Solar Dynamics Observatory

"…to understand the nature and source of the solar variations that affect life and society."

- **到達点：太陽の変動現象の本質と原因の解明**
  - **目的1、太陽変動のメカニズムの理解**
    - **太陽周期　　数ヶ月～数世紀**
    - **活動領域の進化　　数時間～数ヶ月**
    - **磁気要素の小規模相互作用　　数秒～数時間**
  - **目的2、宇宙空間への太陽活動の影響の理解**
    - **太陽照射量変動**
    - **フレアやＣＭＥによる荷電粒子**
    - **太陽風でのプラズマ擾乱**
    - **(宇宙天気予報)**
- **(参)** http://lws.gsfc.nasa.gov/docs/lws_sdo_sdt_report.pdf

SDO Mission

- **高空間時間分解能、連続観測**
  ⇒　地球同期軌道による
  常時コンタクト
- 2006**年後半～**2007**年初頭に、**
  デルタロケットにて打上げ
- **運用期間**
  ノミナル、5年間
  追加で、さらに5年間

SDO Instruments (higher priority)

Helioseismic/Magnetic Imager

- SOHO/MDI**の拡張型機器。全面画像で高分解能化**

Atmospheric Imaging Array

- SOHO/EIT**や**TRACE**の類似機器**
- TRACE**なみの空間分解能で全面画像取得**

EUV Spectral Irradiance Monitor

- 1 nm **〜** 120 nm**の照射量を長期間連続モニター**

(Total Solar Irradiance Monitor)

- **同時期の他衛星の存在を考えて(　)扱い**

SDO Instruments (high priority)

Photometric Mapper

- SDO**特有機器**
- photometric and bolometric images of the solar radiance.

Vector Magnetograph

- 5**分間間隔で全面走査**

UV/EUV Imaging Spectrometer

- Atmospheric Imaging Array **や**Magnetographs**と相補的役割**

Coronagraph

- SOHO/LASCO**と類似機器。**
- **高分解能化＆広視野化**(1.1 R Sun 〜 15 R Sun)。

Helioseismic/Magnetic Imager(1)

- **Measurement Characteristics for the Helioseismic Imager**
  - Observable — Osc. Time Series
  - Accuracy (Clock) — 10 -6
  - Dynamic Range — 13 km/s
  - Time Cadence — < 50 sec
  - Spatial Resolution — 1 arcsec
  - Field of View — Full Disk
  - Duration — 10 years
  - Completeness — 99.99% coverage, 95% of time

Helioseismic/Magnetic Imager(2)

- **Measurement Characteristics for the Longitudinal Magnetograph**
  - Observable — Longitudinal B
  - Precision — 5-50 G / 5 min
  - Accuracy — 0.1 G
  - Dynamic Range — Several kG
  - Time Cadence — ~ 1 min
  - Spatial Resolution — 1 arcsec
  - Field of View — Full Disk
  - Duration — 10 years

Atmospheric Imaging Array

- **Measurement Characteristics**
  - Observable — Intensity
  - Precision/Accuracy 1 — 0 %
  - Dynamic Range — 10^3 – 10^5
  - Time Cadence — 10 sec
  - Spatial Resolution — 1.2 arcsec
  - Field of View — 40 x 40 arcsec 2
  - Spectral Resolution — $l/\Delta\lambda \sim 20$
  - Temperature Range — 0.02 – 4 MK

EUV Spectral Irradiance Monitor

- **Measurement Characteristics**
  - Observable — Spectral Irradiance
  - Precision/Accuracy — 10 %
  - Dynamic Range — 10^3
  - Time Cadence — 10 sec
  - Spatial Resolution — None
  - Field of View — 1 °
  - Spectral Resolution — $\Delta\lambda$ ~ 0.1 nm
  - Spectral Range — 1 – 120 nm

(Total Solar Irradiance Monitor)

- **Measurement Characteristics**
  - Observable Total Irradiance
  - Precision/Accuracy 0.01%
  - Repeatability 0.001% per year
  - Time Cadence 1 min
  - Duration Solar Cycle
  - Completeness continuous
  - Field of View 2 °

Photometric Mapper

- **Characteristics**

– Channel	Photometric	Bolometric
– Observable	Surface Int.	Bolometric Int.
Precision	0.1 %	3 %
– Dynamic Range	>10^3	30
– Time Cadence	1 min	1 min
– Spatial Resolution	1 arcsec	10 arcsec
– Field of View	Full Disk	Full Disk
– Spectral Resolution	Narrow band	Broad band
– Completeness	95%	95%

Vector Magnetograph

- **Measurement Characteristics**
  - Observable — Vector B
  - Transverse Precision — 50 G (~3 °)
  - Polarimetric Precision — ~10^-4
  - Dynamic Range — Several kG
  - Time Cadence — ~ 10 min
  - Spatial Resolution — 1 arcsec
  - Field of View — Full Disk
  - Duration — 10 years

UV/EUV Imaging Spectrometer

- **Measurement Characteristics**
  - Observable — Line Profiles
  - Precision/Accuracy — Int. 10 %, Width 10%, Vel. 1-5 km/s
  - Dynamic Range — 10^3 – 10^5
  - Time Cadence — 10 sec
  - Spatial Resolution — ~1 arcsec
  - Field of View — 16 to 34 arcmin
  - Spectral Resolution — $l/\Delta\lambda$ ~ 30,000
  - Temperature Range — 0.02 – 4 MK

Coronagraph

- **Measurement Characteristics**

– Channel	Inner	Outer
– Observable	Polarized Int.	Polarized Int.
– Precision	10 %	10 %
– Dynamic Range	10^3	10^4
– Time Cadence	1 min	5 min
– Spatial Resolution	6 arcsec	30 arcsec
– Field of View	1.1-3. R Sun	2.5-15 R Sun
– Spectral Range	400-700 nm	400-700 nm