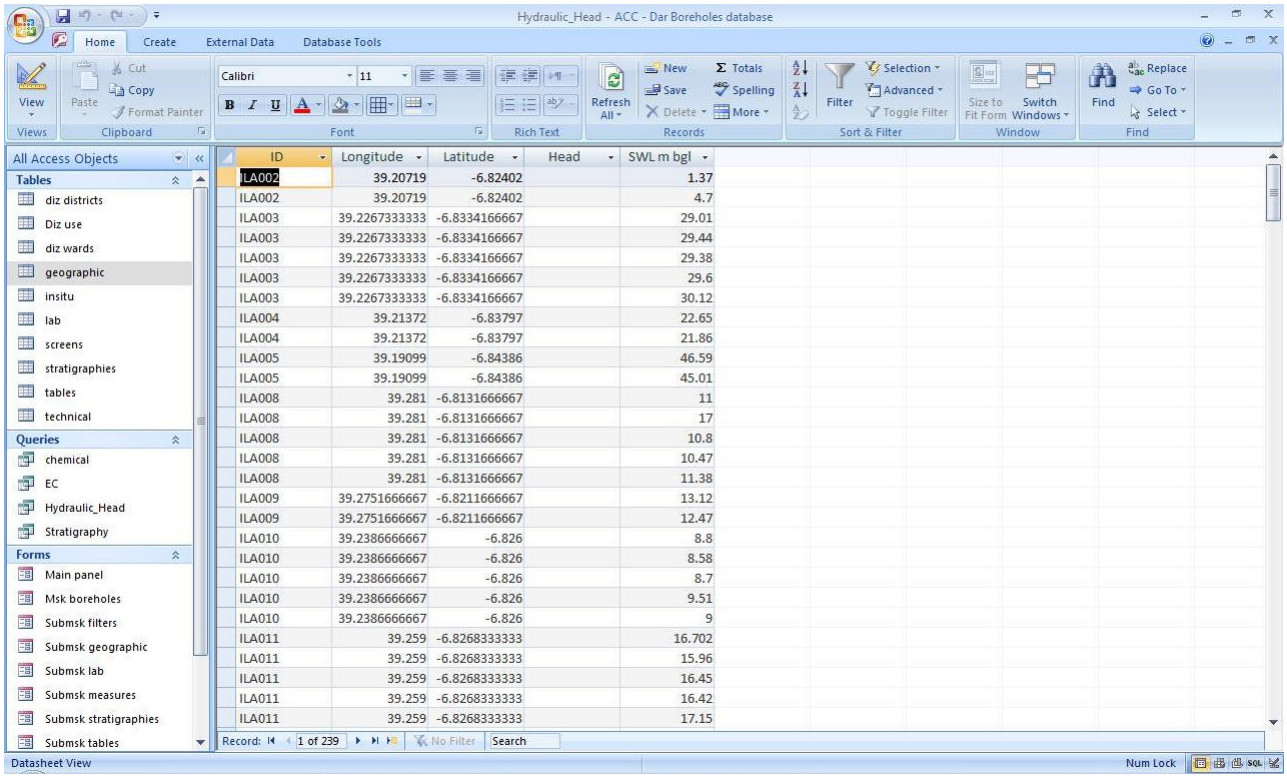


Figure 9: ACC-Dar BMD main page - SWL query



ID	Longitude	Latitude	Head	SWL m bgl
LA002	39.20719	-6.82402		1.37
ILA002	39.20719	-6.82402		4.7
ILA003	39.2267333333	-6.8334166667		29.01
ILA003	39.2267333333	-6.8334166667		29.44
ILA003	39.2267333333	-6.8334166667		29.38
ILA003	39.2267333333	-6.8334166667		29.6
ILA003	39.2267333333	-6.8334166667		30.12
ILA004	39.21372	-6.83797		22.65
ILA004	39.21372	-6.83797		21.86
ILA005	39.19099	-6.84386		46.59
ILA005	39.19099	-6.84386		45.01
ILA008	39.281	-6.8131666667		11
ILA008	39.281	-6.8131666667		17
ILA008	39.281	-6.8131666667		10.8
ILA008	39.281	-6.8131666667		10.47
ILA008	39.281	-6.8131666667		11.38
ILA009	39.2751666667	-6.8211666667		13.12
ILA009	39.2751666667	-6.8211666667		12.47
ILA010	39.2386666667	-6.826		8.8
ILA010	39.2386666667	-6.826		8.58
ILA010	39.2386666667	-6.826		8.7
ILA010	39.2386666667	-6.826		9.51
ILA010	39.2386666667	-6.826		9
ILA011	39.259	-6.8268333333		16.702
ILA011	39.259	-6.8268333333		15.96
ILA011	39.259	-6.8268333333		16.45
ILA011	39.259	-6.8268333333		16.42
ILA011	39.259	-6.8268333333		17.15

Figure 10: SWL query

3. EC query

Click EC query (Figure 11) to show geographic coordinates (Latitude and Longitude) and electrical conductivity (EC) (Figure 12) for all available boreholes.

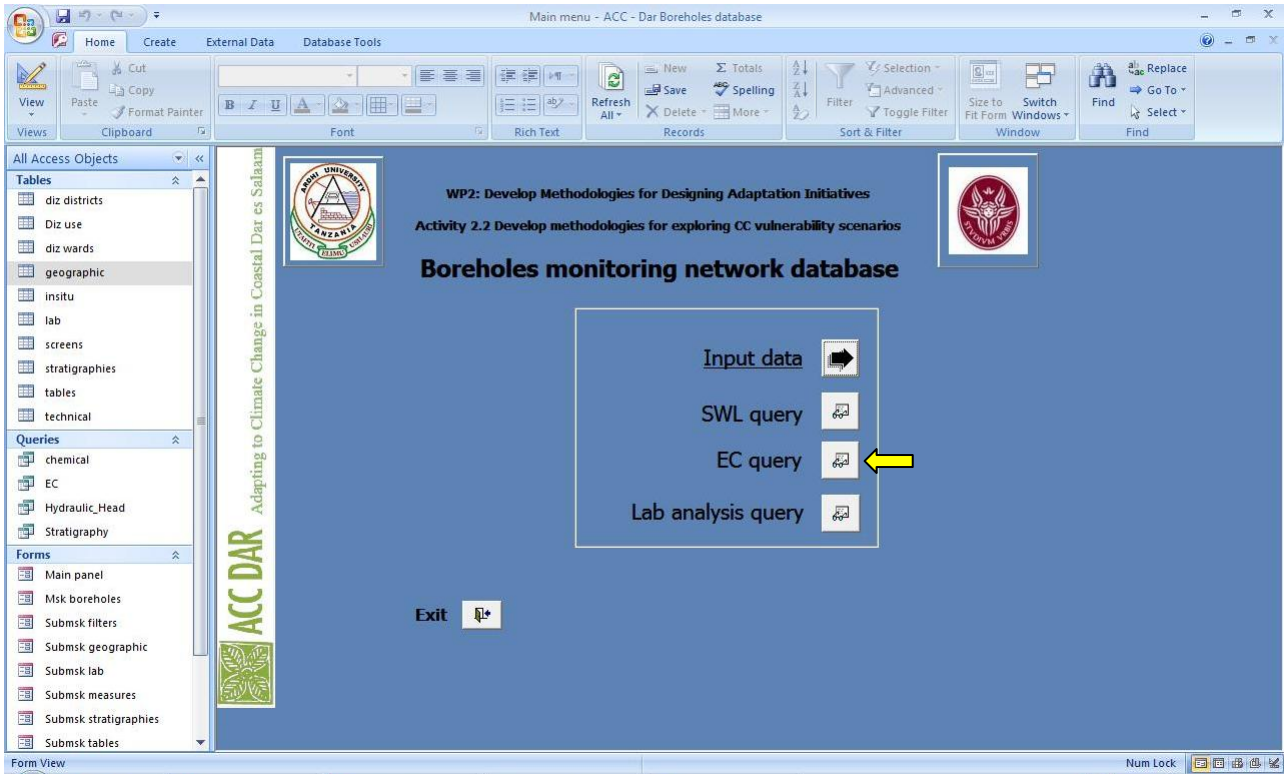
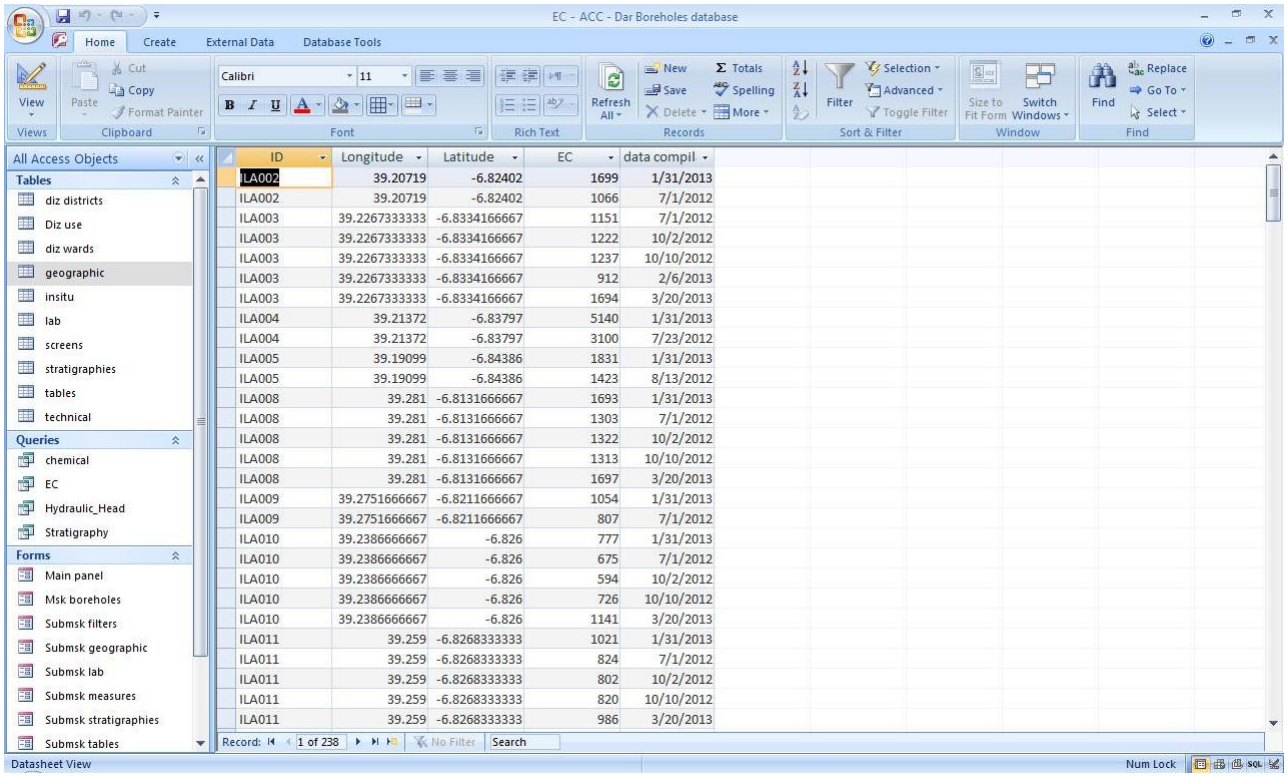


Figure 11: ACC-Dar BMD main page – EC query



ID	Longitude	Latitude	EC	data compil
ILA002	39.20719	-6.82402	1699	1/31/2013
ILA002	39.20719	-6.82402	1066	7/1/2012
ILA003	39.2267333333	-6.8334166667	1151	7/1/2012
ILA003	39.2267333333	-6.8334166667	1222	10/2/2012
ILA003	39.2267333333	-6.8334166667	1237	10/10/2012
ILA003	39.2267333333	-6.8334166667	912	2/6/2013
ILA003	39.2267333333	-6.8334166667	1694	3/20/2013
ILA004	39.21372	-6.83797	5140	1/31/2013
ILA004	39.21372	-6.83797	3100	7/23/2012
ILA005	39.19099	-6.84386	1831	1/31/2013
ILA005	39.19099	-6.84386	1423	8/13/2012
ILA008	39.281	-6.8131666667	1693	1/31/2013
ILA008	39.281	-6.8131666667	1303	7/1/2012
ILA008	39.281	-6.8131666667	1322	10/2/2012
ILA008	39.281	-6.8131666667	1313	10/10/2012
ILA008	39.281	-6.8131666667	1697	3/20/2013
ILA009	39.2751666667	-6.8211666667	1054	1/31/2013
ILA009	39.2751666667	-6.8211666667	807	7/1/2012
ILA010	39.2386666667	-6.826	777	1/31/2013
ILA010	39.2386666667	-6.826	675	7/1/2012
ILA010	39.2386666667	-6.826	594	10/2/2012
ILA010	39.2386666667	-6.826	726	10/10/2012
ILA010	39.2386666667	-6.826	1141	3/20/2013
ILA011	39.259	-6.8268333333	1021	1/31/2013
ILA011	39.259	-6.8268333333	824	7/1/2012
ILA011	39.259	-6.8268333333	802	10/2/2012
ILA011	39.259	-6.8268333333	820	10/10/2012
ILA011	39.259	-6.8268333333	986	3/20/2013

Figure 12: EC query

4. Lab analysis query

Click Lab analysis query (Figure 13) to display geographic coordinates (Latitude, Longitude) and chemical analysis (Lab) (Figure 14) for all the wells available.

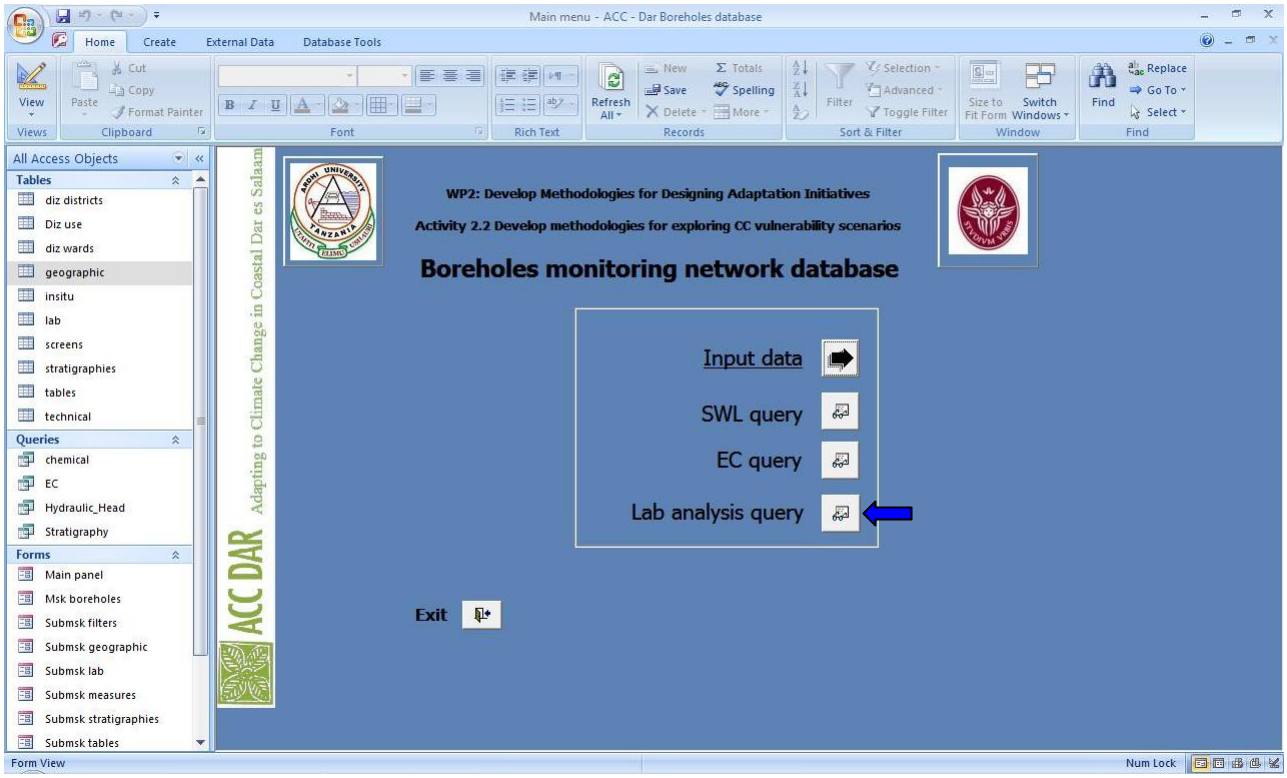
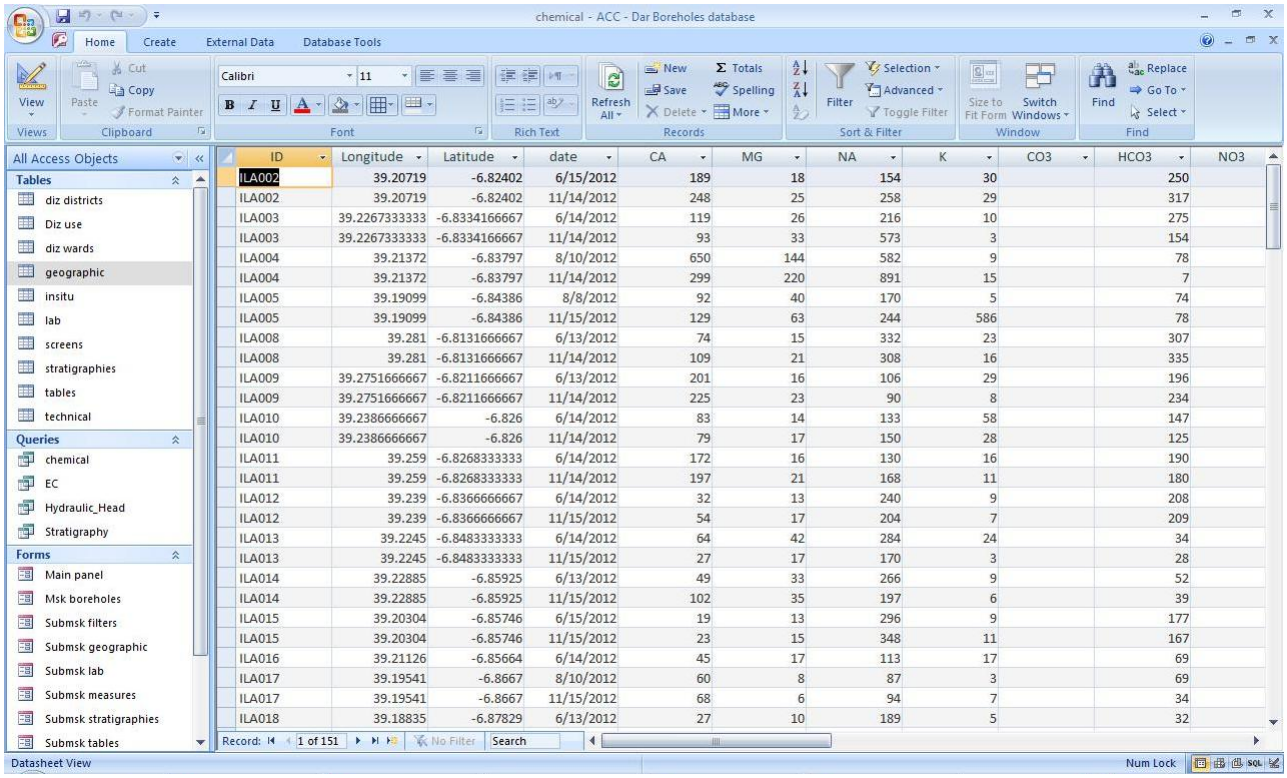


Figure 13: ACC-Dar BMD main page – Lab analysis query



ID	Longitude	Latitude	date	CA	MG	NA	K	CO3	HCO3	NO3
ILA002	39.20719	-6.82402	6/15/2012	189	18	154	30		250	
ILA002	39.20719	-6.82402	11/14/2012	248	25	258	29		317	
ILA003	39.2267333333	-6.8334166667	6/14/2012	119	26	216	10		275	
ILA003	39.2267333333	-6.8334166667	11/14/2012	93	33	573	3		154	
ILA004	39.21372	-6.83797	8/10/2012	650	144	582	9		78	
ILA004	39.21372	-6.83797	11/14/2012	299	220	891	15		7	
ILA005	39.19099	-6.84386	8/8/2012	92	40	170	5		74	
ILA005	39.19099	-6.84386	11/15/2012	129	63	244	586		78	
ILA008	39.281	-6.8131666667	6/13/2012	74	15	332	23		307	
ILA008	39.281	-6.8131666667	11/14/2012	109	21	308	16		335	
ILA009	39.2751666667	-6.8211666667	6/13/2012	201	16	106	29		196	
ILA009	39.2751666667	-6.8211666667	11/14/2012	225	23	90	8		234	
ILA010	39.2386666667	-6.826	6/14/2012	83	14	133	58		147	
ILA010	39.2386666667	-6.826	11/14/2012	79	17	150	28		125	
ILA011	39.259	-6.8268333333	6/14/2012	172	16	130	16		190	
ILA011	39.259	-6.8268333333	11/14/2012	197	21	168	11		180	
ILA012	39.239	-6.8366666667	6/14/2012	32	13	240	9		208	
ILA012	39.239	-6.8366666667	11/15/2012	54	17	204	7		209	
ILA013	39.2245	-6.8483333333	6/14/2012	64	42	284	24		34	
ILA013	39.2245	-6.8483333333	11/15/2012	27	17	170	3		28	
ILA014	39.22885	-6.85925	6/13/2012	49	33	266	9		52	
ILA014	39.22885	-6.85925	11/15/2012	102	35	197	6		39	
ILA015	39.20304	-6.85746	6/15/2012	19	13	296	9		177	
ILA015	39.20304	-6.85746	11/15/2012	23	15	348	11		167	
ILA016	39.21126	-6.85664	6/14/2012	45	17	113	17		69	
ILA017	39.19541	-6.8667	8/10/2012	60	8	87	3		69	
ILA017	39.19541	-6.8667	11/15/2012	68	6	94	7		34	
ILA018	39.18835	-6.87829	6/13/2012	27	10	189	5		32	

Figure 14: Lab analysis query

5. Creating a Query

As with all relational databases, in the ACC-Dar BMD it is possible to limit the display of data to specific records without modifying the structure of a query, mask or table.

Through the *Filter* tool, you can define a specific standard that identifies the value of the field that you want to display.

For example, if you want to create a query containing only chlorine concentration of the well ILA002 collected in the campaign of June 2012, click *Query Design* in *Create* tab (Figure 15).

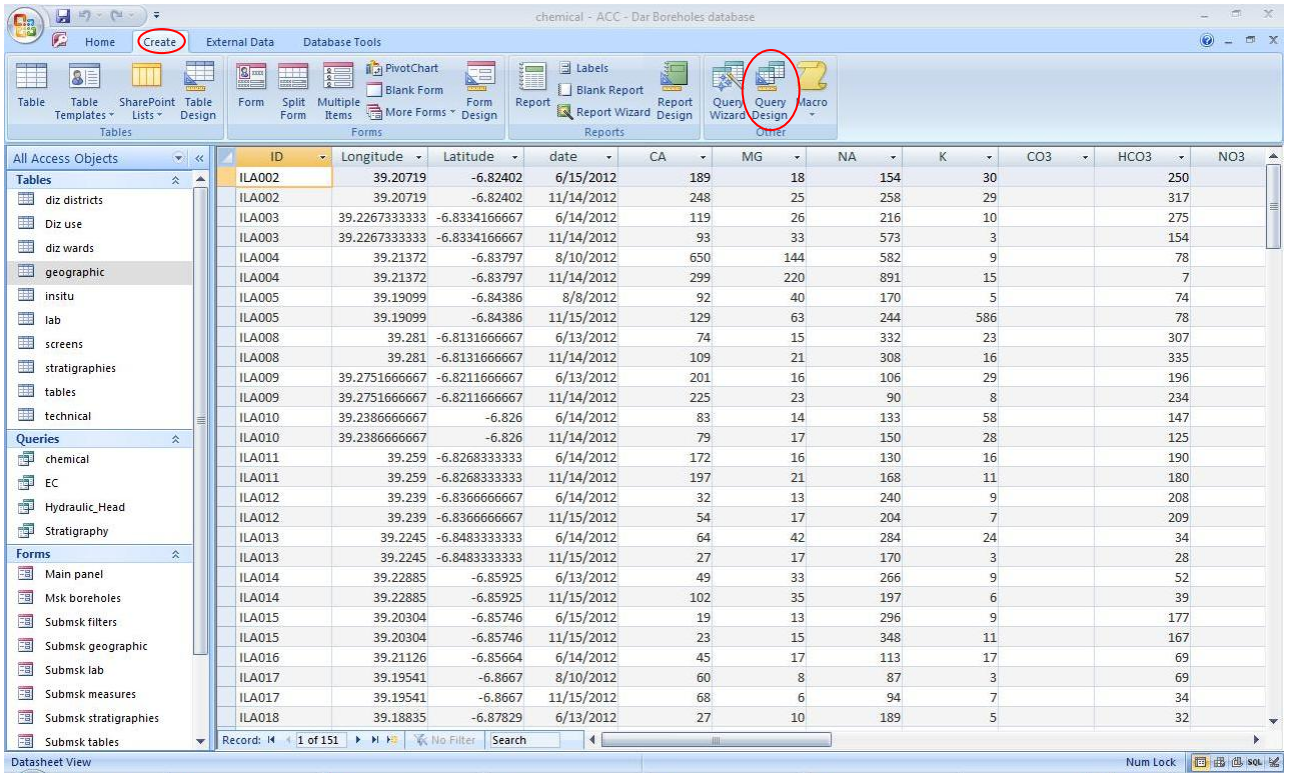


Figure 15: Query creation (Step 1)

In the *Show Table* dialog box (Figure 16) click the tables from which you want to recover data, in the example *geographic* and *lab*.

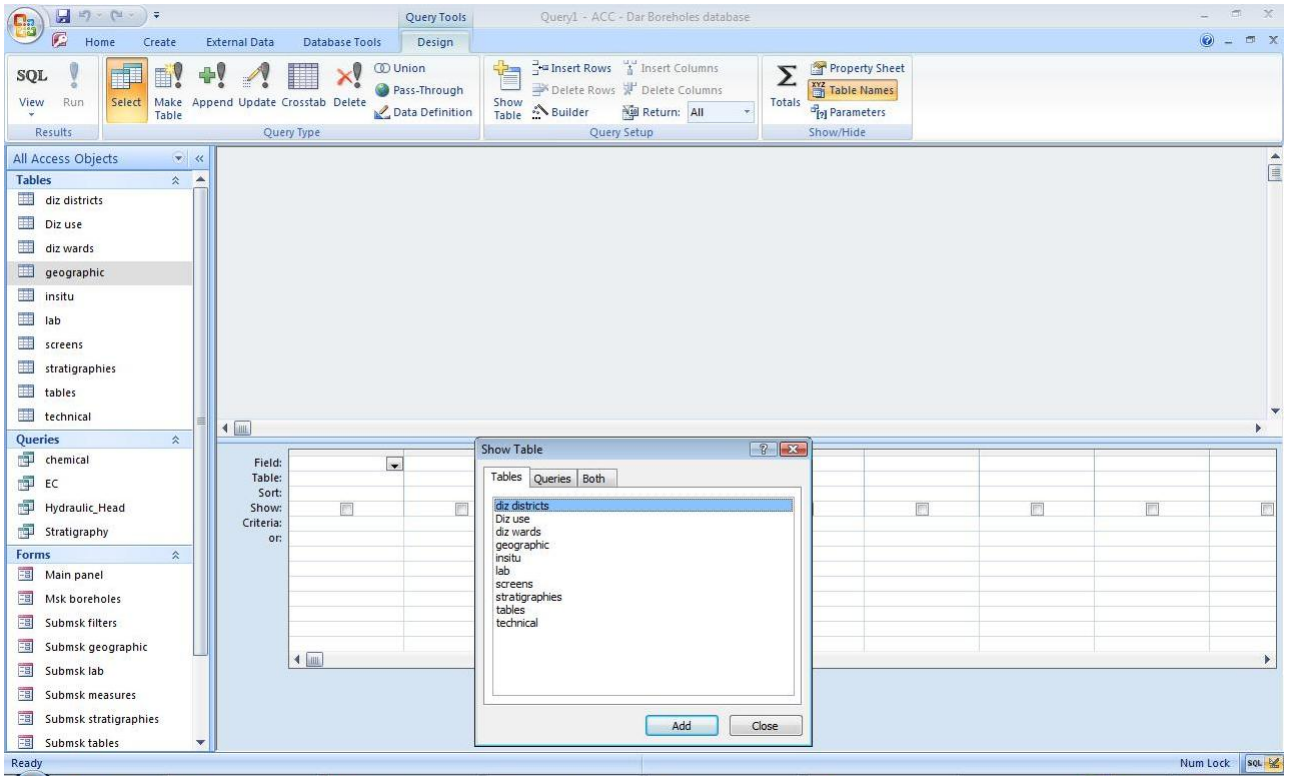


Figure 16: Query creation (Step 2)

Each table will be displayed in a window at the top of the query designer. Click Close after you have added all the tables (Figure 17).

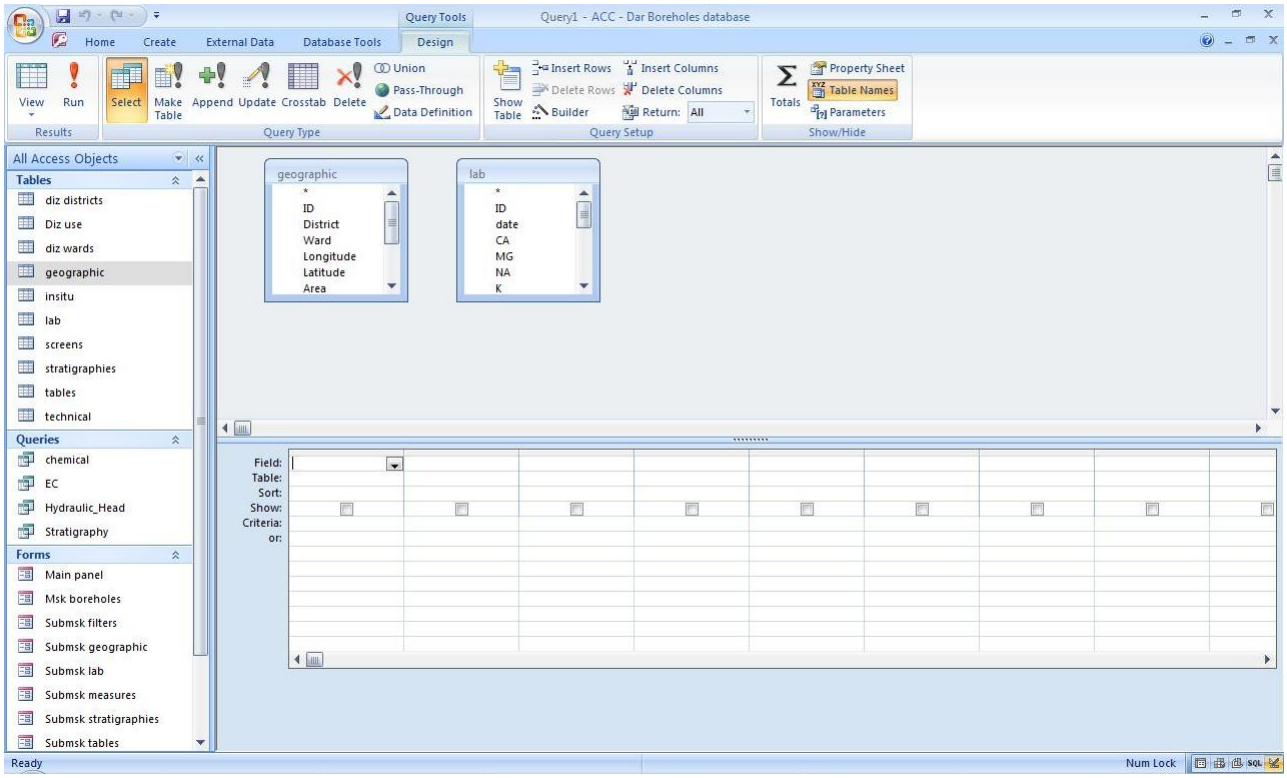


Figure 17: Query creation (Step 3)

Now it's necessary to insert a link between borehole IDs, which represent the primary key of the system (primary keys) (Figure 18).

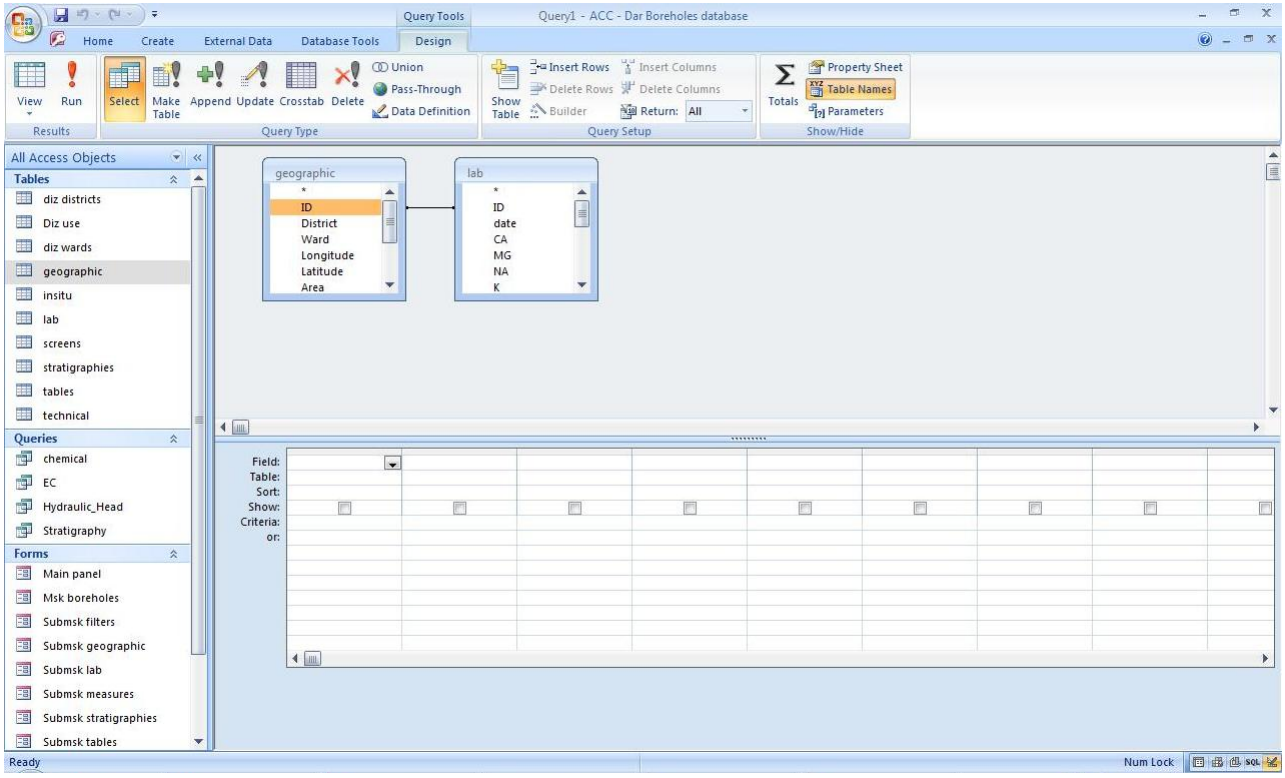


Figure 18: Query creation (Step 4)

In each table, click the field or fields that you want to use in the query. Each field will be displayed in a blank cell in the Field row of the grid. In the example, select ID borehole (ILA002), chlorine content and date. Optionally, you can add criteria in the Criteria row of the query grid. In the example, to filter the data concerning the campaign of June 2012 it is necessary to write the string (like * 06/2012) in the criteria section.

Click Run to run the query (Figure 19) and display the results in a datasheet (Figure 20).

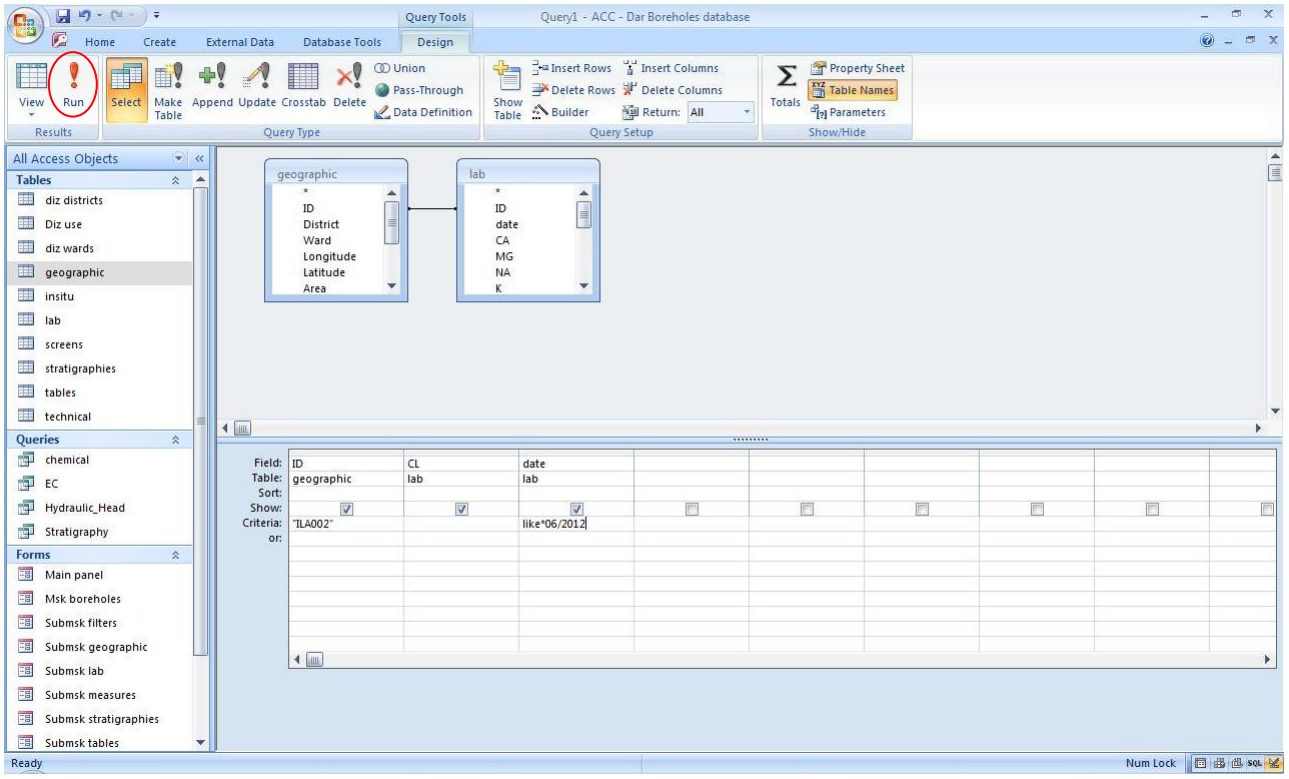


Figure 19: Query creation (Step 5)

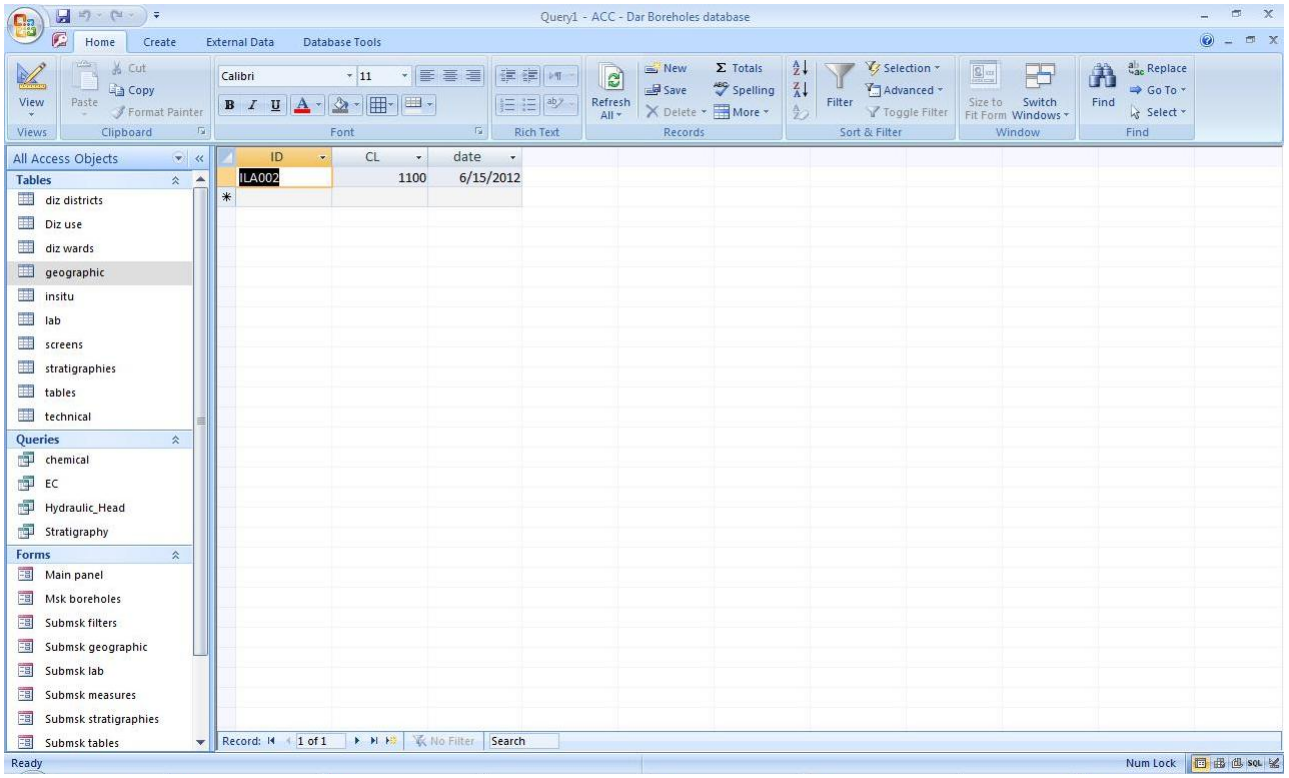


Figure 20: Query creation (Step 6)