JEZ-1 Jezero Delta Simulant | **Fact Sheet**

December, 2022

Simulant Name: JEZ-1 Jezero Delta Simulant
Simulant Type: General purpose
Reference Material: Jezero crater deltas
Uncompressed Bulk Density: 1.54 g/cm^3
Mean Particle Size: 70 µm
Median Particle Size: 60 µm
Particle Size Range: <0.04 – 500 µm

Geotechnical Properties

Avg Angle of Repose: 42.2°
Max Angle of Repose: 46.6°

More coming soon!

Mineralogy

As mixed.

Component	Wt.%
Olivine	32.0
Anorthosite	16.0
Glass-rich basalt	13.5
Pyroxene	12.0
Mg-carbonate	11.0
Smectite	6.0
Mg-sulfate	2.4
Ferrihydrite	2.1
Hydrated silica	1.8
Magnetite	1.1
Anhydrite	1.0
Fe-carbonate	0.8
Hematite	0.3

Safety

See SDS for details. Primary hazard is dust inhalation; wear a respirator in dusty conditions.

Bulk Chemistry

Relative abundances. Measured by XRF.

Oxide	Wt.%
SiO_2	36.4
TiO_2	0.4
Al_2O_3	8.0
FeO	11.9
MnO	0.1
MgO	25.6
CaO	4.6
Na_2O	0.9
K_2O	0.3
P_2O_5	0.1
LOI*	10.0
Total**	98.4

* Loss on ignition
** Excluding volatiles and trace elements

Photo credit Matthew Villegas. XRF data obtained by Hamilton Analytical Lab using fused bead sample preparation. Reflectance spectrum courtesy of Dr. Takahiro Hiroi, NASA RELAB, Brown University.

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Trace Elements
Measured by XRF

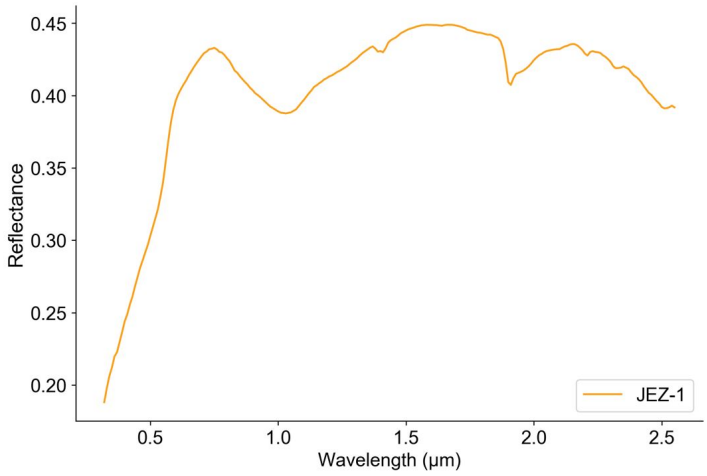
Element	ppm
Ni	1058
Cr	2080
V	68
Sc	9.8
Cu	10
Zn	56
Ga	7
Ba	100
Rb	7
Cs	0
Sr	141
Y	5
Zr	44
Hf	2.6
Nb	10.7
Ta	1
Mo	4
La	8
Ce	12
Nd	7
Sm	0.8
Dy	1.9
Yb	1.0
Th	3
U	0
Tl	0
Pb	3
Sn	0
Bi	0
Sb	1

Volatiles
Measured by XRF

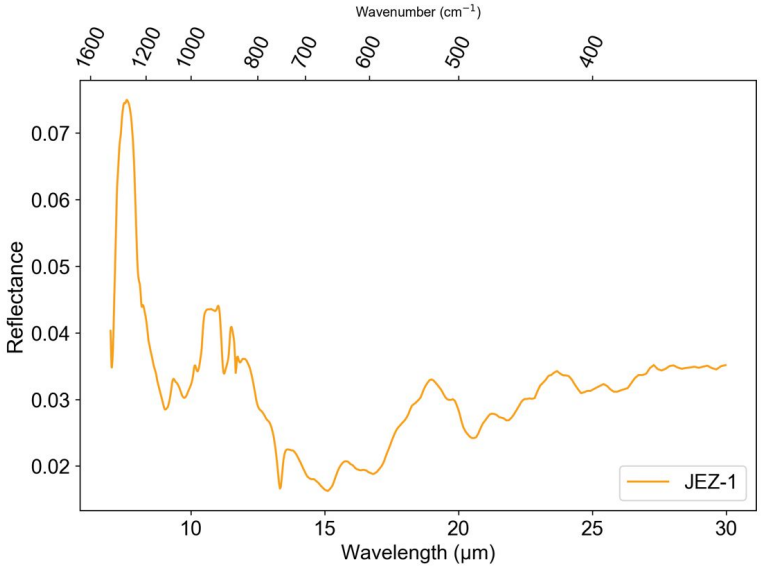
Compound	Wt%
F	≥0.04
Cl	≥0.002
SO_3	≥0.7

Compound	ppm
Br	≥1
As	≥0

Reflectance Spectrum
Incidence angle 30°, emission angle 0°



Mid-Infrared FTIR Spectrum



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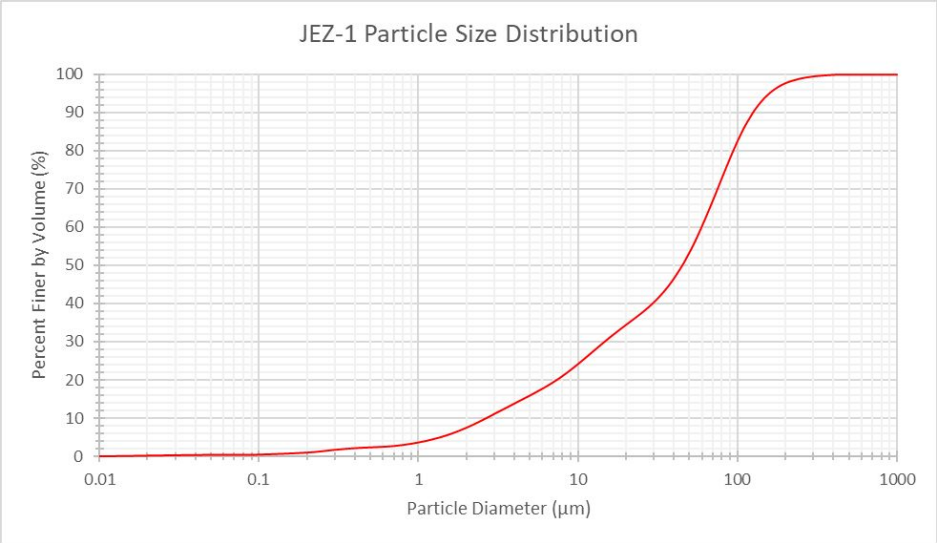
Volumetric Particle Size Distribution

From CILAS 1190 laser diffraction particle size analyzer



Sieve Analysis

Following ASTM Standard E11 using RO-TAP RX-30 sieve shaker

Sieve Number	Diameter (µm)	Mass of Soil Retained on Each Sieve (g)	Percent Retained by Mass (%)	Cumulative Retained by Mass(%)	Percent Finer by Mass(%)
18	1000.000	0.0000	0.0%	0.0%	100.0%
25	710.000	46.0000	4.6%	4.6%	95.4%
35	500.000	41.6667	4.1%	8.7%	91.3%
45	355.000	47.6667	4.7%	13.4%	86.6%
70	212.000	74.3333	7.4%	20.8%	79.2%
140	106.000	462.0000	45.9%	66.7%	33.3%
200	75.000	226.3333	22.5%	89.2%	10.8%
270	53.000	87.0000	8.6%	97.9%	2.1%
PAN		21.3333	2.1%	100.0%	0.0%

Sieve analysis skews particle size larger, as many of the fines cling to the larger pieces of regolith. This is measured by mass percent rather than volume.