

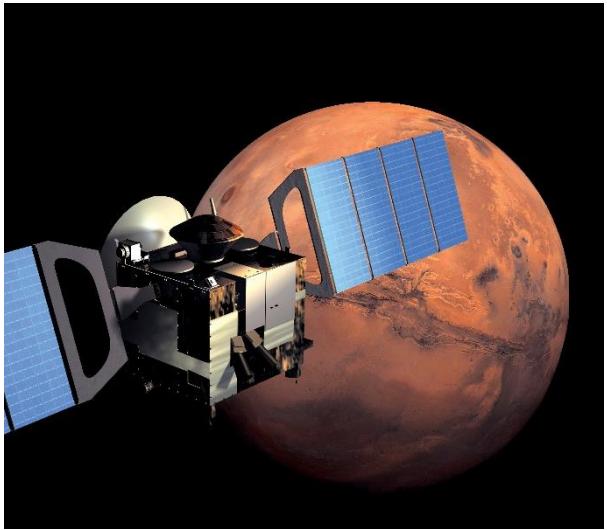
Mars Express Power Challenge

CC71Q - Introducción a la Minería de Datos

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25.Abril.2016

Mars Express Orbiter: Cartografía planetaria

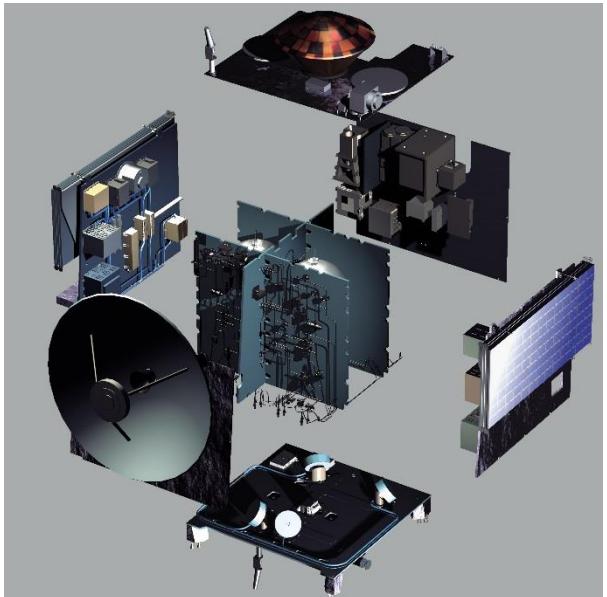


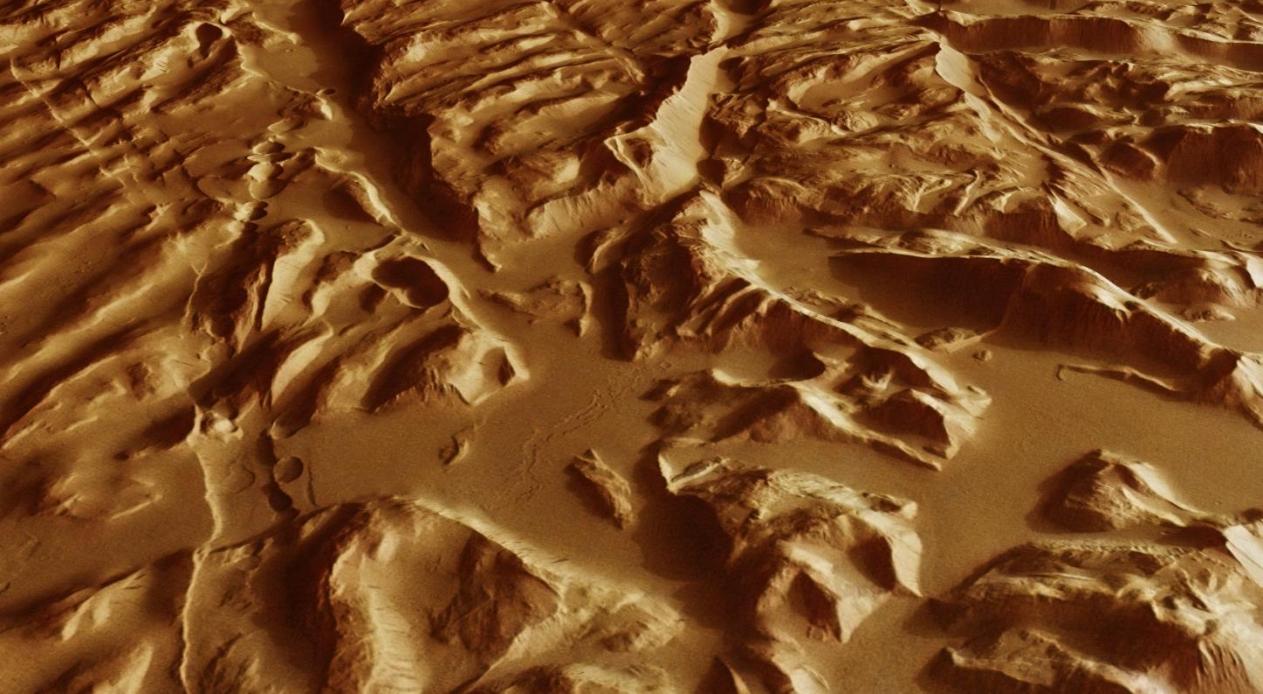
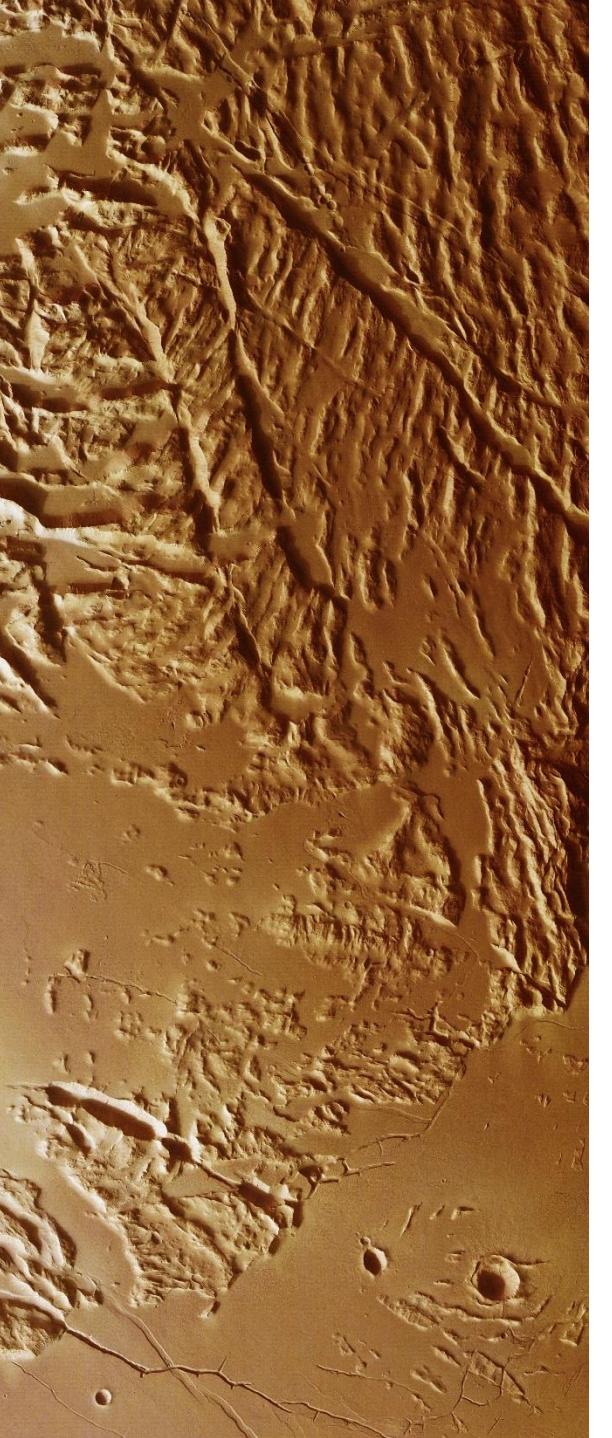
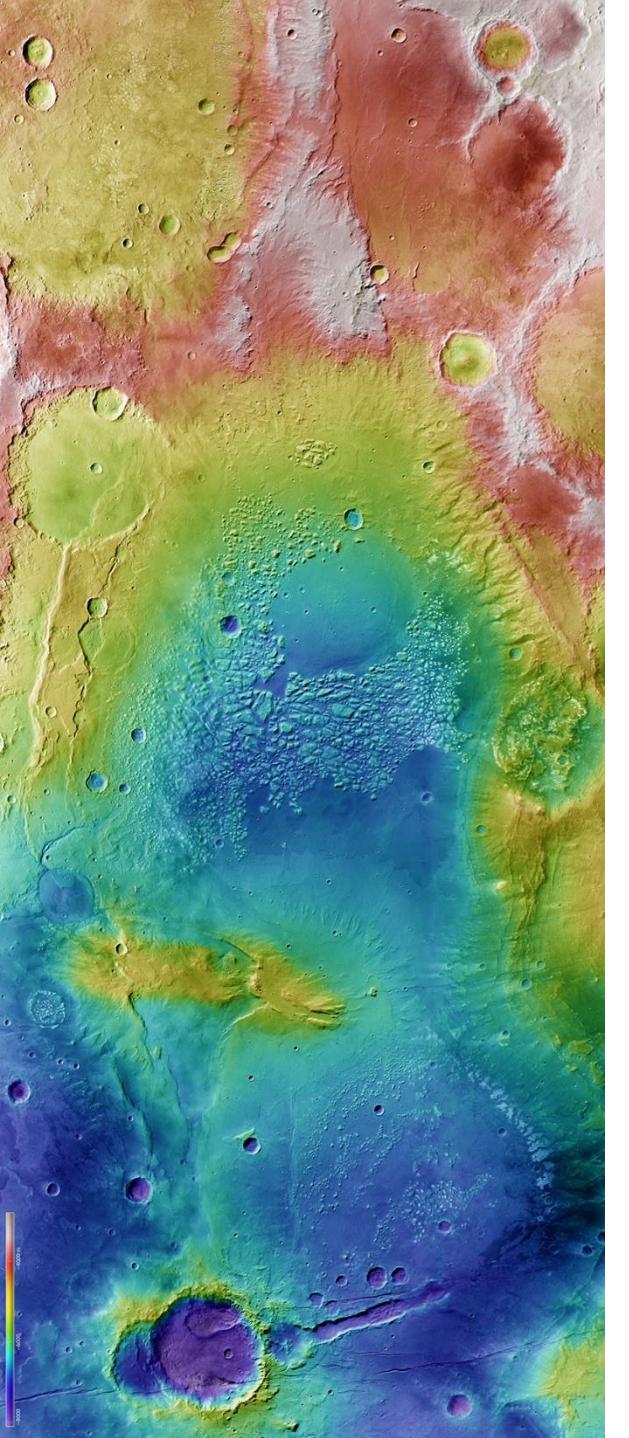
Mission:

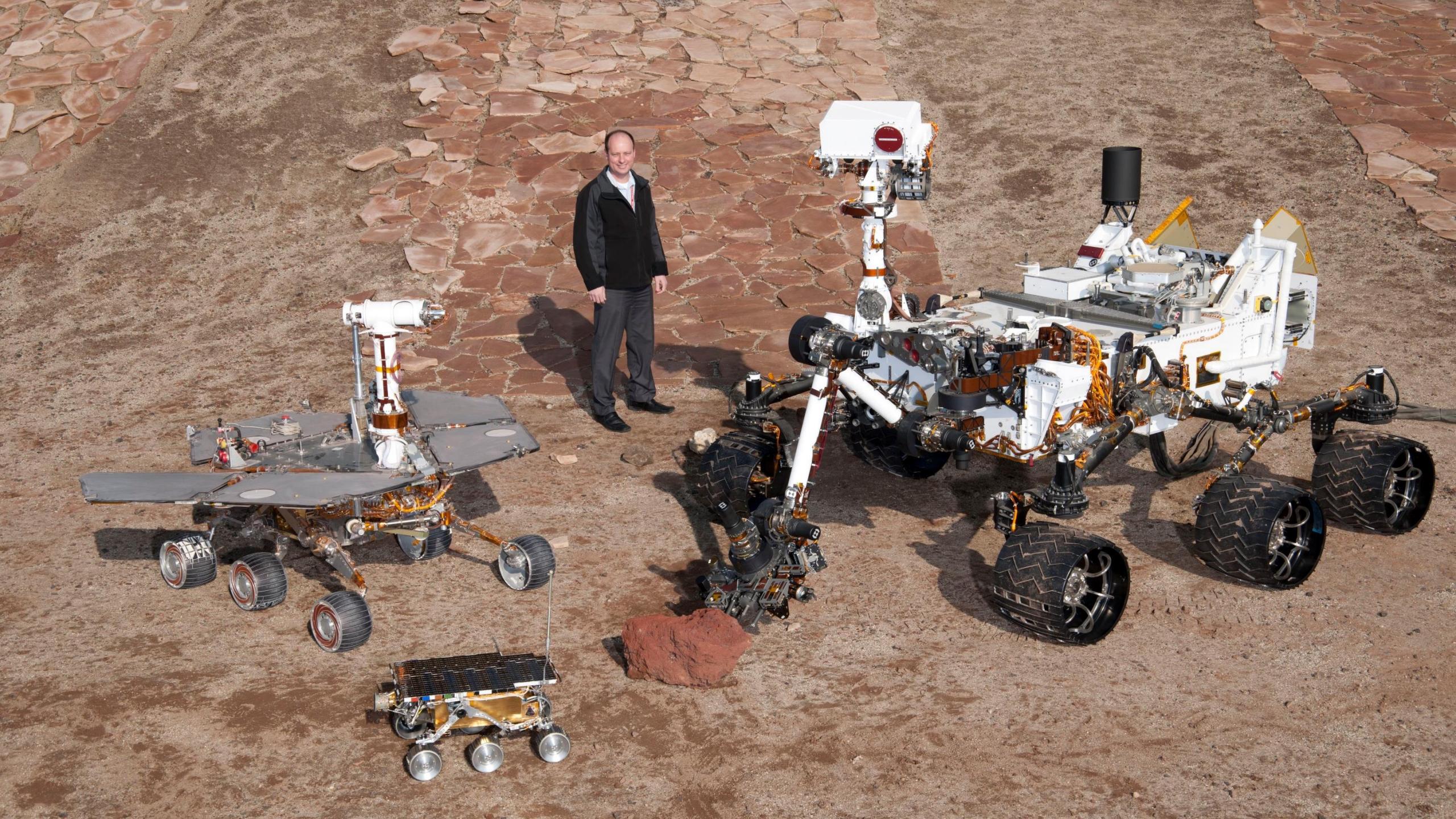
- Image the entire surface at high resolution (10 metres/pixel) and selected areas at super resolution (2 metres/pixel);
- Produce a map of the mineral composition of the surface at 100 metre resolution;
- Map the composition of the atmosphere and determine its global circulation;
- Determine the structure of the sub-surface to a depth of a few kilometres;
- Determine the effect of the atmosphere on the surface;
- Determine the interaction of the atmosphere with the solar wind.

Tools:

- High Resolution Stereo Camera (HRSC);
- Energetic Neutral Atoms Analyser (ASPERA);
- Sub-Surface Sounding Radar Altimeter (MARSIS);
- Mars Radio Science Experiment (MaRS);
- Ultraviolet and Infrared Atmospheric Spectrometer (SPICAM);
- Planetary Fourier Spectrometer (PFS);
- Visible and Infra Red Mineralogical Mapping Spectrometer (OMEGA);



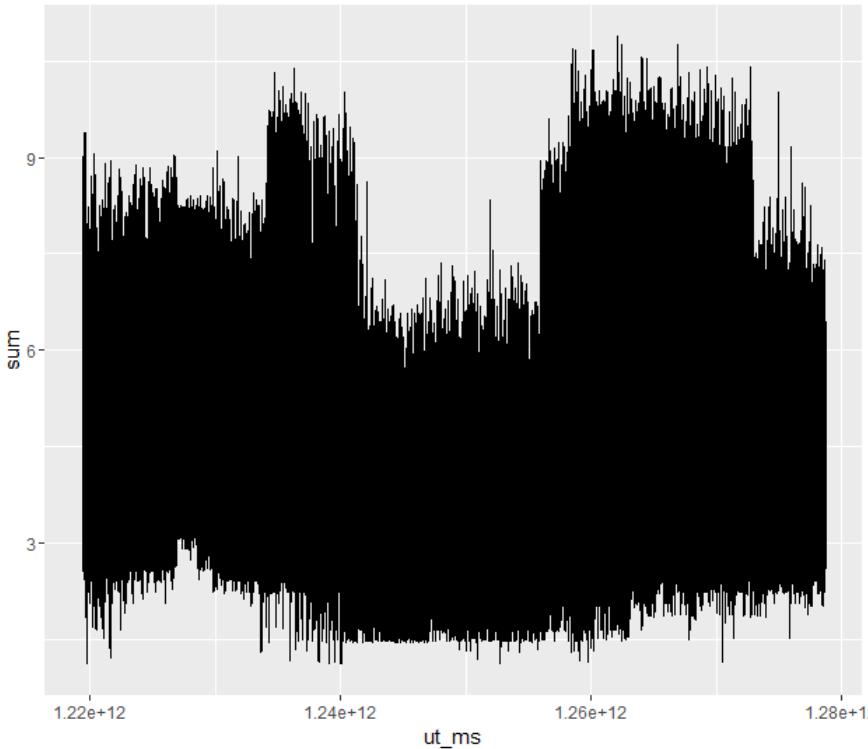




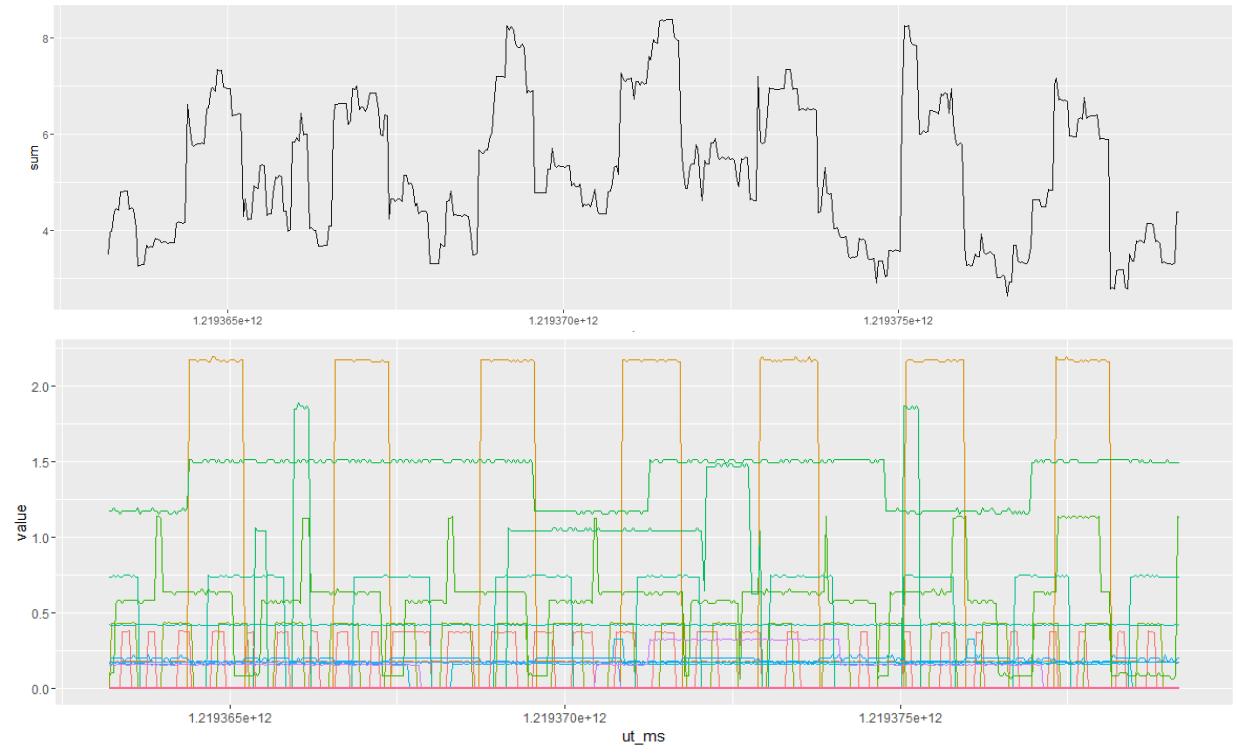
Mars Express Power Challenge

Problema: Predicción del consumo energético del satélite

$$E_{\text{Ciencia}} = E_{\text{Solar}} - E_{\text{Nave}} - E_{\text{Climatización}}$$



Consumo: 1 año, Suma circuitos



Consumo [1:500]

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Datos: Estado (DMOP), Eventos (EVTF)

Datos por año (687d):
 3 Sets de entrenamiento
 1 Set de pruebas

Set	Años 1, 2 y 3	Año 4
SAAF, DMOP, FTL, EVTF, LTDATA	X	X
Power Circuits Consumption	X	?

ut_ms	subsystem
1,219,363,211,000	AXXX301A
1,219,364,909,000	AAAAF20C1
1,219,364,914,000	AAAAF57A1
1,219,364,919,000	AAAAF23G1
1,219,364,924,000	AAAAF60A1
1,219,365,615,000	AXXX305A
1,219,366,035,000	AXXX380A
1,219,366,635,000	ASEQ4200
1,219,367,381,000	ATTTF301E
1,219,369,061,000	ATTTF310A
1,219,369,181,000	APSF01A2
1,219,369,301,000	APSF02A1
1,219,369,306,000	APSF89A1

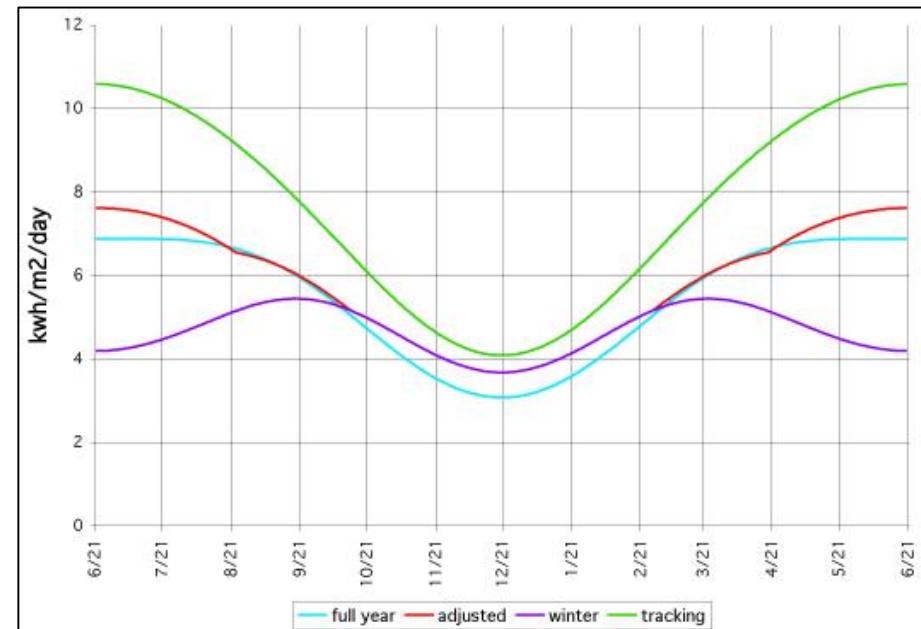
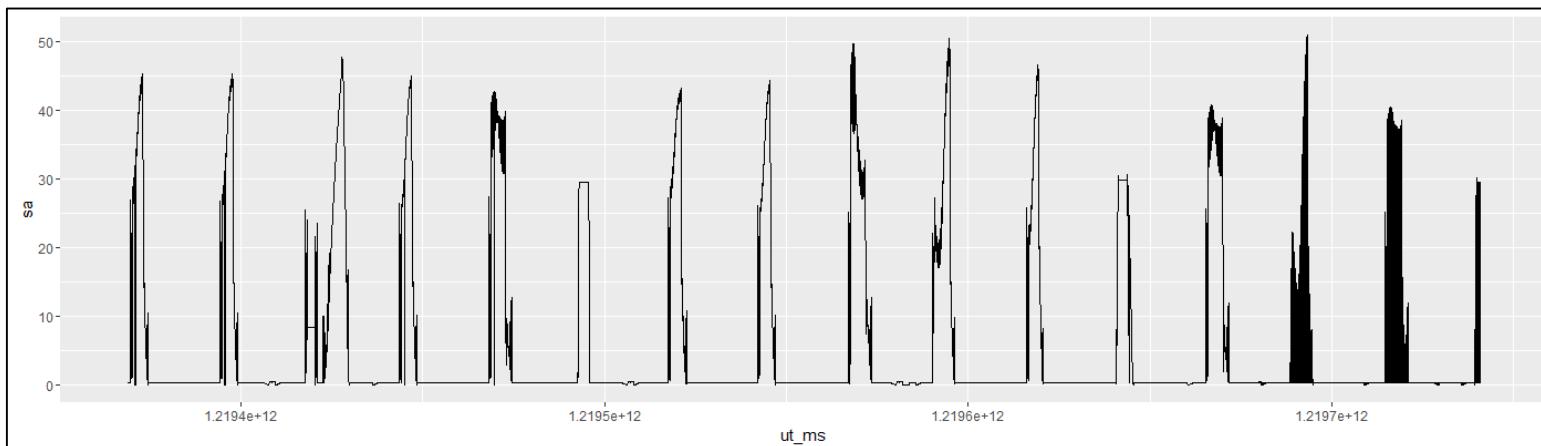
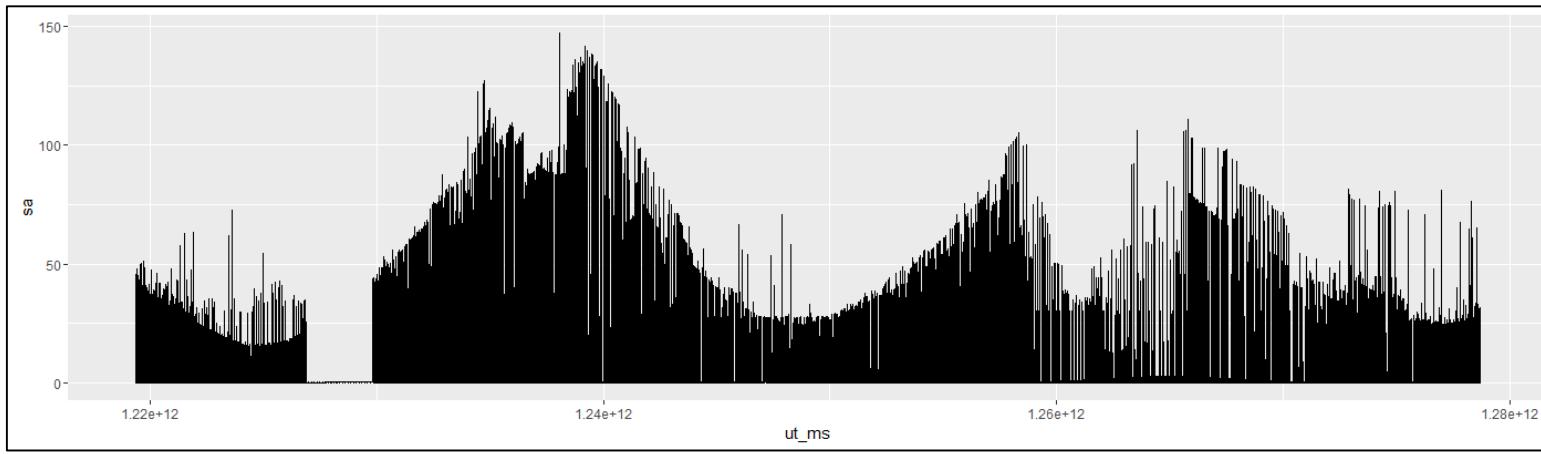
Detailed Mission Operations

ut_ms	description
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1,219,364,356,000	NNO_AOS_00/_RTLT_02373
1,219,365,058,000	MLG_LOS_02/_RTLT_02373
1,219,365,755,000	NNO_AOS_05/_RTLT_02373
1,219,367,159,000	NNO_AOS_10/_RTLT_02374
1,219,368,640,000	4000_KM_DESCEND
1,219,369,280,000	MRB/_RANGE_06000KM_START
1,219,369,855,000	OCC_MARS_200KM_START/_RA_181.68/_DE_-00.08/_OMP_(296.35,-46.48)/_SZA_077
1,219,369,949,000	OCC_MARS_START/_RA_181.69/_DE_-00.08/_OMP_(299.32,-43.44)/_SZA_076
1,219,369,956,000	2000_KM_DESCEND
1,219,370,016,000	MRB_AOS_00
1,219,370,500,000	1200_KM_DESCEND
1,219,370,632,000	MRB_AOS_10

Other Events (EVTF)

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Datos: Sol (SAAF)



Mars Express Power Challenge

Metodología propuesta

- Metodología:
 - Continuous values prediction: Regression
- Pre-procesamiento de los datos:
 - Identificar y transformar comandos ON/OFF de pulsos a zonas
 - Eliminar ruido de mediciones
 - Alinear comandos con tiempos más cercanos
 - Agregar características: Crecimiento, Varianza
- Asociación:
 - Buscar correlaciones entre circuitos y comandos
- Procesamiento:
 - Entrenamiento por circuitos

