

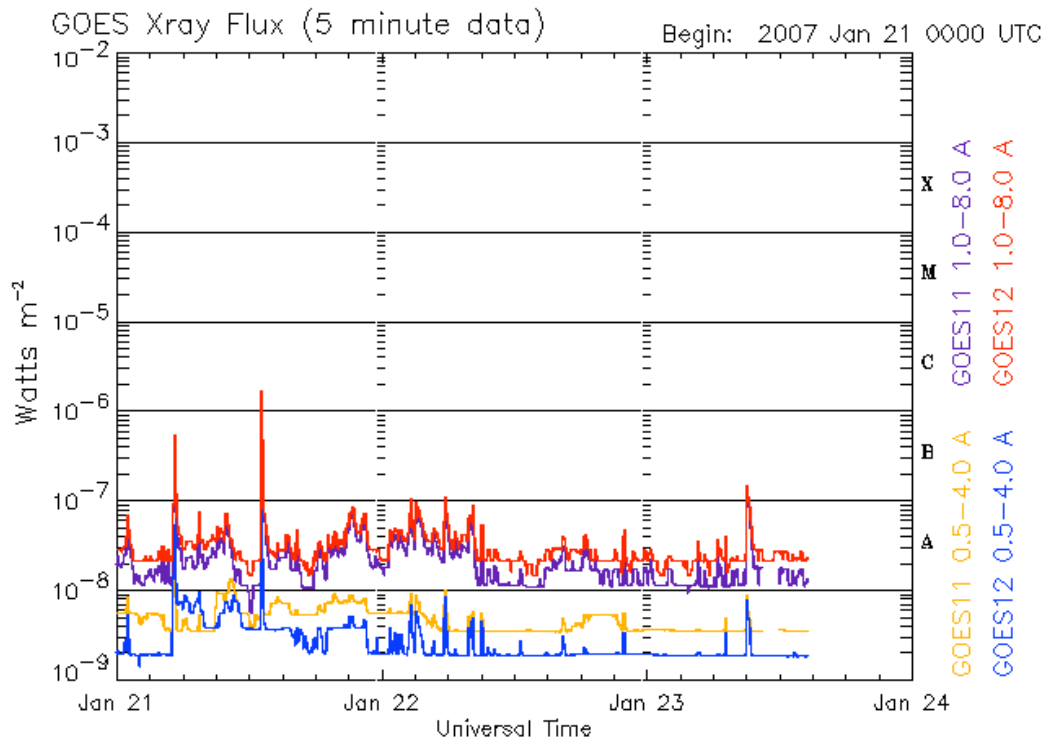
# THE FIRST TELESCOPE AT THE LUNAR OUTPOST

**SUMMARY:** When explorers begin building the lunar outpost a primary concern will be timely understanding of the space weather environment. The world space weather community will provide forecasts and information on the current status of the near earth environment. However, it is likely that lunar residents will need to have local space weather monitoring so they can determine the current conditions without depending on data transfer from earth, and can react to rapidly changing conditions. While the lunar space weather monitoring station augments systems on and near the earth, the capability of fully local forecasting will be a requirement for any permanent Mars base.

Among the basic tools for space weather monitoring will be solar telescopes. This talk outlines a possible first set of telescopes, their operational use, and the role they will play in the development of other telescopes on the moon.

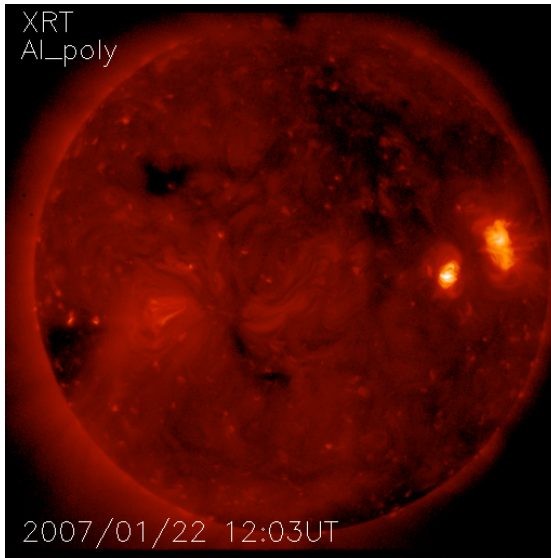
**GOALS:** Provide on-site data for basic space weather forecasting and nowcasting. Learn how to build, operate and maintain lunar observatories starting with small instruments. The development of this infrastructure includes site development, mounting and tracking, remote operations, data transfer and on-site data analysis. The establishment of the data pipeline on the moon will extend capabilities of the lunar outpost. Prepare for Mars base.

**BASELINE INSTRUMENTATION:** GOES full sun x-ray spectrometers; X-Ray imaging telescope (SXI or XRT like); vector magnetograph (photospheric or chromospheric).

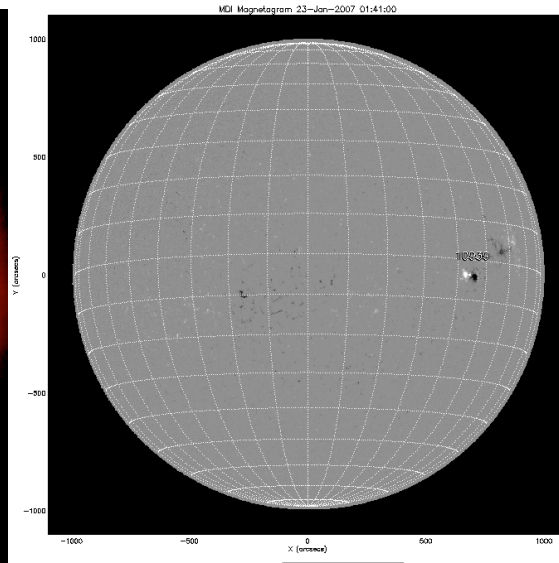


Updated 2007 Jan 23 14:41:05 UTC

NOAA/SEC Boulder, CO USA



XRT



MDI

**FIRST STEPS:** Define the operational requirements for on-site forecasting. Define the mass and power constraints on the telescope packages. Trade studies for telescope package: resolution requirements (X-ray and visible light telescope), cadence, photosphere vs chromosphere magnetic fields, vector fields vs LOS. Analysis software and training requirements: pipeline analysis to produce predictions and current status.

**FOLLOW-ON STUDIES:** Determine the level of effort needed to deploy and operate simple telescopes in the harsh environment of the moon. Determine the level of training and software development needed for lunar residents to utilize on site data.

**HUMAN INVOLVEMENT:** Site development, installation of the telescopes, installation of analysis computers, instrument control computers and software.

**TIMING:** Timing of the development of an on-site space weather forecasting system must be assessed; it is partially redundant in the lunar environment, but required for Mars. The installation of these telescopes is likely to be one of the early activities at the outpost site.

**FUTURE BENEFIT:** On site space weather forecasting is critical for Mars exploration. Developing the infrastructure to accomplish that will be an important activity of the lunar outpost.