

## Homework Assignment 2

(100 points)

**Assigned Date: Wednesday, September 18, 2013**

**Due Date: 4:00 PM Monday, September 23, 2013**

### Educational Goal

Become familiar with problem formulation under the context of solving problems by searching.

### Problem Description

- The objective of the NASA Wet Chemistry Lab (WCL) Data Analysis project is to provide data processing and in-depth analysis of the WCL data to enable better identification and/or quantification of additional chemical species present in the soil, thus leading to a more accurate modeling of the soil chemistry and mineralogy of Mars.
- A variety of instrumental and environmental factors during the 152 sols of WCL data collection have both provided a rich data set thus greatly increased the complexity of the data (see Figure 1 and Table 1). It has become clearly evident that the analyses were complicated by the presence of chemical species whose signal was convoluted into other sensor readings, and the effects of temperature and noise. The combined effect of these interferences has put into question the concentrations and identity of the ionic species that were directly measured.

### Requirements

- Understand the WCL problem and make reasonable abstraction. The choice of a good abstraction involves removing as much detail as possible while retaining validity and ensuring that the abstract actions are easy to carry out. Formulate the WCL data analysis problem as follows:
  - states
  - initial state
  - actions
  - transition model
  - goal test
  - path cost

### Submission Requirements

- Prepare your report in PDF and use the provided homework cover page as the report cover page and submit the final report to UMassOnline. Submit the paper copies of your report in class.

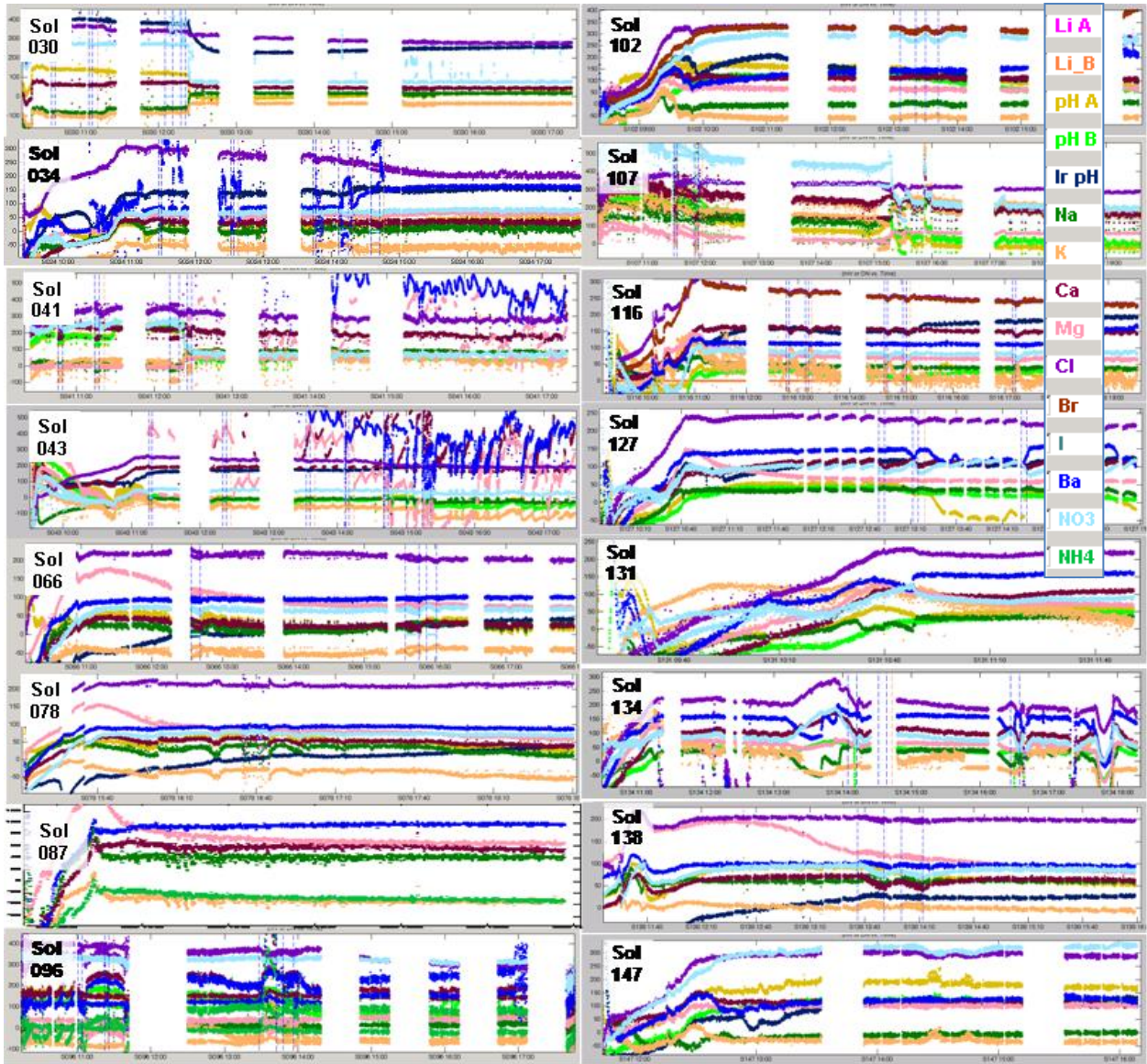


Figure 1. Raw WCL ISE sensor data collected for the entire sol for each cell during the entire mission

Table 1. WCL analysis events for entire surface mission.

Run*	CELL-0 Rosy Red	CELL-1 Sorceress 1	CELL-2 Sorceress 2	CELL-3 Golden Goose
Run 1	Sol 030 - First Sample	Sol 041 - "First Sample"	Sol 107 - "First Sample"	Sol 096 - "First Sample "
Run 2	Sol 032 - Beaker Thaw	Sol 043 -- Acid & Barium	Sol 116 - Acid & First Barium	Sol 102 -Second Sample
Run 3	Sol 034 - Acid & Barium		Sol 127 - "Second Barium"	Sol 147 - Third Sample
Run 4	Sol 066 - Second Sample		Sol 131 - Beaker Thaw	
Run 5	Sol 078 - Thermal Diagnostic		Sol 134 - Third Barium	
Run 6	Sol 087 - Diagnostic			

Run 7	Sol 138 - Third Sample			
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