NASA Spectrum Management Issues
WRC-07 Status and other issues

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NASA Remote Sensing Spectrum Program Manager

Presentation to CORF

10 April 2006

Introduction

- World Radiocommunication Conferences occur every 4 years or so
- Purpose is to consider certain items on its agenda to modify the international Radio Regulations
- Next WRC is currently scheduled for October 2007

Primary WRC-07 NASA Agenda Items

- Agenda Item 1.2: Passive sensing sharing conditions in 10.6-10.68 and 36-37 GHz
- Agenda Item 1.3: Active sensing allocation extension of 200 MHz near 9.5 GHz
- Agenda Item 1.5: Aeronautical Mobile Telemetry (AMT) allocations
- Agenda Item 1.12: Possible changes to coordination and notification procedures for satellite networks

Primary WRC-07 NASA Agenda Items (continued)

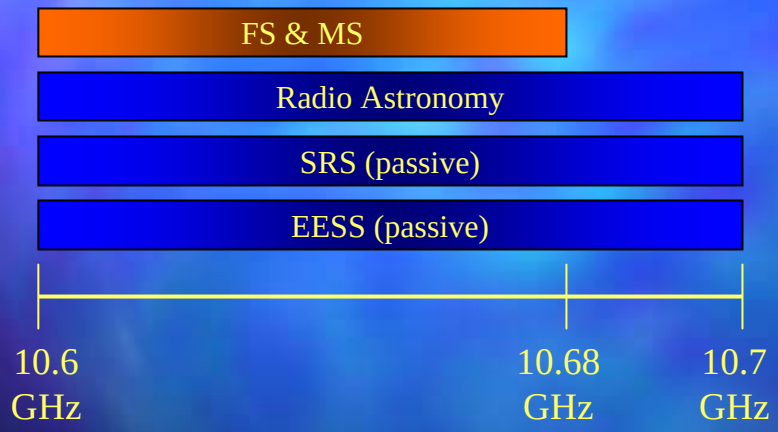
- Agenda Item 1.17: MSS feederlinks near 1400-1427 MHz and protection of passive services in this band
- Agenda Item 1.20: Protection of passive sensors from unwanted emissions
- Agenda Item 7.2: Future WRC agenda items

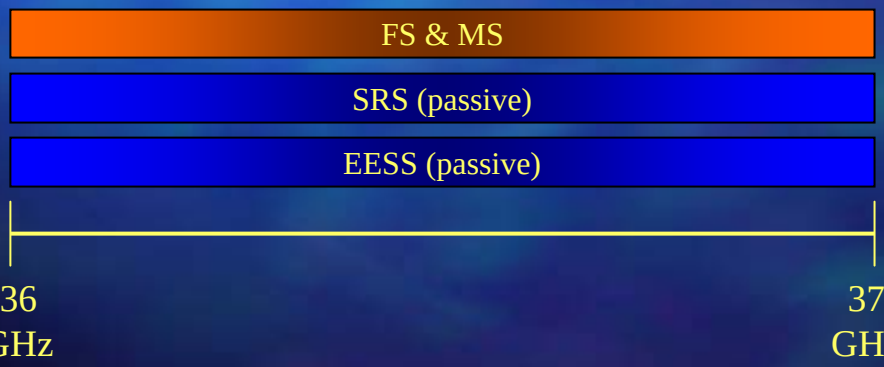
Secondary WRC-07 NASA Agenda Items

- Agenda Item 1.4: Frequency-related matters for IMT-2000 and beyond
- Agenda Item 1.8: HAPS near 30 and 50 GHz
- Agenda Item 1.18: Review PFD limits for HIO FSS systems in 17.7-19.7 GHz
- Agenda Item 1.19: Global harmonization of broadband FSS allocations for Internet access

Agenda Item 1.2

- Considers sharing conditions between FS/MS and passive sensors in the bands 10.6-10.68 GHz and 36-37 GHz



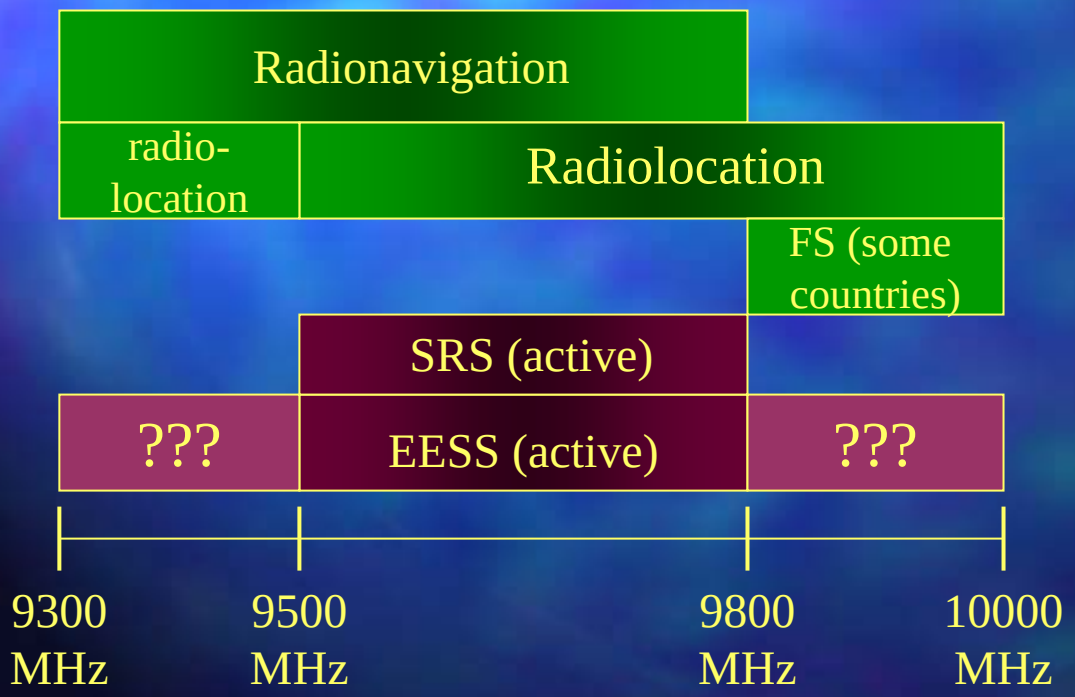


Agenda Item 1.2

- to consider allocations and regulatory issues related to the Earth exploration-satellite (passive) service, space research (passive) service and the meteorological satellite service in accordance with Resolutions **746 (WRC-03)** and **742 (WRC-03)**;
- U.S. proposal on MetSat extension sent to CITEL; currently under revision to address possible problem with BSS in 18.0-18.1 GHz
- CEPT draft ECP proposes extension in 18.3-18.4 GHz
- No proposals concerning passive sensors in 10.6 or 36 GHz bands to date.
- APT has no proposals but has generally supportive PVs

Agenda Item 1.3

- Considers an extension of 200 MHz to existing active sensing allocation from 9500-9800 MHz



Agenda Item 1.3

- in accordance with Resolution **747 (WRC-03)**, consider upgrading the radiolocation service to primary allocation status in the bands 9 000-9 200 MHz and 9 300-9 500 MHz and extending by up to 200 MHz the existing primary allocations to the Earth exploration-satellite service (active) and the space research service (active) in the band 9 500-9 800 MHz without placing undue constraint on the services to which the bands are allocated;
- US proposal for radiolocation upgrade; no proposal for EESS extension until issues resolved
- CEPT draft proposes radiolocation upgrade and extension to EESS (active) allocation in 9300-9500 MHz
- APT has no proposals but has generally supportive PVs

Agenda Item 1.5

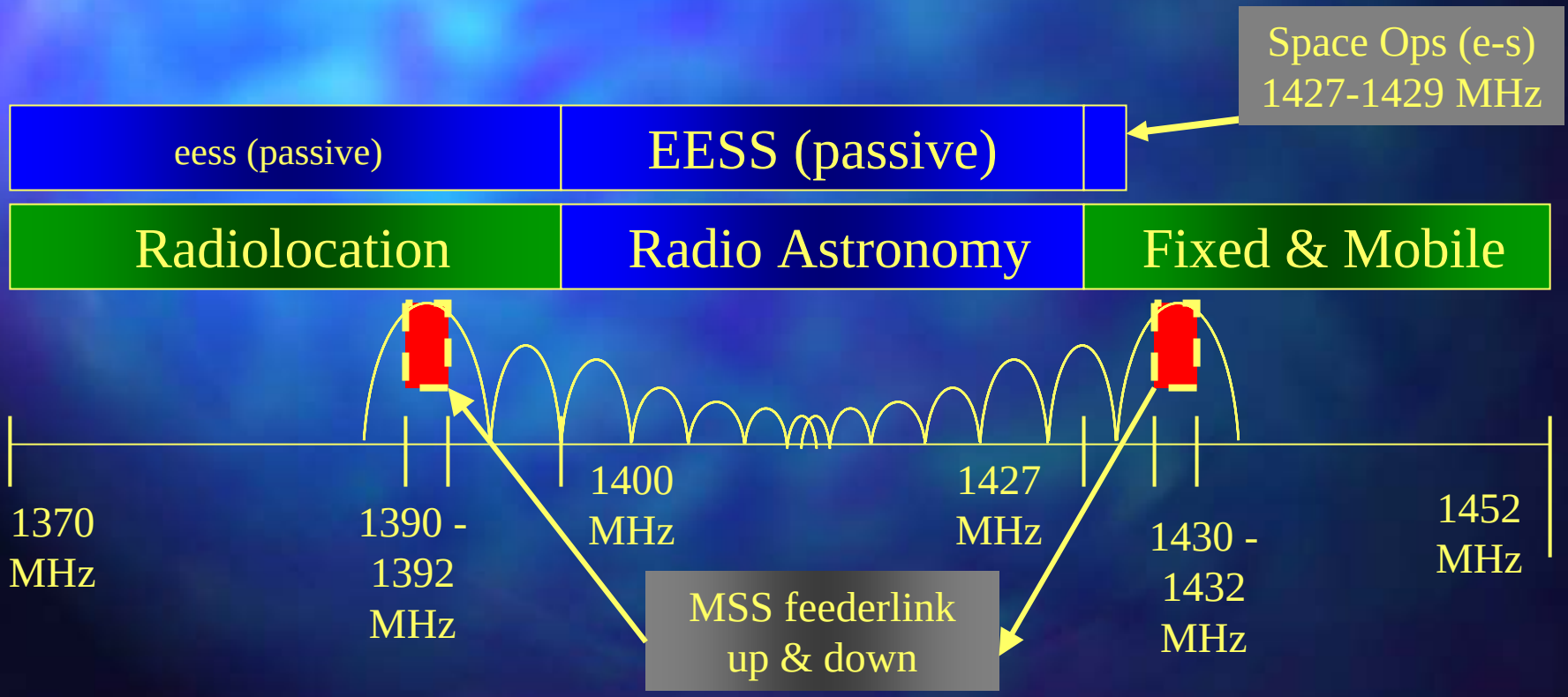
- to consider spectrum requirements and possible additional spectrum allocations for aeronautical telecommand and high bit-rate aeronautical telemetry, in accordance with Resolution **230 (WRC-03)**;
- No proposal as yet on actual allocations
- CEPT draft proposes AMT in 5030-5150 MHz and 5150-5250 MHz
- APT has no proposals but has generally supportive PVs

Agenda Item 1.12

- to consider possible changes in response to Resolution **86 (Rev. Marrakesh, 2002)** of the Plenipotentiary Conference: “Coordination and notification procedures for satellite networks” in accordance with Resolution **86 (WRC-03)**;
- RCS proposal for mandatory items for AP/Notification of NGSO satellites not requiring coordination and RCS proposal on notification of active and passive sensors sent to FCC
- CEPT & APT have no proposals at this time

Agenda Item 1.17

- Considers protection of existing services (including passive services in 1400-1427 MHz band) from MSS feederlink allocations in 1390-1392 MHz and 1430-1432 MHz bands

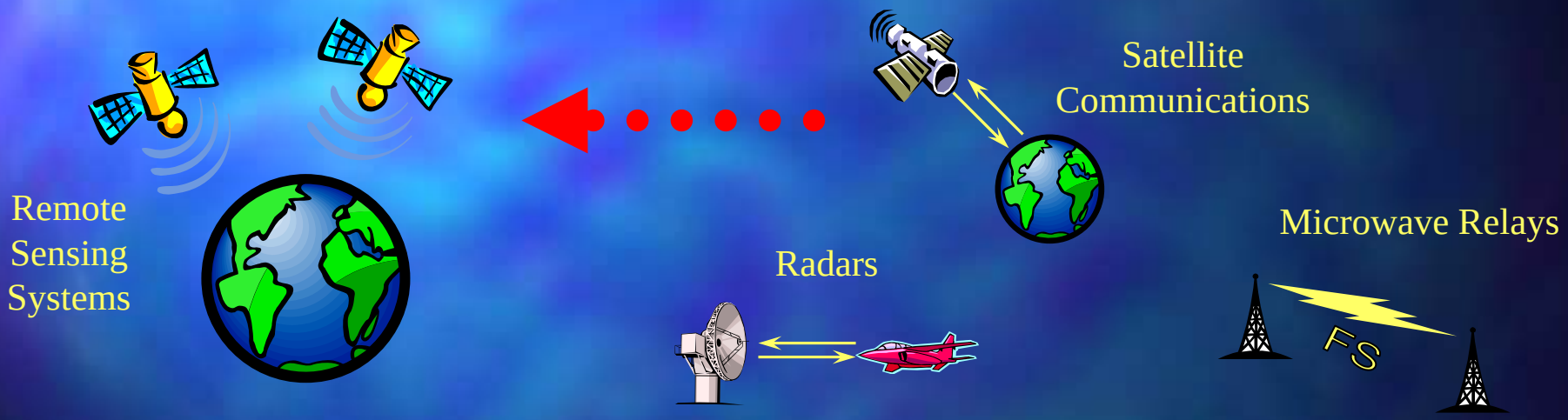


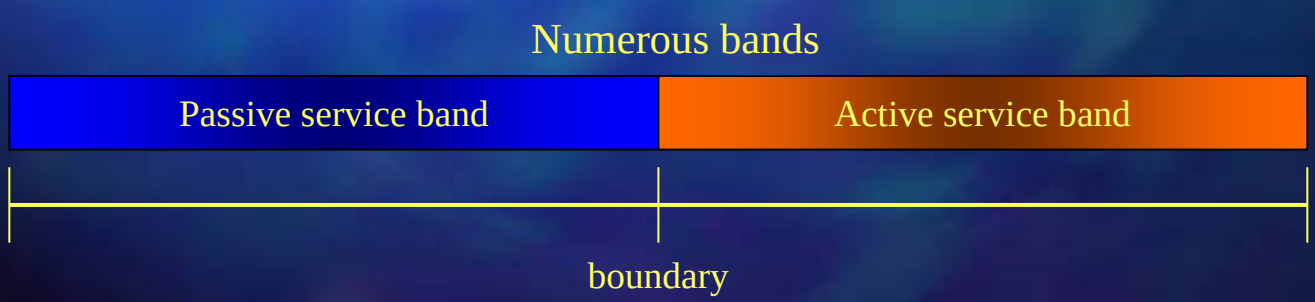
Agenda Item 1.17

- to consider the results of ITU-R studies on compatibility between the fixed-satellite service and other services around 1.4 GHz, in accordance with Resolution **745 (WRC-03);**
- RCS proposal submitted by NASA to SUP allocation for MSS feederlinks
- CEPT draft proposes to SUP allocation for MSS feederlinks
- APT PV supports protection of existing services from MSS feederlink emissions

Agenda Item 1.20

- Considers protection of passive sensors from unwanted/out-of-band emissions in specified bands (i.e., 1400-1427 MHz, 23.6-24 GHz, 31.3-31.5 GHz, 50.2-50.4 GHz and 52.6-54.25 GHz)





Agenda Item 1.20

- to consider the results of studies, and proposals for regulatory measures regarding the protection of the Earth exploration-satellite service (passive) from unwanted emissions of active services in accordance with Resolution **738 (WRC-03);**
- RCS proposal on various footnotes to protect passive sensors from unwanted emissions in certain bands. Proposal faces stiff opposition from FCC.
- CEPT draft ECP proposes power limits to FS transmitters in 31-31.3 GHz and 51.4-52.6 GHz
- APT has no proposals but PV generally supports possible regulatory solutions to protect EESS (passive)

Agenda Item 1.20

EESS (passive) band	Active service band	Active service
1 400-1 427 MHz	1 350-1 400 MHz	FS, MS and RLS
1 400-1 427 MHz	1 427-1 429 MHz	FS, MS and SOS (E-s)
1 400-1 427 MHz	1 429-1 452 MHz	FS and MS
23.6-24 GHz	22.55-23.55 GHz	ISS
31.3-31.5 GHz	30-31 GHz	FSS E-s
31.3-31.5 GHz	31-31.3 GHz	FS (except HAPS)
50.2-50.4 GHz	50.4-51.4 GHz	FSS (E-s)
50.2-50.4 GHz	47.2-50.2 GHz (Regions 2 & 3) 49.44-50.2 GHz (Region 1)	FSS
52.6-54.25 GHz	51.4-52.6 GHz	FS

Agenda Item 7.2

- to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, taking into account Resolution **803 (WRC 03)**;
- Draft proposal to SUP AI 2.2 (allocations above 275 GHz) and ADD AI concerning possible revision of RR **5.565.** Draft proposal to consider SRS (E-s) allocation within 22.55-23.55 GHz sent to FCC.
- No CEPT, APT proposals available at this time

Agenda Items of Secondary Concern to NASA

AI	Agenda Item Information	Proposals
1.4	Frequency-related matters for IMT-2000 and beyond	None at this time (NOC preferred)
1.8	HAPS near 30 and 50 GHz	None at this time (NOC preferred)
1.18	Review PFD limits for highly inclined orbit FSS systems in 17.7-19.7 GHz	US: NOC to Table 21-4 CEPT & APT: None at this time
1.19	Global harmonization of broadband FSS allocations for Internet access	US: NOC Article 5 CEPT & APT: None at this time

Current Remote Sensing Issues

- Domestic proceedings on rules for Ultra-Wide Band (UWB) devices, primarily vehicular radars from 22-29 GHz overlapping 23.6-24 GHz passive band in several countries
  - Interference into the important 23.6-24.0 GHz H_2O_V band from UWB vehicular radars could approach intolerable interference levels for high traffic densities, high market penetration, and particular look directions
  - Proceedings in Germany, Canada and New Zealand (recent) and Australia (current)

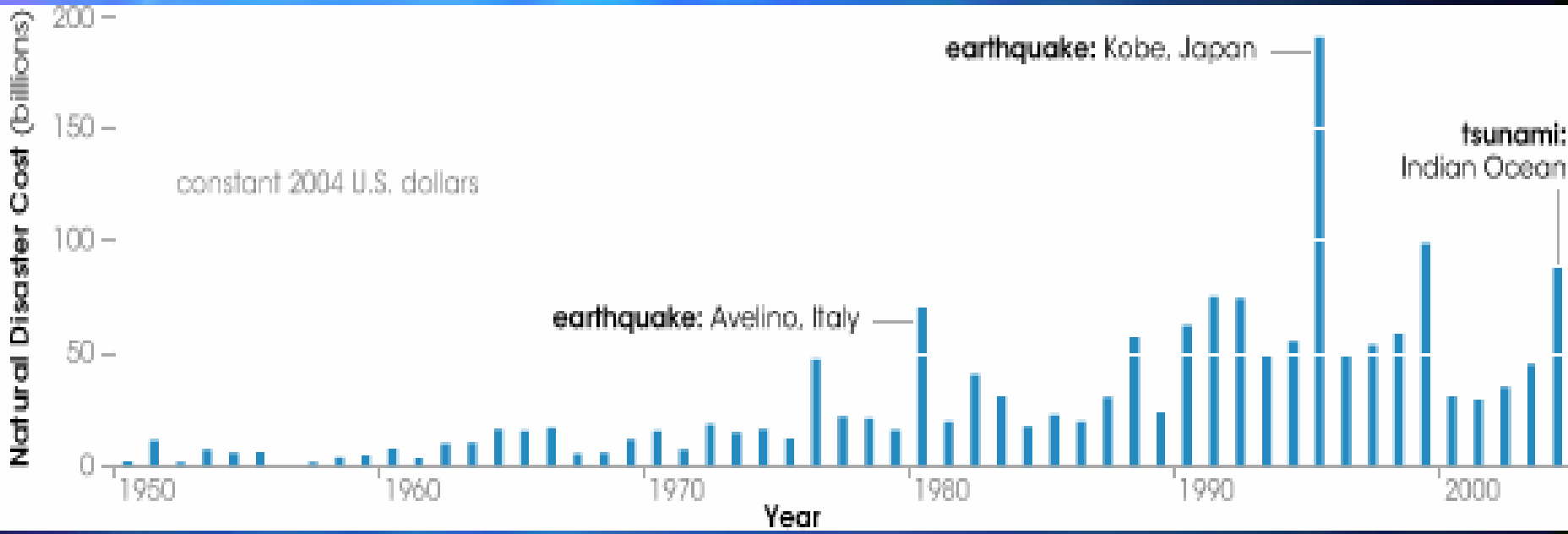
Current Remote Sensing Issues

- Use of the 6-7 GHz band for passive sensing
  - Measurement of sea surface temperature vital to early warning for tsunamis and other natural and weather-related phenomena
  - 6-7 GHz band not allocated nor protected in any way for passive sensing and is badly polluted by RFI from terrestrial and satellite communications systems
  - Look for possible alternative bands such as 4200-4400 MHz which is allocated on a secondary basis for passive sensing and is only shared with radio altimeters on-board aircraft

The Role of Remote Sensing in Disaster Management

Presented by John Zuzek
NASA Headquarters
Meteorology Workshop
20-21 March 2006

The Rising Cost of Natural Disasters

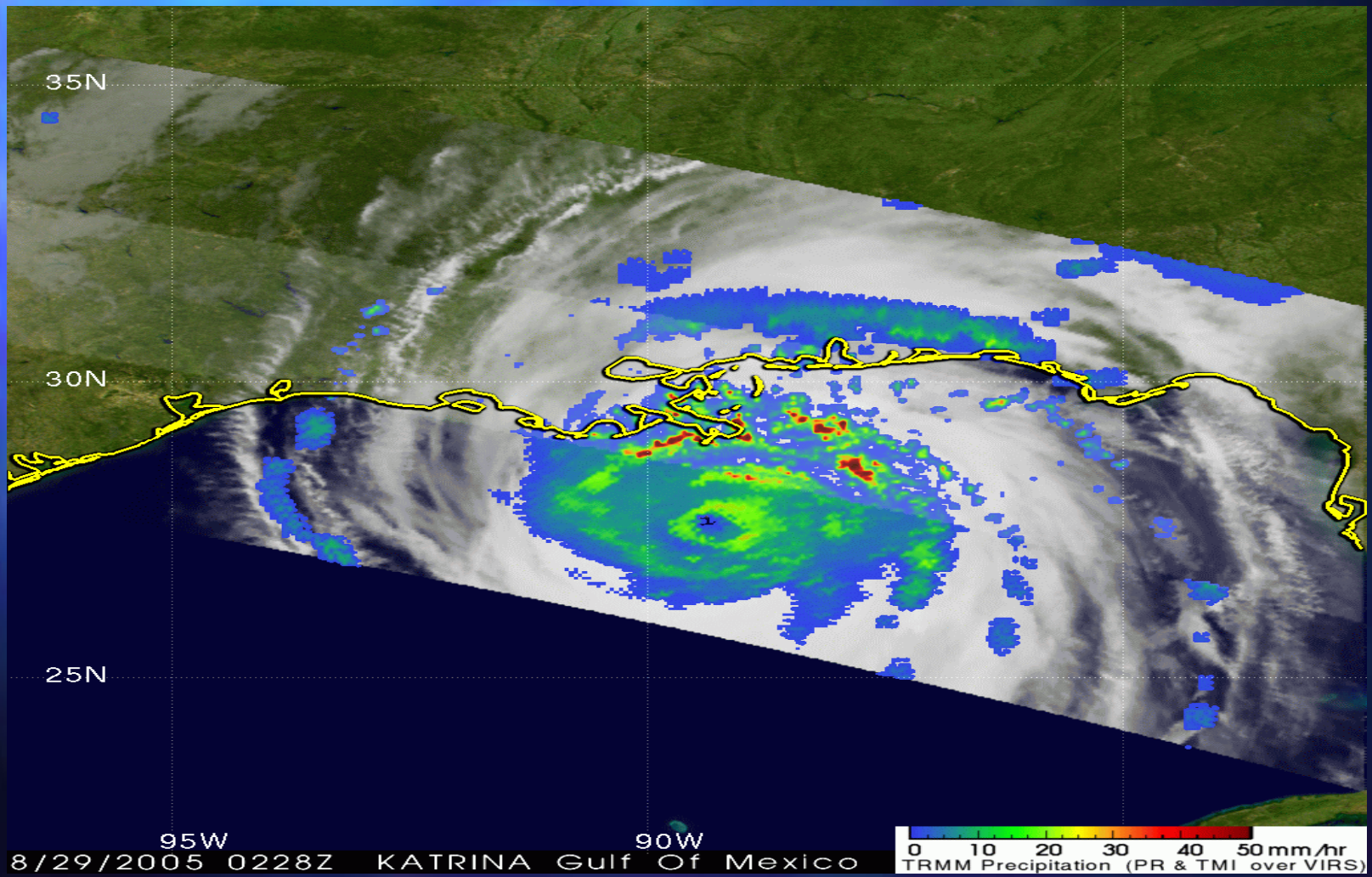


Graph by Robert Simmon, based on data courtesy EM-DAT: The OFDA/CRED International Disaster Database http://www.em-dat.net Université Catholique de Louvain—Brussels, Belgium

Uses of Remote Sensing in Disaster Management

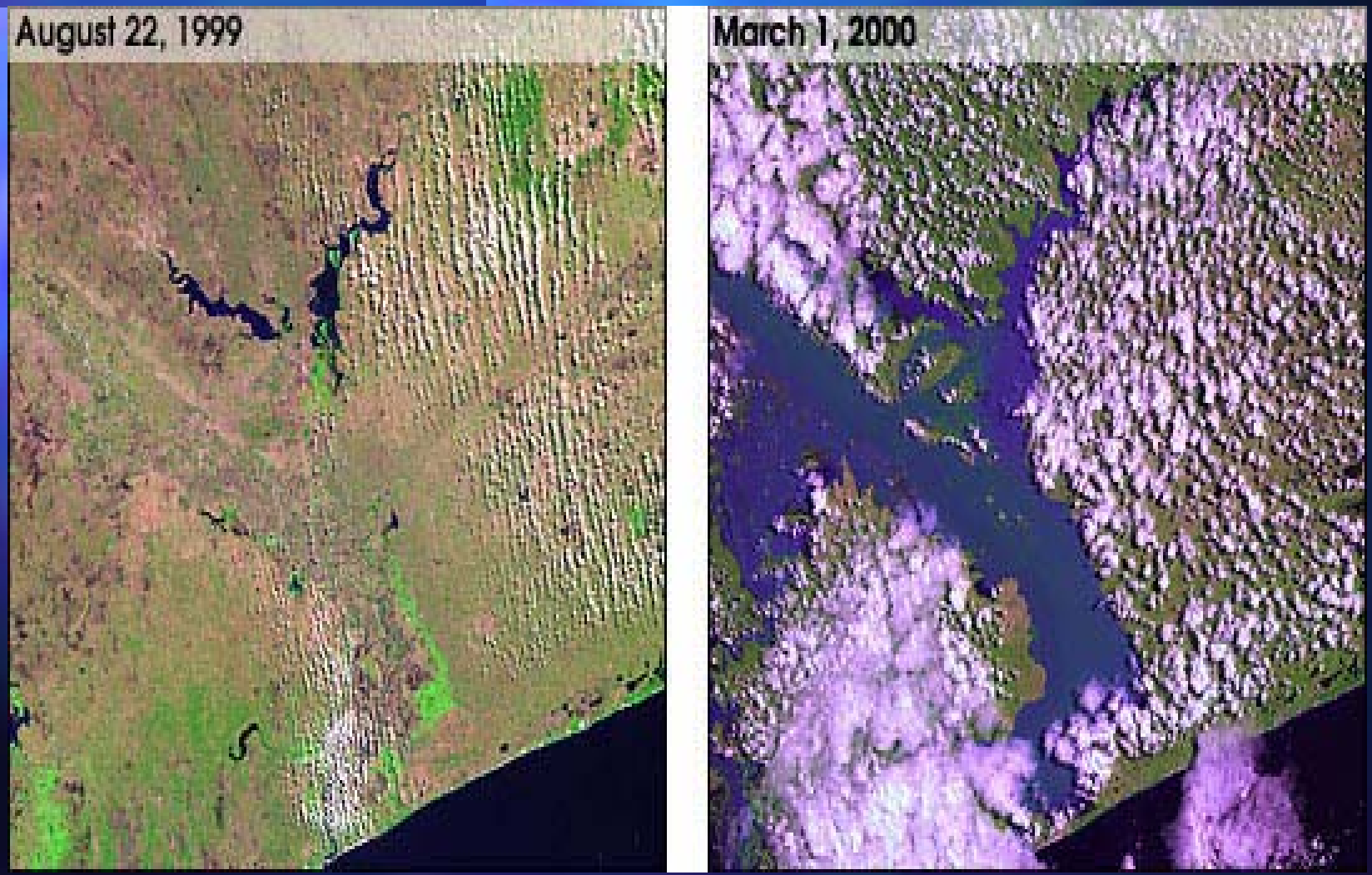
- Hazard and risk modeling of tsunamis, hurricanes, earthquakes and disease pandemics
- Models of extreme oceanic, land and atmospheric phenomena as well as pandemic outbreaks
- Remote sensing based early warning systems for natural disasters such as tsunamis, hurricanes, earthquakes, floods, etc.
- Satellite and/or airborne observations of extreme natural events in support of disaster response
- Damage assessment using satellites and airborne sensors
- Damage and loss estimation

Hurricane Katrina (2005)



Tsunami Damage (Dec. 2004)

Flooding in Mozambique (2000)



Notable Efforts to Date

- Committee on Earth Observation Satellites (CEOS)
  - Ad hoc Disaster Management Support Group (DMSG) http://www.ceos.org/pages/DMSG/index.html
  - Produced report, “The Use of Earth Observing Satellites for Hazard Support: Assessments & Scenarios”, 2002 available on-line
- International Conference on Early Warning
  - Third International Conference on Early Warning against natural hazards will take place in Bonn from 27-29 March 2006 http://www.ewc3.org/

Current NASA Efforts

- Space Frequency Coordination Group (SFCG)
  - Resolution A25-1 “Intersessional Working Group on Disaster Management (IWG-DM)”
  - http://sfcgonline.org/handbook/res/RES_A25-1.pdf
- International Telecommunication Union – Development Sector (ITU-D)
  - New Question /2: “Examination of ICTs and active and passive space-based sensing systems as they apply to disaster prediction, detection and mitigation” (Note: NASA is the tentative Rapporteur, to be affirmed at ITU-D SG2 September 2006)

Current NASA Efforts (continued)

- Next Steps
  - Meeting of the SFCG IWG-DM at the International Geoscience and Remote Sensing Symposium (IGARSS) http://www.igarss06.com/index.html Denver, USA 30 July 2006
  - ITU-D Study Group 2 meeting in Geneva, Switzerland September 2006