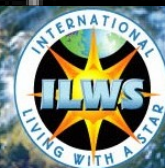


# Toward the ILWS Decade

William Liu  
Canadian Space Agency

4<sup>th</sup> ILWS General Meeting  
Beijing, July 22-23, 2006

International  
Living With  
a Star



# Report and Outlook

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- State of the Program
- State of missions
- Future needs



# ILWS Mantra (<http://ilws.gsfc.nasa.gov>)

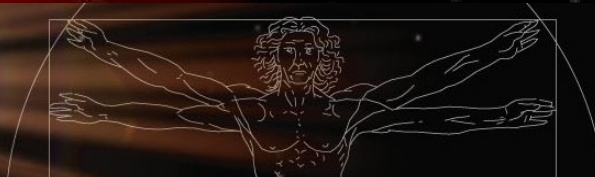
- **MISSION:**

Stimulate, strengthen, and coordinate space research to understand the governing processes of the connected Sun-Earth System as an integrated entity.

- **OBJECTIVES:**

To Stimulate and Facilitate:

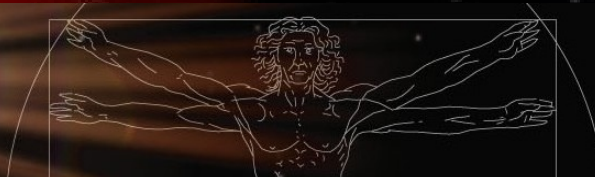
1. Study of the Sun-Earth connected system and the effects which influence life and society.
2. Collaboration among potential partners in solar-terrestrial space missions.
3. Synergistic coordination of international research in solar-terrestrial studies, including all relevant data sources as well as theory and modeling.
4. Effective and user driven access to all data, results, and value-added products.



# The ILWS Decade

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- In the next 10 years, more than 20 missions for Sun-Earth System Science will be launched by ILWS agencies
- The collection of these missions is International Living With a Star
- The Question:
  - How to make the ILWS Decade also the renaissance of our science?





# Program Update

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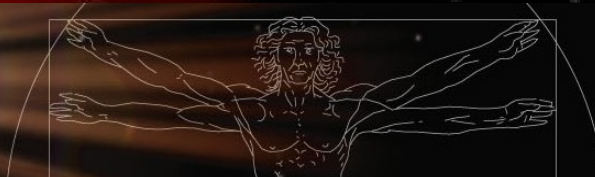
- Greece and Taiwan joined, giving a total membership of 28
- Steering Committee meetings
  - Goa, February 2006
  - Telecon, May 2006
- Solar Task Group formed (T. Hoeksema chair)
- Various discussions with CAWSES/SCOSTEP, IHY, eGY on matters of common interest, especially on data exploitation and preservation
- Conducted an independent peer review of Kuafu mission assessment study at the request of CNSA



# Program Update -cont.

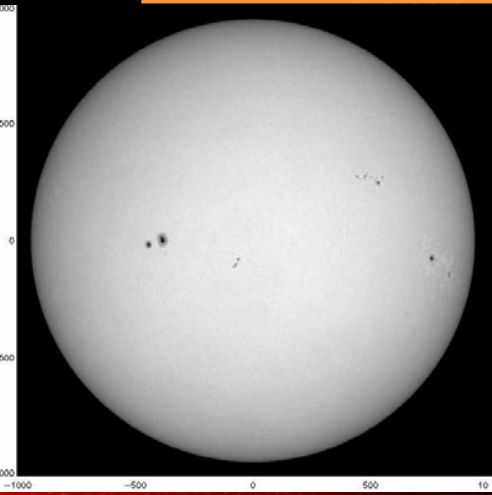
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- Several workshops, conference sessions
  - Goa Workshop
  - IAGA (2005) and COSPAR (2006) sessions
  - Varna Workshop (September 2006)
- Several mission launches this year
- NASA (Lika) is Vice Chair and will become Steering Committee Chair for 2007-8
  - Hurah! Je peux faire de la recherche à temps plein!

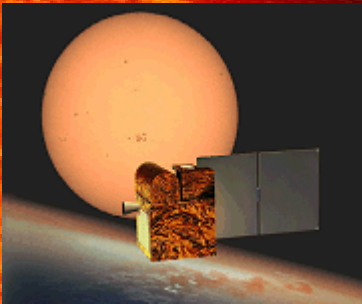


# Mission Update 1

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- Solar B (2006)
- STEREO (2006)
- Proba-2 (2007)
- Corona-Photon (2007)
- PICARD (2008)
- SDO (2008)
- Solar Orbiter (2015)



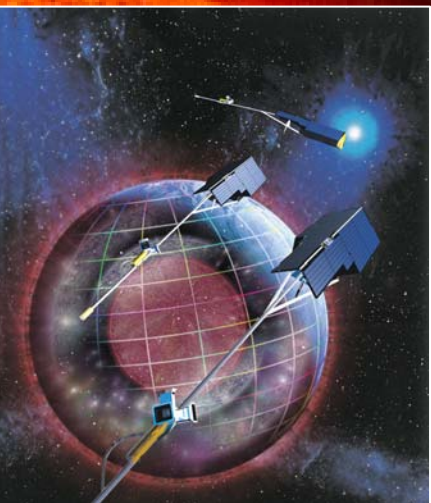
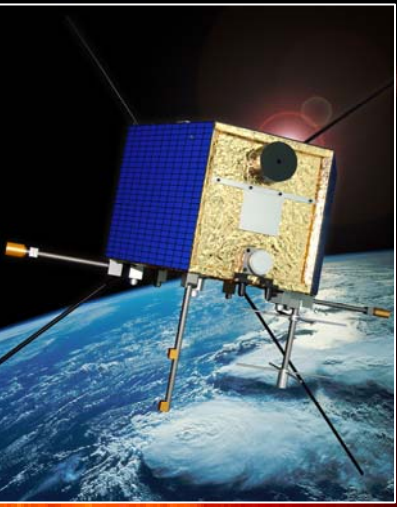
- 
- SMESE
  - Kuafu
  - Solar Sentinel
  - Solar Probe

International  
Living With  
a Star

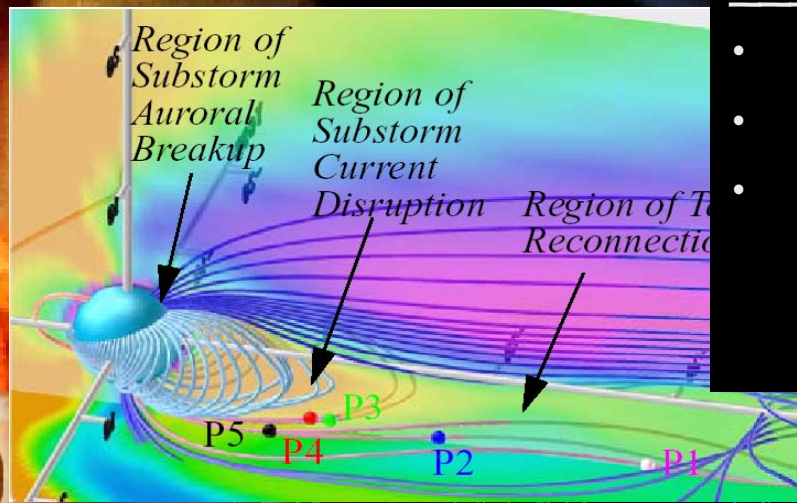




# Mission Update 2



a Star



- THEMIS (2006)
- ePOP (2007)
- Argo (2008)
- SWARM (2010)
- RBSP (2012)
- MMS (2013?)

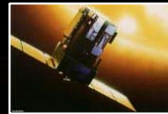
- ERG (2013)
- ORBITALS (2013-4)
- M<sup>3</sup>/SCOPE (>2016)



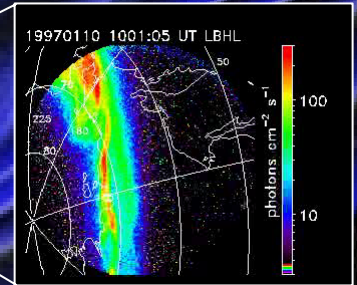


# New Opportunity 1

*Kuafu A*



*Kuafu B*



- Kuafu will be the first-ever coordinated simultaneous 24/7 imaging of the Sun and magnetosphere
- A large Canadian-Sino-European collaboration

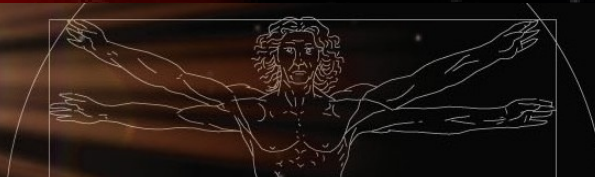


# New Opportunity 2

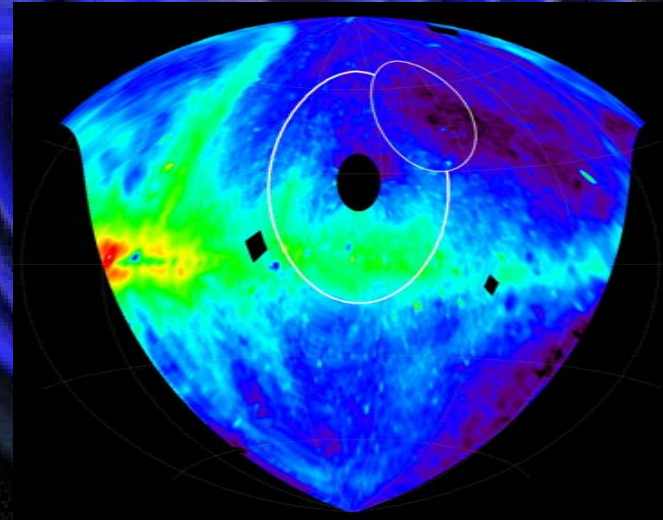
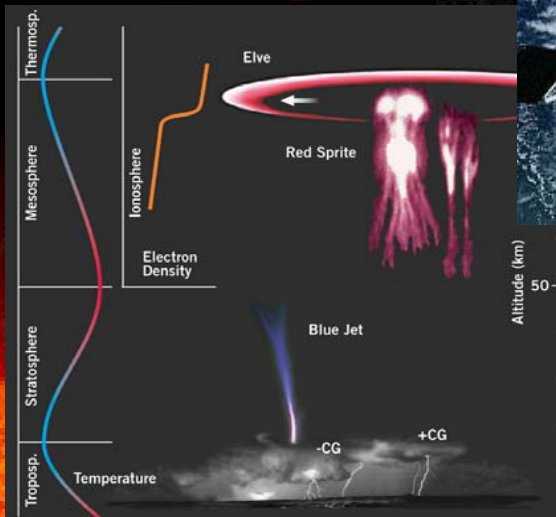
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- Canadian-US ORBITALS and Japanese ERG for radiation belt science



# New Opportunity 3

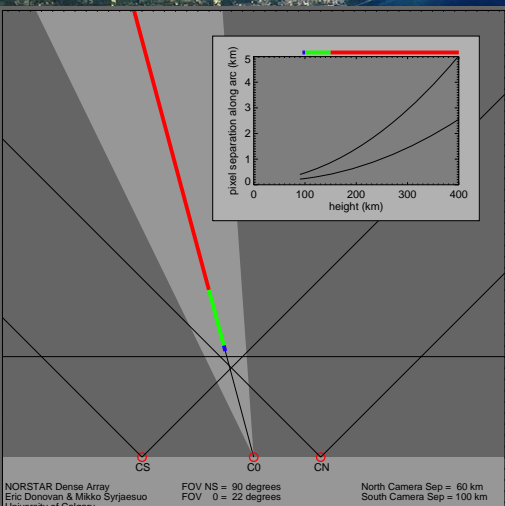
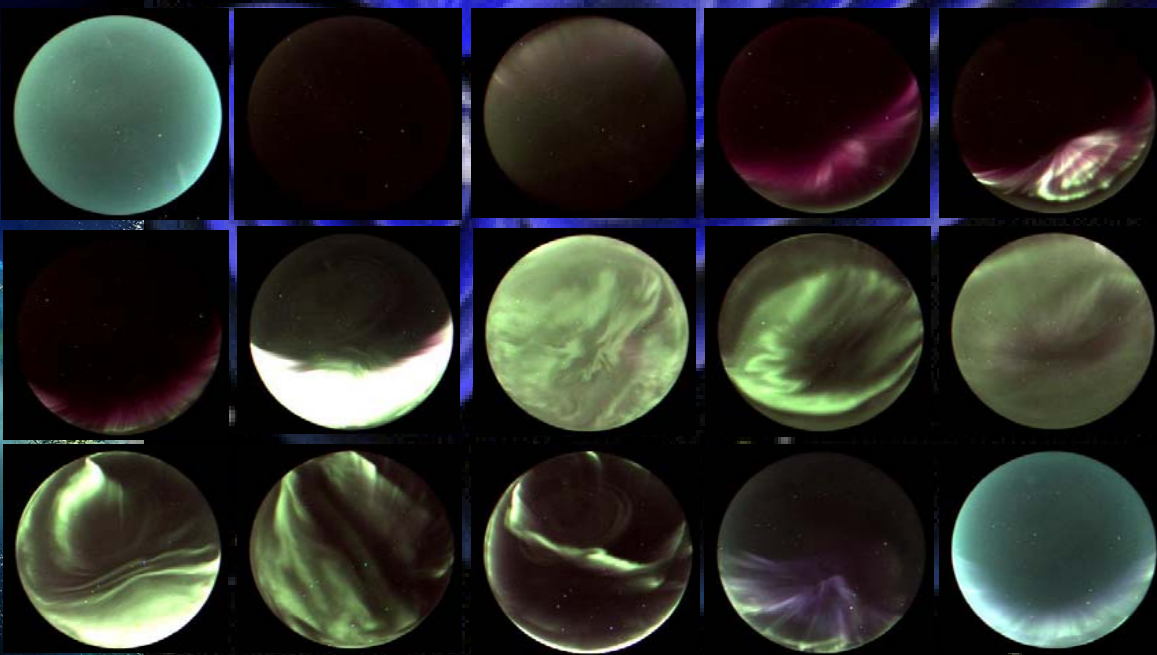
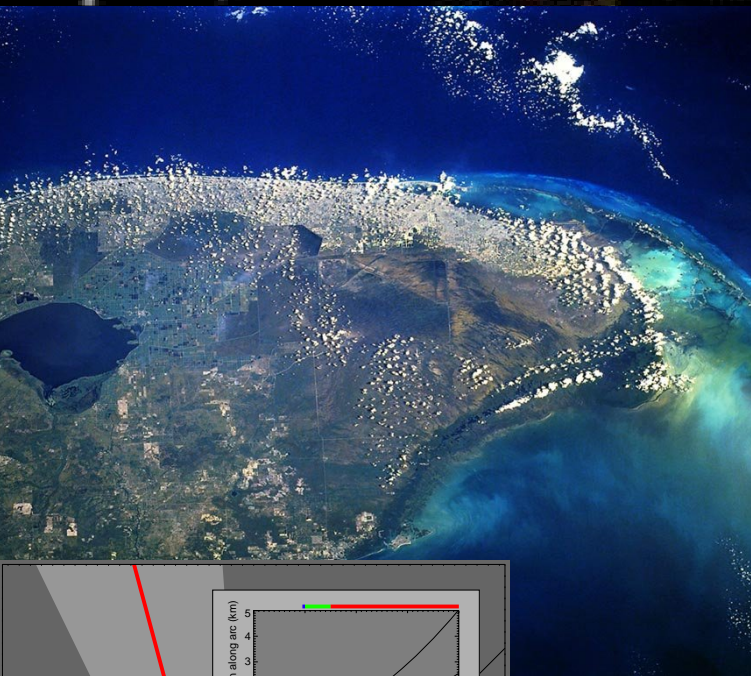


- ASIM (Atmospheric-Space Interaction Monitor) is a photometer-x-ray sensor package for flight in ISS

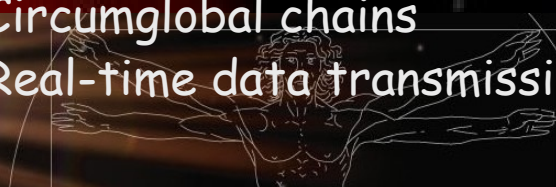




# Ground-based Science

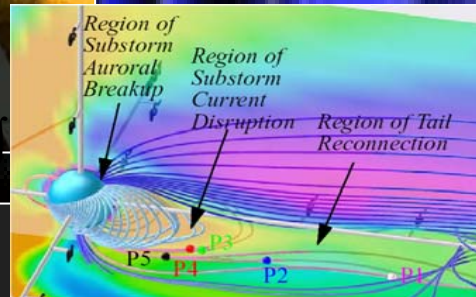


- Emergence of Super-Mag and GAIA
- Further expansion of remote-sensing radar networks
- Circumglobal chains
- Real-time data transmission solutions



# Issue 1: Data

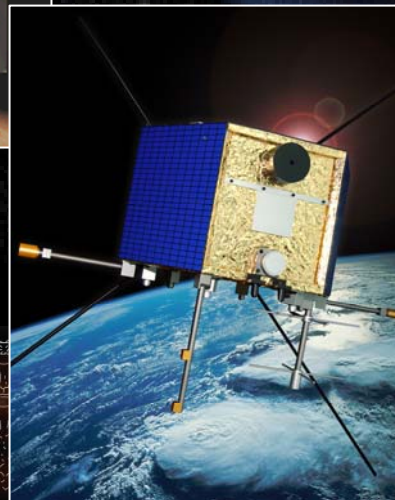
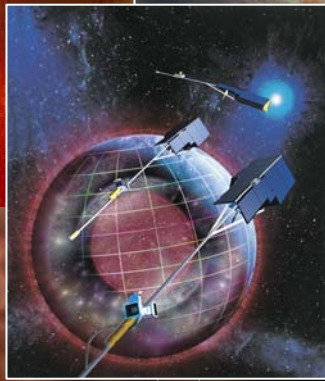
- Solar B
- STEREO
- Proba-2
- Coronas-Photon
- PICARD
- SDO
- Solar Orbiter
- THEMIS
- ePOP
- Argo
- SWARM
- RBSP
- MMS
- ASIM
- ORBITALS
- SMESE
- Kuafu
- M<sup>3</sup>/SCOPE
- ...



= ?

Cooperation with  
eGY, IHY,  
CAWSES, etc

International  
Living With  
a Star

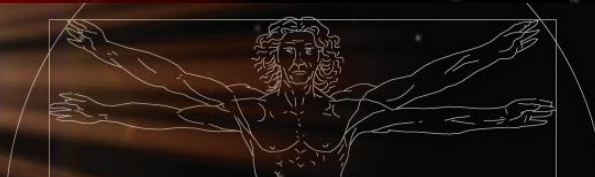




# Issue 2: Coordination

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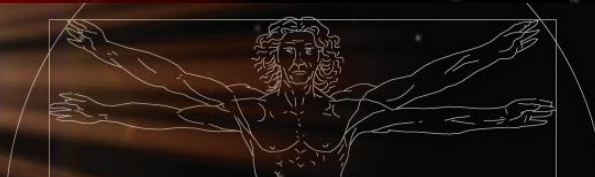
- A new wave of solar missions accentuates the importance of coordination
  - A principal task for Solar TG
- Proactive steps should be taken on the geospace side as well





# Issue 3: Missions under Planning

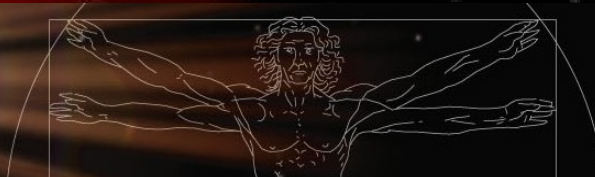
- Kuafu is an important test case on how ILWS can help optimize its science and fill important gaps
- Coordinated European action is very important
  - Not necessarily a zero-sum game vis a vis Solar Orbiter
  - China is important enough for Europe and Canada to invest more



# Issue 4: Ground-based

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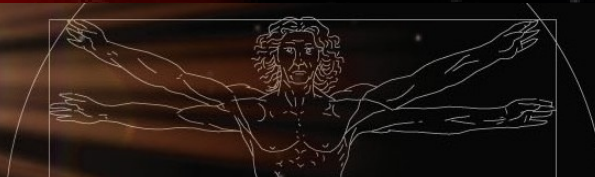
- Most ILWS agencies do not have direct mandate on GB
- ILWS won't be a scientific success if it is disconnected with GB community
- Creative links with this community need to be established
- A GB workshop to discuss how to best synergize ILWS missions and GB activities



# Issue 5: Break down boundaries

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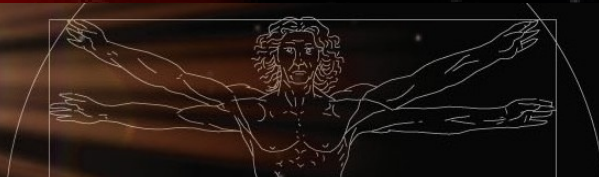
- Systems science requires scientists from different disciplines to communicate
- An ILWS symposium series (biannual?) over the ILWS Decade to focus on interdisciplinary problems and system-level approach to their solution





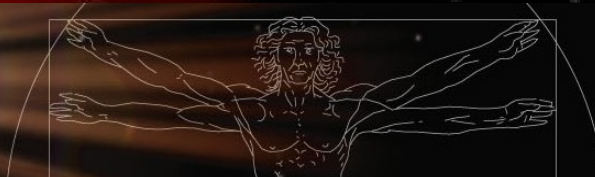
# Issue 6: IT and Atmosphere

- IT is now a weakness of the program
  - Falling in no-man's land
  - Lacking a compelling science or practical argument
  - Lacking leadership from the community
- IT will be a gap that can be filled by emerging ILWS countries
- IT can benefit from nontraditional partners (SWARM and ASIM examples)
- IT should look more seriously at geospace impact on the atmosphere (Sun-Climate Connection)



# Issue 7: Coordinated ILWS Mission Planning Framework

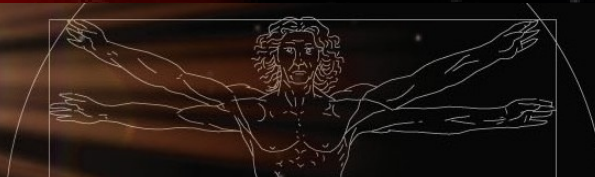
- An optional framework to plan a specific ILWS endorsed mission from the outset
  - E.g., M<sup>3</sup>/SCOPE
- Plus
  - Longer planning horizon
  - Allow participation from smaller agencies
- Minus
  - Increased legalism
  - May reduce agency flexibility due to international commitment



# Issue 8: Program Operation

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- Program budget
- Program newsletter
- Next ILWS Meeting
- etc





# Toward the ILWS Decade

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- We are on the verge of an exciting decade of discovery and international cooperation
- Much remains to be done
  - Articulate a powerful and sustainable vision for our science
  - Strengthen the international framework of cooperation
  - Establish a data infrastructure
  - Last hence the most, renew our human resource in space research
- A well-organized ILWS will help address all these needs.

