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Mars Exploration Mission Elements

- Trace Gas Orbiter
- Mars Sample Return
- MAX-C
- Network Mission
GOALS
- Provide extensive survey of key trace gases
- Help us understand history of earth’s atmosphere and climate
- Life on Mars?

APPROACH
- High sensitivity spectrometers for trace gas detection
- Low-cost sounders and wide angle imagers with new microwave/sub-mm profilers
- Composition of crust and core
GOALS

- Obtain >350 gm of well-characterized, isolated samples from high-priority site and return to earth

APPROACH

- Sample acquisition and caching rover
- Mars assent vehicle
- Return orbiter
MAX-C
(Mars Sample Acquisition and Caching Rover)

GOALS

- Water activity
- Characterize site and prepare sample cache for retrieval
- Part one of Sample Return campaign

APPROACH

- Emphasis on quality sample cache
- Provide retrievable and carefully selected sample cache
- MER-class instruments
GOALS

- Lay out sites to look at:
  - Interior structure
  - Composition
  - Processes

- Geo/meteorological cycles

- Climate history

APPROACH

- Conduct interior measurements, particularly of seismic signals

- Does not require precision landing (advantage)

- Long term observing period (2+ years)

- Potential to build network over multiple launch opportunities
Possible Mission Set for Mars Exploration

2011
- MAVEN
- Mars Science Laboratory

2013
- Trace Gas Orbiter
- ExoMars (ESA)
- MAX-C
- Mars Network
- Mars Sample Return Orbiter
- Mars Sample Return Lander
Ground Based

- Develop:
  - Mars ascent vehicle (MAX-C)
  - MSR-O
  - Network of surface stations

- Improve:
  - Sample handling facilities (contamination control)

- Available:
  - LIDAR Laser Scanning Satellite
  - Magnetometers
  - RADAR technology
Why Mars is Important

- Possibility of life
- Climate Change
- Answer questions regarding formation of the solar system
- Science return per dollar
Image Resources

- Slide 2: [http://sci.esa.int/science-e-media/img/0c/Orbiter2016_Mars_02_410.jpg](http://sci.esa.int/science-e-media/img/0c/Orbiter2016_Mars_02_410.jpg)
- Slide 4: [http://astrobio.net/albums/mars/abu.jpg](http://astrobio.net/albums/mars/abu.jpg)
- Slide 9: [http://www.dailygalaxy.com/a/6a00d8341bf7f753ef014e8689b86a970d-500wi](http://www.dailygalaxy.com/a/6a00d8341bf7f753ef014e8689b86a970d-500wi)