The Japan-America Society of Georgia
U.S.-Japan Now: Technology & Innovation Symposium

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@Smithsonian Air&Space Museum, D.C.
I have only 15 min to speak about 14 Billion years old history of Space!

- Technical Achievements & Capability through “Hayabusa” Mission
- Celebrating International Cooperation through Space
Returned Particles from an “Asteroid”

x1,000,000

10 – 50μm
(Human Hair ≈ 50μm)

Return Date: 2010/6/13
Asteroid “ITOKAWA”
Spacecraft “HAYABUSA”

Launch Date: 2003/5/9
Spacecraft “HAYABUSA”

530 kg (incl. 50 kg of chemical propellant and 65 kg of xenon gas.)
Spacecraft “HAYABUSA”
Space Orbit
“Not Easy to Catch”

- 0.3 Billion km Away
- 3 Billion km Catch-up (Rendezvous)
- 300m Asteroid Target (Moving/Rotating)
- Touchdown & Sample and Bring Home

Example: Shooting a “Mosquito” in Brasil from Japan! (With a tip of a Needle.)
HAYABUSA
“Long Journey”
HAYABUSA
“Long Journey”
HAYABUSA
“Long Journey”
HAYABUSA

“Long Journey”
HAYABUSA
“Long Journey”
(Reentry Video)
HAYABUSA
“Technical Capability”

- 1st Ever Unmanned Sample Return from a Celestial Body beyond Moon.
- 7yrs Duration of Ion-Engine Tech.
- Operation Skills during Contingency.
  - Communication Loss (Limited)
  - Attitude Control Loss (1 of 3)
  - Ion-Engine Loss (3 of 4)
HAYABUSA
“Influence (Domestic)”

Hands Complete!
HAYABUSA
“Influence (International)”
HAYABUSA
“What Now?”

Hayabusa 2 (Launched 2014/12/3)
Touchdown 2018 -> Return 2020

Rosetta Mission by ESA
Commet Landing: 2014/11/12

OSIRIS-Rex Mission by NASA
Launch 2016 -> Return 2023
JAXA’s Capability: 27 Perfect Flights for Recent 11 years (2004-15)

**H-II A**
- First Flight in 2001, and 21/22 successful launches.
- GTO 4-6 ton class capability

**H-II B**
- First Flight in 2009,
- 4 successful flights of 16.5 ton HTV to ISS
- GTO 8 ton class capability

**Epsilon**
- First Launch (Sept 14)
- 3 stages Solid Rocket
- LEO 1.2 ton, SSO 0.45 ton
① H-IIB Rocket (Liquid Propellant)
First Commercial Launch Service
ISS Mission Expedition 38/39
(Commander Astronaut Koichi Wakata)
JAXA Recent Highlights

③ GPM Earth Observation Mission (Global Precipitation Monitor)
You can find all about Japan Aerospace!

http://global.jaxa.jp/
JAXA’s Capability & International Cooperation (Multi-lateral)

International Space Station

HTV (Supply Transfer Vehicle)

Japanese Astronauts

- First Japanese ISS Commander
  JAXA Koichi Wakata
JAXA’s Capability & International Cooperation (Asia, Int’l, UN)

APRSAF (Asia Pacific Regional Forum)

- 19th Malaysia 33 nations, 14 Int’l Organization

IAF

- President 2013- JAXA Mr. Higuchi

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- Chair 2012-2014 JAXA Dr. Horikawa

Hosted and Secretariat by JAXA
JAXA’s Capability & International Cooperation (US-Japan)

Diplomatic Aspect of Space
Thank you for your attention.

御清聴ありがとうございました。
Contributions toward a Secure and Prosperous Society

**Earth Observation Satellites**
- Advanced Land Observing Satellite (ALOS) “DAICHI”
- Global Change Observation Mission-Water (GCOM-W) “SHIZUKU”
- Greenhouse Gases Observing Satellite (GOSAT) “IBUKI”

**Communication & Navigation Satellites**
- Wideband Internetworking Engineering Test & Demonstration Satellite (WINDS) “KIZUNA”
- 1st Quasi-Zenith Satellite “MICHIBIKI”

**Expansion of Human Frontiers**

**International Space Station (ISS)**
- H-II transfer Vehicle (HTV)
- ISS/Japanese Experiment Module (JEM) Kibo

**Space Science**
- Solar Physics Satellite “HINODE”
- SELEnological and Engineering Explorer “KAGUYA” “HAYABUSA”

**Space Exploration**
- Asteroid Explorer

**Development of Advanced Technologies**

**Space Transportation**
- H-IIA/B Rocket
- Epsilon Rocket

**Basic Technology Research**
- Large-thrust Ion Engine
- High-perf. Reaction Wheel

**Aeronautics**
- Research on Clean Engine Technology
History of Japan’s Civil Space Program and International Cooperation

- 1969 US-Japan Agreement on Space Cooperation
  - technology transfer from US on C-C base

- Early 1980’- 2010 Space Shuttle Cooperation
  - utilization and crew activities

- Late 1980’- ISS Cooperation as a Partner
  - full activities on JEM, HTV and Japanese crew

- 1990’- Expand to broad area including Earth observation, space science, aeronautics and so on as well as APRSAF