PDS Geosciences Node

Supporting Information for

Elemental Composition and Geological Context of MSL APXS Targets from Sol 3054 to 3712

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In Support of the Manuscript
Elemental Composition and Isochemical Characteristics of the Clay-Sulfate Transition in Gale Crater, Mars: APXS Results from Mont Mercou to the Marker Band Valley

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Additional Supporting Information (File uploaded separately)

Data Set S1

Explanation for Data Set S1

Data Set S1 contains MSL-APXS results for sols 3054 to 3712, with geological context and selected observations for each target. Explanations for the columns of Data Set S1 are provided below. The data are available separately in the supporting information file named "ds01_2024.csv".

Explanation of columns in Data Set S1

Column name	Explanation
Sol	Martian solar days since *Curiosity* landed on August 6, 2012. One sol = 24.7 hours.
Target	The name of the APXS target. Names are taken from geographical place names according to naming conventions (e.g., Vasavada et al., 2014) and do not necessarily have any significance to the target itself. APXS target names are applied to a location on the martian surface with a footprint approximately less than 5 cm in diameter, with few exceptions. When other instruments analyze the same location, the same target name is used, with some exceptions. The APXS target names are appended with modifying information (e.g., _raster1, _raster2) when applicable, and the appended text may or may not correspond with appended text used by other instruments for the same target. Names are the same in the APXS data set in the Planetary Data System (DOI 10.17189/1518757).
Strat_group	Stratigraphic group name.
Strat_formation	Stratigraphic formation name.
Strat_member	Stratigraphic member name.
Informal_waypoint_outcrop_name	Informal name periodically assigned to waypoints, outcrop , and/or regions.
Note	Additional notes on the type of target, e.g., "diagenetic feature". Comments on targets above the Marker Band Valley are not included.
Diagenetic_observations	Observations about the morphology, color, occurrence, and notable compositional characteristics of features interpreted to be diagenetic. Notes if veins are crosscutting or concordant with the bedding planes. Comments on targets above the Marker Band Valley are not included.
Preparation_method	Describes the target preparation method with the abbreviations explained in Table S1.
Quality	Indicates targets with low quality due to sub-standard statistics or spectral resolution (FWHM Fe K_α >210 eV).
Fit_Type	Name of the fit method as described for the MSL APXS in the Planetary Data System (DOI 10.17189/1518757). It specifies the fit routine type and version used for the calculation of concentrations released herein.
Start_Time	Sol number and local mean solar time (24-hour clock format) at the beginning of the APXS integration. For example, 00046M11:43:31 denotes a start time on sol 46 at 11 hours, 43 minutes, and 31 seconds Mars time in Gale crater.
Northing	Northing coordinate of the target location in units of meters[a].
Easting	Easting coordinate of the target location in units of meters[a].
Elevation	Elevation of the APXS target in meters[a].
Standoff_distance	Estimated distance of the APXS sensor head from the mean surface of the target, in centimeters.
SH_Temp	Average temperature of the sensor head chassis during the integration in degrees C.
Lifetime	Duration of the APXS integration in seconds after removing poorer quality data. APXS integrations are time-partitioned into multiple blocks to allow for the selective removal of data of a poorer quality. Factors that can affect whether a block is accepted or rejected include its resolution (i.e. temperature), instrument lock-up, detector high voltage stabilization, etc.

FWHM	Full width at half-maximum at the Fe K-alpha peak, in eV.
Na2O	Oxide concentration in weight percent.
Na2O_err	Statistical fitting error (two sigma) in weight percent.
MgO	Oxide concentration in weight percent.
MgO_err	Statistical fitting error (two sigma) in weight percent.
Al2O3	Oxide concentration in weight percent.
Al2O3_err	Statistical fitting error (two sigma) in weight percent.
SiO2	Oxide concentration in weight percent.
SiO2_err	Statistical fitting error (two sigma) in weight percent.
P2O5	Oxide concentration in weight percent.
P2O5_err	Statistical fitting error (two sigma) in weight percent.
SO3	Oxide concentration in weight percent.
SO3_err	Statistical fitting error (two sigma) in weight percent.
Cl	Element concentration in weight percent.
Cl_Err	Statistical fitting error (two sigma) in weight percent.
K2O	Oxide concentration in weight percent.
K2O_err	Statistical fitting error (two sigma) in weight percent.
CaO	Oxide concentration in weight percent.
CaO_err	Statistical fitting error (two sigma) in weight percent.
TiO2	Oxide concentration in weight percent.
TiO2_err	Statistical fitting error (two sigma) in weight percent.
Cr2O3	Oxide concentration in weight percent.
Cr2O3_err	Statistical fitting error (two sigma) in weight percent.
MnO	Oxide concentration in weight percent.
MnO_err	Statistical fitting error (two sigma) in weight percent.
FeO	Oxide concentration in weight percent.
FeO_err	Statistical fitting error (two sigma) in weight percent.
Ni	Element concentration in parts per million.
Ni_err	Statistical fitting error (two sigma) in parts per million.
Zn	Element concentration in parts per million.
Zn_err	Statistical fitting error (two sigma) in parts per million.
Br	Element concentration in parts per million.
Br_err	Statistical fitting error (two sigma) in parts per million.

[a]https://an.rsl.wustl.edu/mer/help/Content/Using%20the%20Notebook/Main%20sections/Maps/Traverse%20map.htm "The base map is a subset of the Gale_C_PSP_010573_1755_010639_1755_25cm image georeferenced by Tim Parker and Fred Calef for their localization activities. The traverse is generated by applying the best_tactical places solution updates to the raw rover telemetry."

Table S1: Description of sample preparation methods

Preparation method	Abbreviation (Data Set S1)	Description
Unbrushed rock	RU	As-is, unbrushed rock surface
Brushed rock	RB	Rock surface after brushing by DRT
Minidrill	MD	Shallow test drill; ~1-5 mm in depth; APXS deployed over chipped/abraded rock
Drill tailings	DT	Drill tailings ejected from the hole without being acquired by SA/SPaH, extracted from a range of depths in the drill hole up to ~5 cm and primarily from the top 2-3 cm
DBA drill fines	DBA	Sample dumped from the drill bit assembly (DBA) using the feed extended drilling and feed extended sample transfer (FED/FEST) techniques (sols >1536)
Undisturbed soil/sand	SU	Soil and sand as-is, untouched by the rover hardware
Disturbed soil/sand	SD	Soil and sand that has been disturbed by the rover's scoop and/or wheels
Failed drill fines	Fines_fail	Sample fines dumped by SA/SPaH but did not fill the APXS FOV and/or was not infinitely thick with respect to APXS sampling depth