Postgraduate Disaster Health Education in Australia:

Incorporation of space-based technologies?

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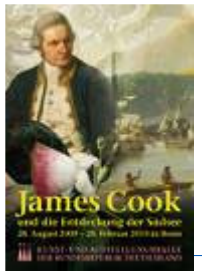
Third United Nations International UN-SPIDER Bonn Workshop:
"Disaster Management and Space Technology-From Concepts to Application"



Exhibition: James Cook and the Exploration of the Pacific

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- Art and Exhibition Hall of the Federal Republic of Germany, Bonn

- 28 August 2009 – 28 February 2010

Acknowledgements

- UN-SPIDER
  - Organising Committtee
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  - Prof. Peter Leggat (WSO CC Co-Dir./Head of School)
  - Assoc. Prof. Peter Aitken
  - Assoc. Prof. (Lt.Col.) Jon Hodge (Australian Army)
  - Prof. Rick Speare (Head of Dept)
  - Assoc. Prof. (Surg. Capt.) Andy Robertson (WA Health)
  - Dr Stefan Mazur (Careflight Medical Services, Qld)

Greetings from Australia!

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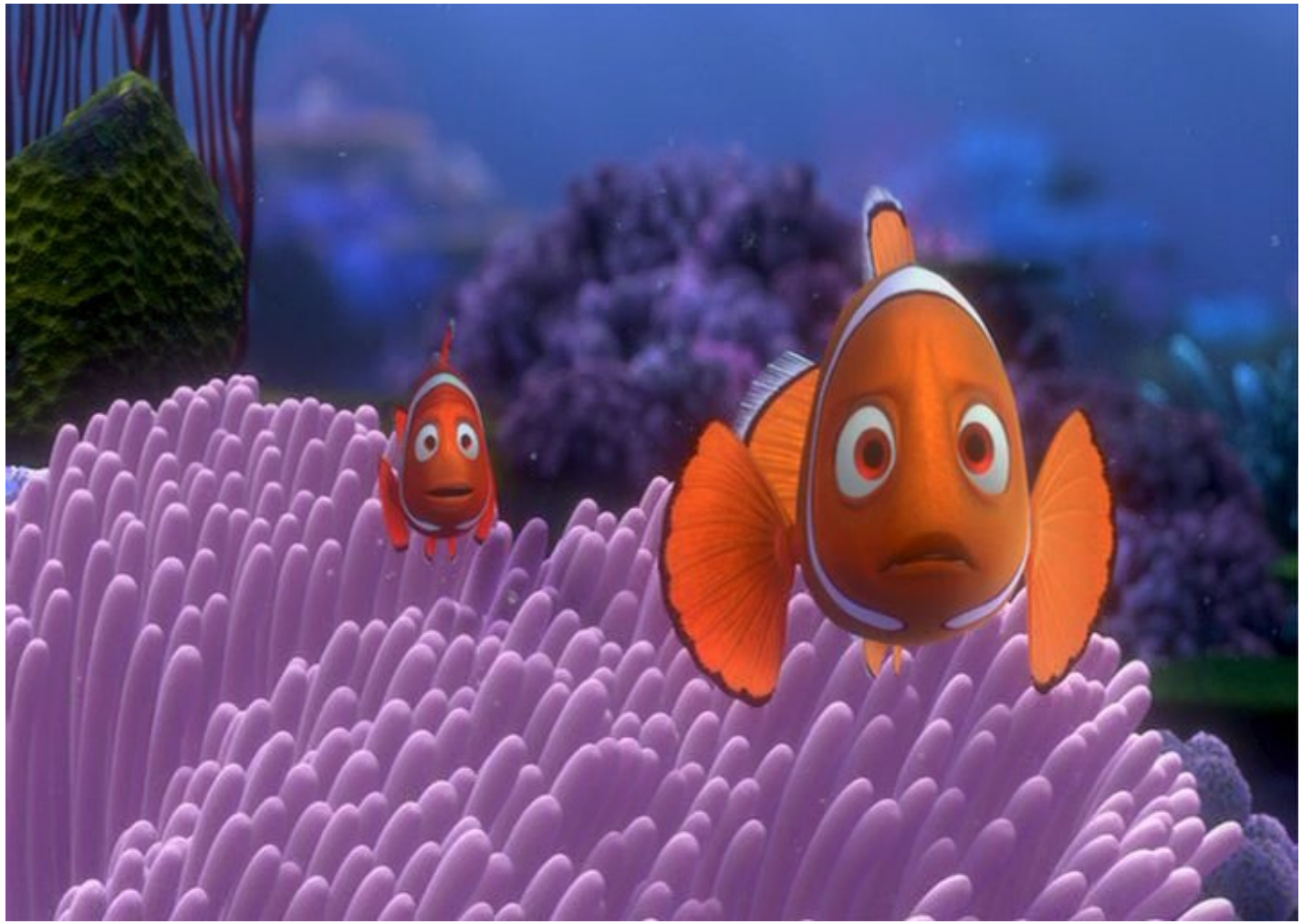
AUSTRALIA



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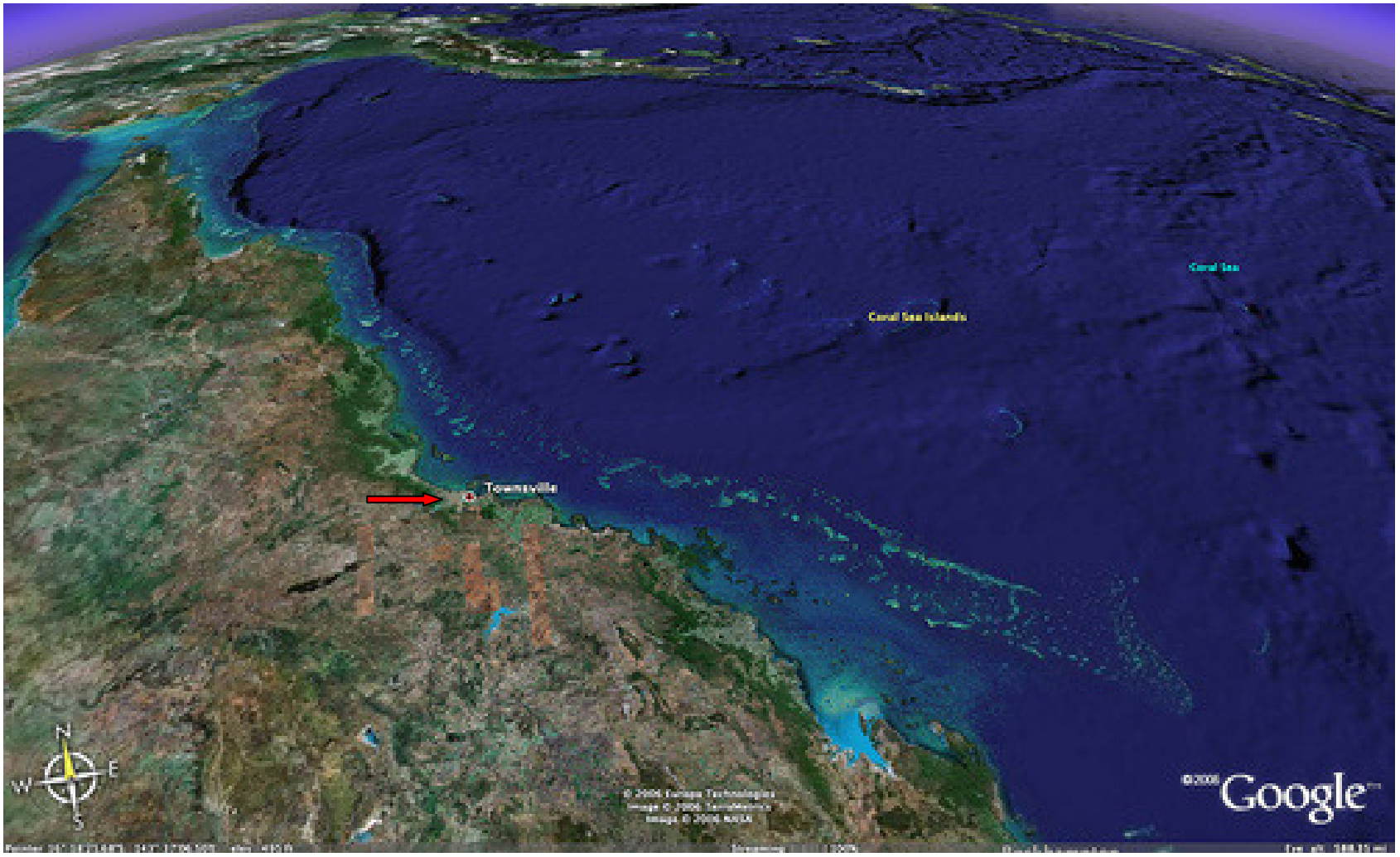

Overview of this session

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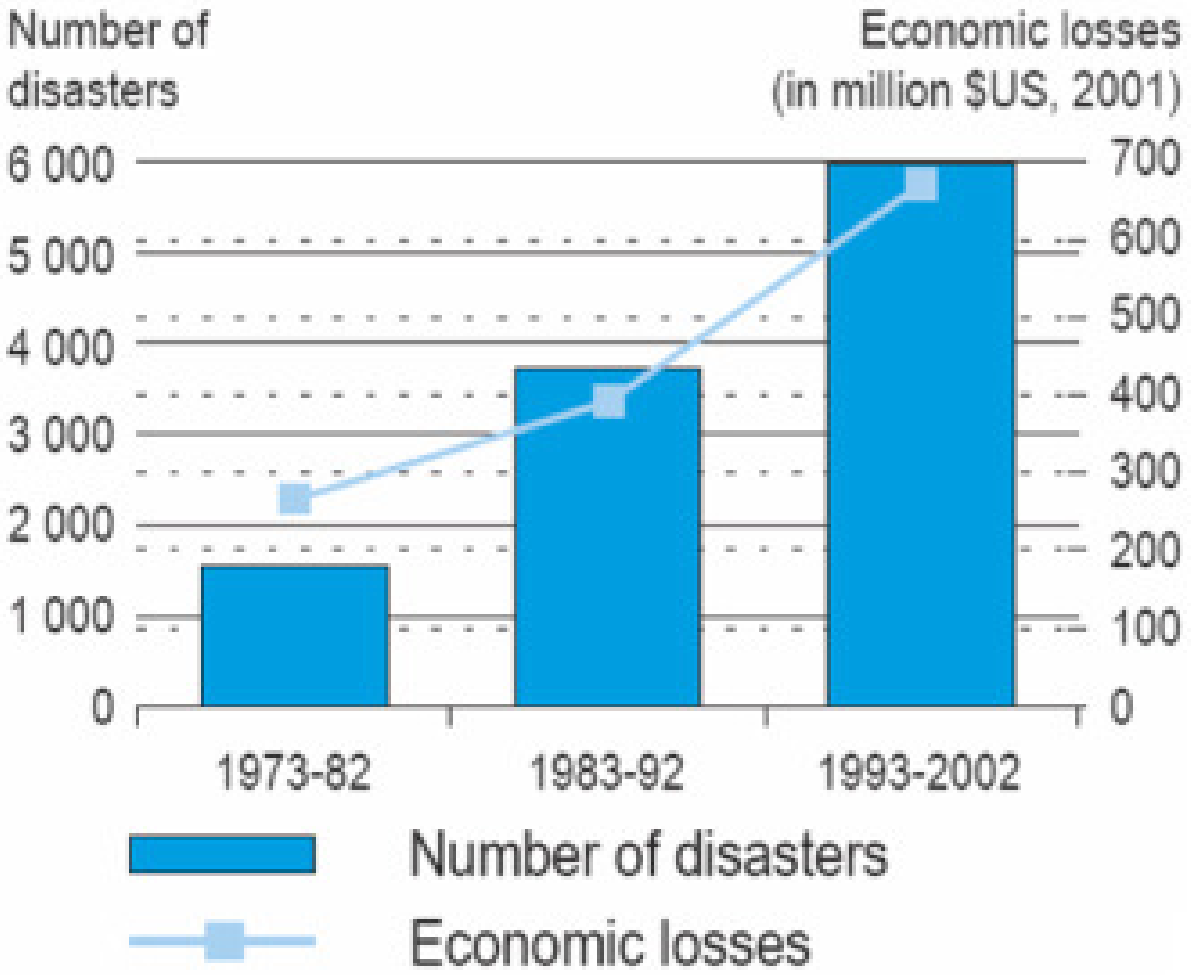
- Brief background
- What we are doing in disaster health education in Australia
- Examples of how space technology can be applied to disaster health
- How we might be able to merge these into our programs

Disasters are increasing in frequency



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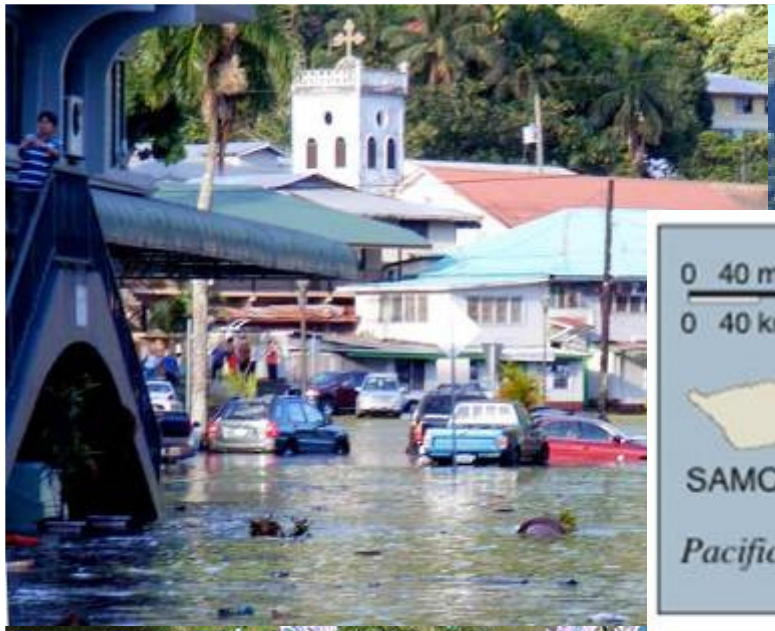
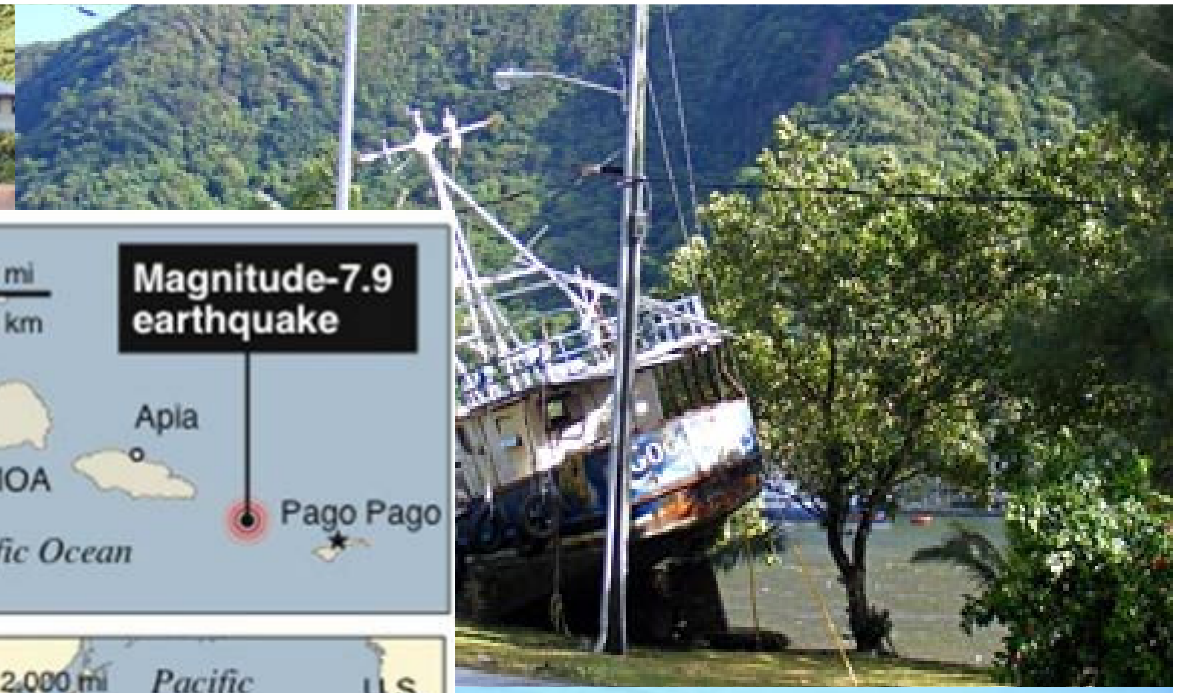
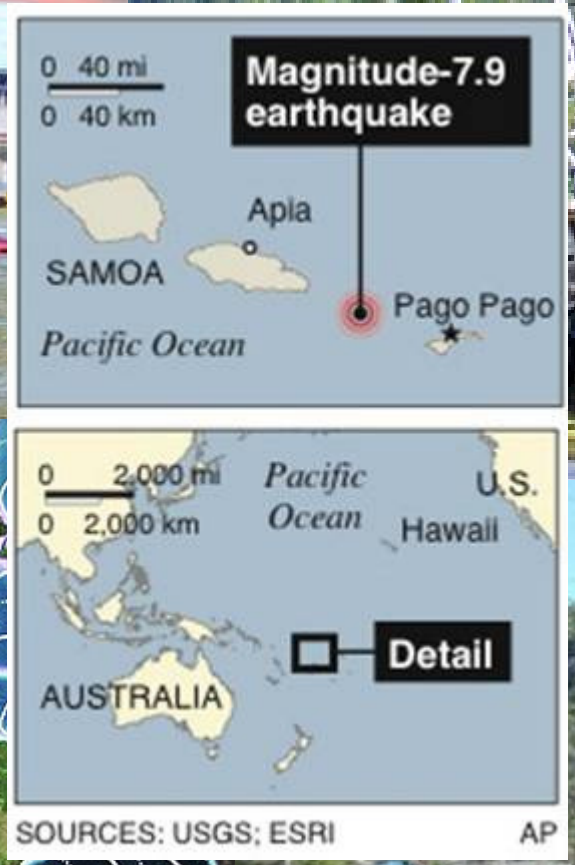
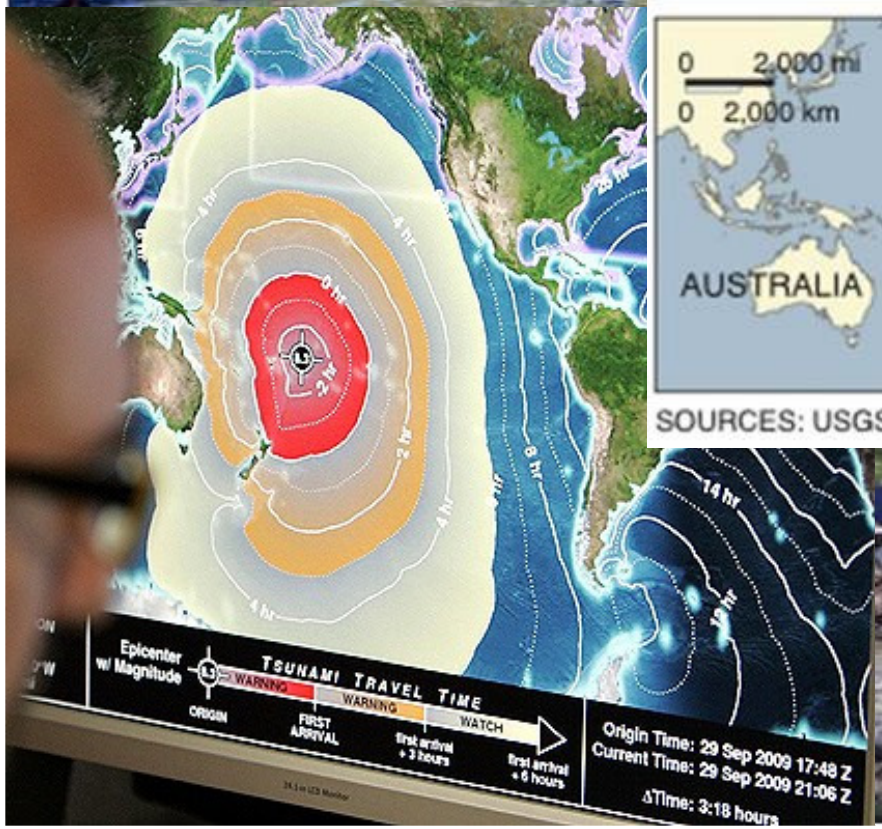





0 40 mi
0 40 km
Magnitude-7.9 earthquake
Apia
SAMOA
Pago Pago
Pacific Ocean
0 2,000 mi
0 2,000 km
Pacific Ocean
U.S.
Hawaii
Detail
AUSTRALIA
SOURCES: USGS; ESRI
AP

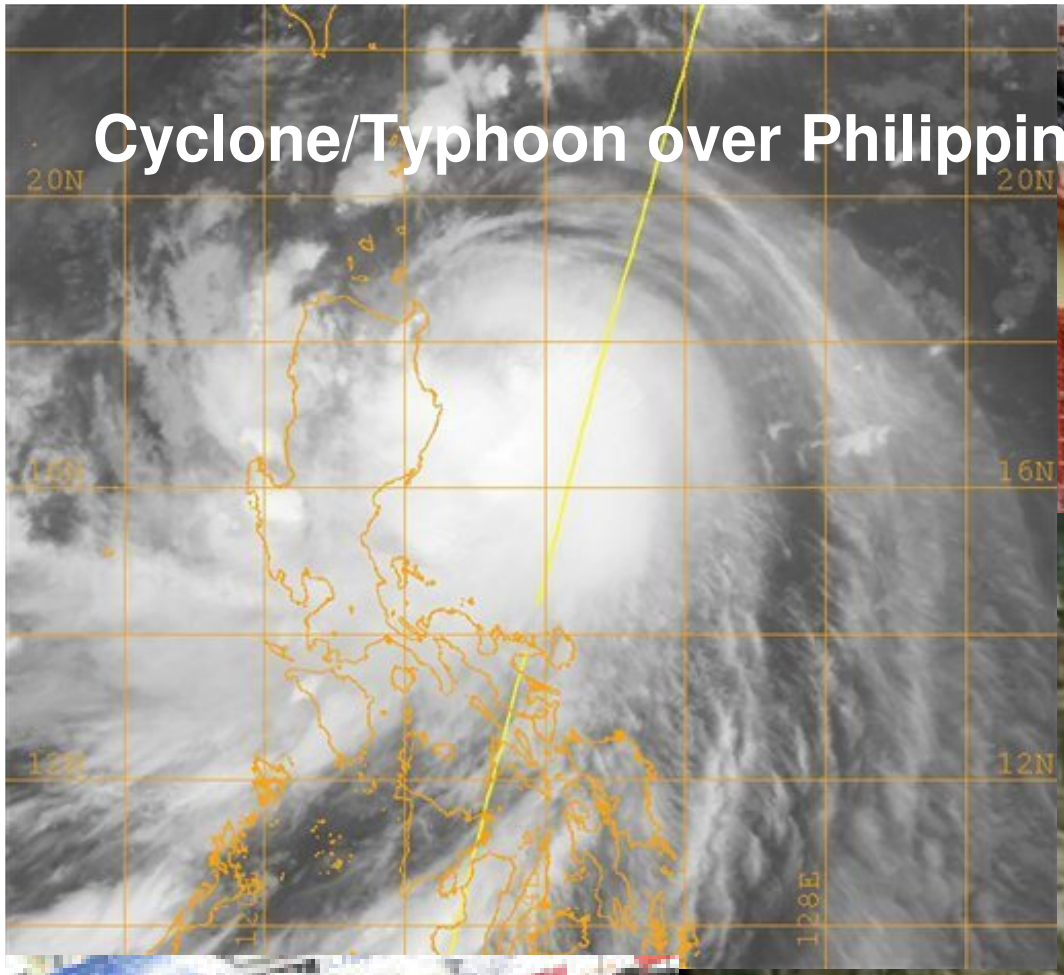

Epicenter w/ Magnitude
TSUNAMI TRAVEL TIME
WARNING
WARNING
WATCH
ORIGIN
FIRST ARRIVAL
first arrival + 3 hours
first arrival + 6 hours
Origin Time: 29 Sep 2009 17:48 Z
Current Time: 29 Sep 2009 21:06 Z
ΔTime: 3:18 hours

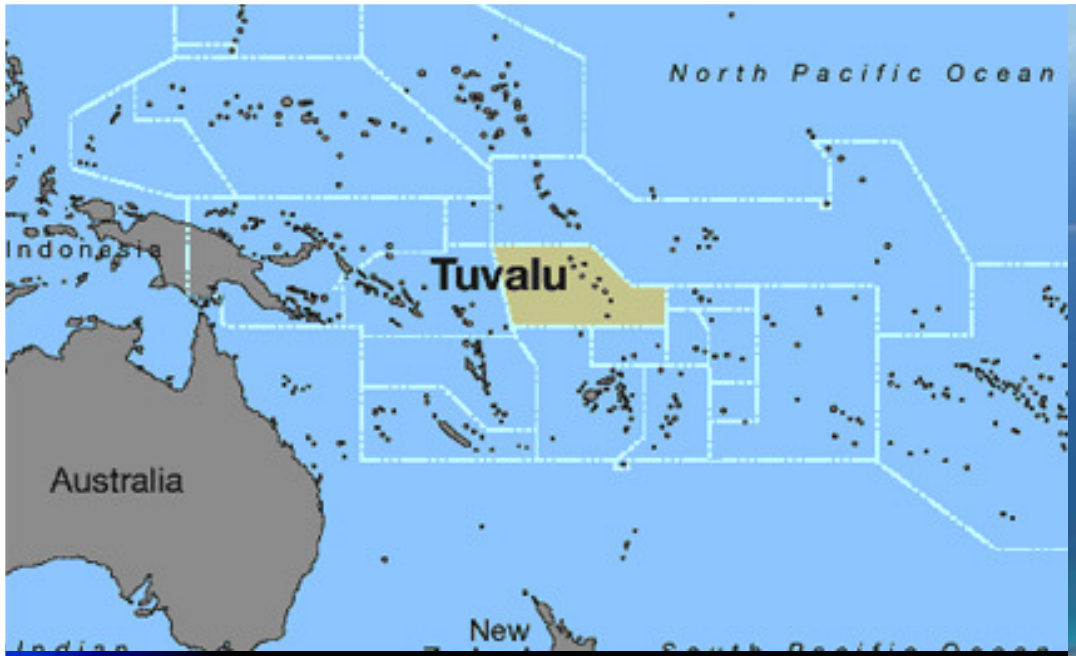
Panasonic
EMLA PRATAMA

THAILAND
VIETNAM
CAMB.
South China Sea
BRUNEI
MALAYSIA
SINGAPORE
Sumatra
Borneo
Bengkulu
INDONESIA
Jakarta
Java
Earthquake epicentre
Indian Ocean

Laris Manis
Furniture

Cyclone/Typhoon over Philippines



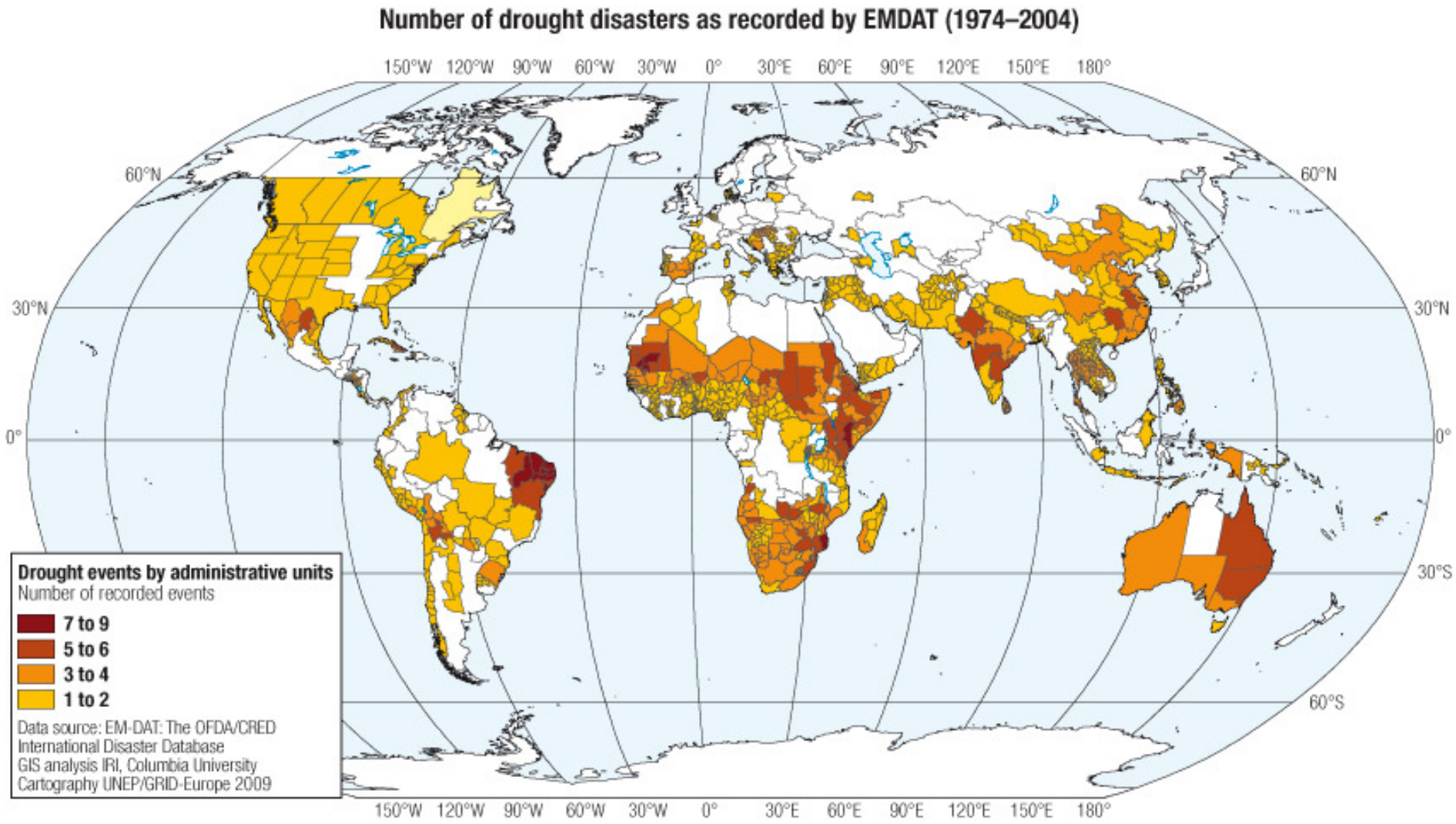


DISAPPEARING ISLAND

TUVALUAN KIDS HANG OUT AS EXTRA HIGH TIDE FLOODS NEIGHBORHOOD.

Sand & dust storms & bush fires near Sydney

UNCCD: Number of drought disasters 1974-2004



Need for disaster health education

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"Human history becomes more and more a race between education and catastrophe."

HG Wells. The Outline of History, Ch 15

"Five minutes before the party is no time to learn how to dance."

Snoopy

Need for disaster health education

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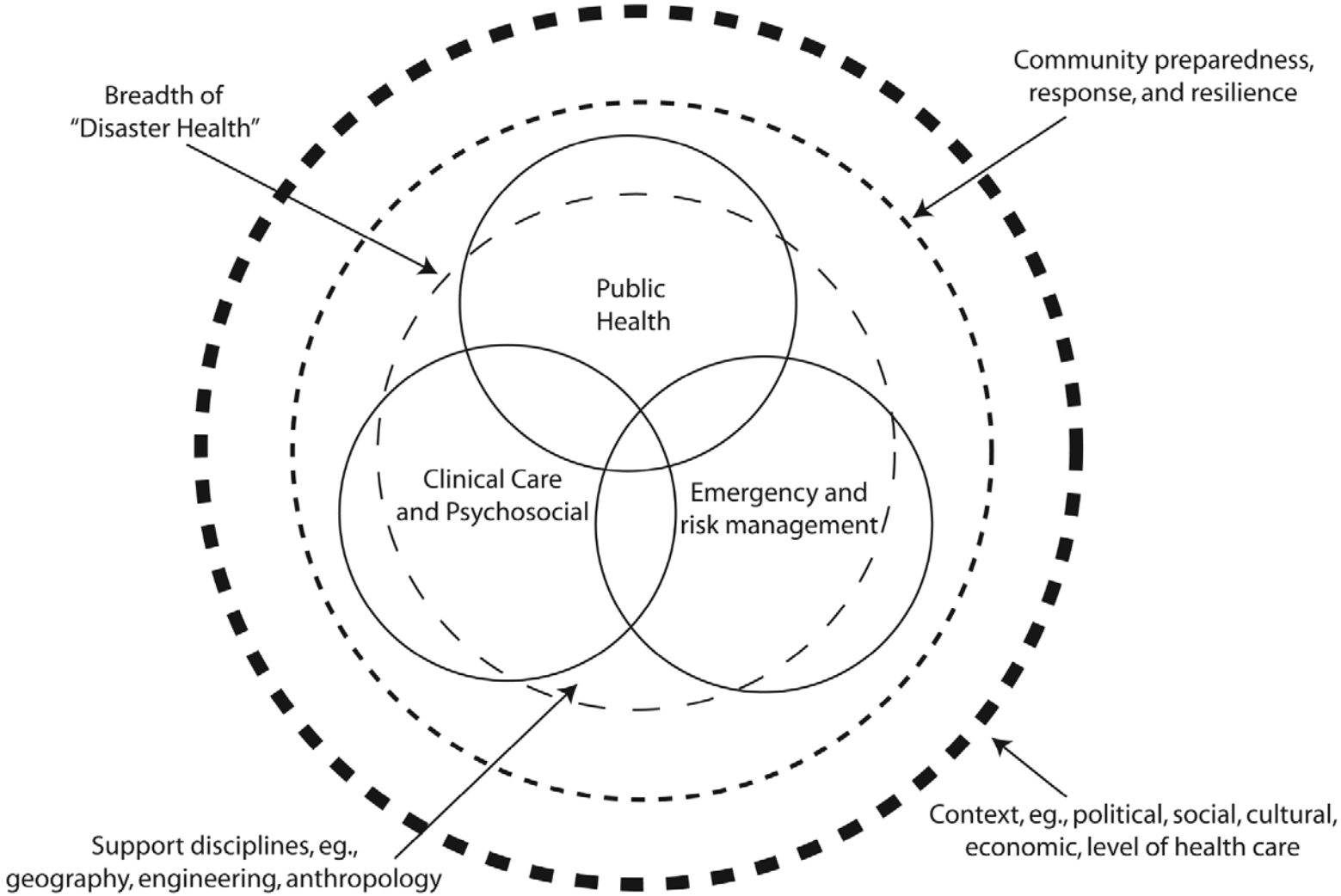
- World Association for Disaster and Emergency Medicine Education Committee

  "We need more and better education"

A General Complete Framework for Disaster Education



Sundnes et al.Prehosp Disast Med 2003; 7(3)1-14

Disaster Health Education in Australia now informed by a consensus Framework

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- Fitzgerald GJ, Aitken P, Arbon P, Archer F, Cooper D, Leggat PA, Myers C, Robertson A, Tarrant M, David E. National Framework for Disaster Health Education in Australia. *Pre-Hosp Disast Med.* 2010; 25(1) (in press)

Disaster Health **Education in Australia now informed by a consensus Framework**

- The framework identifies seven educational levels along with educational outcomes for each level.
  - Aligns with WADEM Levels and links with qualifications framework in Australasia
- The framework also identifies the recommended contents at each level and assigns a rating of depth for each component.
  - The framework is not intended as a detailed curriculum but rather a guide for educationalists to develop specific programs at each level.

What Disaster Health education providers are there in Australia?

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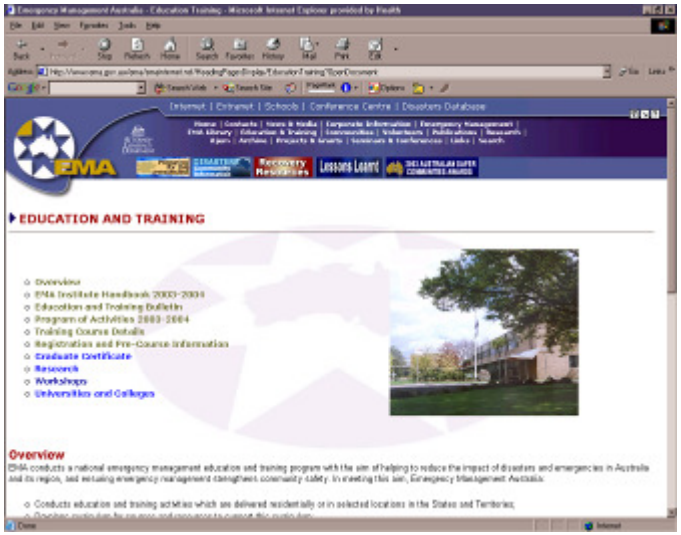
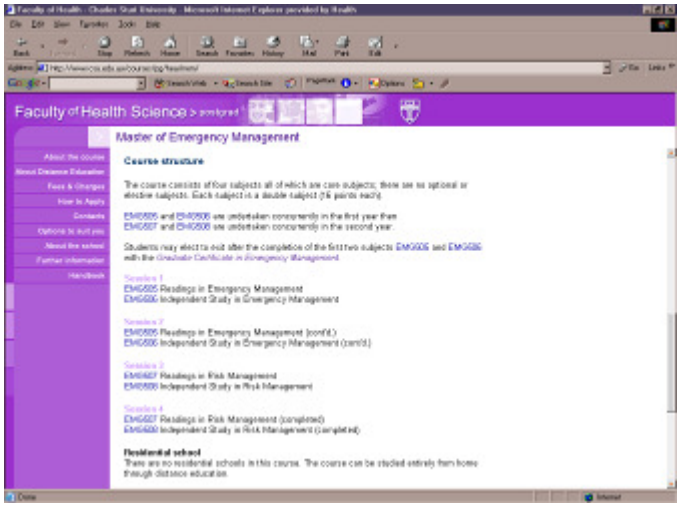
- Government
  - Federal: Emergency Management Australia
  - State programs
- Universities
  - Charles Sturt University
  - James Cook University
  - Queensland University of Technology
  - University of Queensland





James Cook University, Australia

- Postgraduate Certificate in Disaster and Refugee Health (PGCDisastRefugHlth) - 2004
  - Refugee Health (existing subject) - 1995
  - Disaster Health Management - 2004
  - 2 relevant electives
- Master of Public Health (Biosecurity and Disaster Preparedness) -2004
  - Above subjects plus communicable disease control; Public Health and Bioterrorism

James Cook University, Australia

- Postgraduate Certificate of Aeromedical Retrieval -2006
  - Aeromedical Retrieval (Introduction
  - Clinical Care Skills in Aeromedical Retrieval
  - Flight Crew Skills in Aeromedical Retrieval
  - Plus elective (could be Clinical Audit/Logbook in Aeromedical Retrieval)
- Master of Public Health (Aeromedical Retrieval)

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Overall Aim of Disaster Health Management Program

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" To provide students with an overview of the knowledge, skills and attitudes required for the successful management of disasters on the Australian and the global context with a special focus on problems with high likelihood and risk in the tropics."

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Overview of subject Disaster Health Management

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- 2 Weeks F/T Block Mode Course On campus
- 30-40 participants (25% international)
- Assessment is 3 hour written examination (70%) and a group presentation (30%)

Topics List: Disaster Health Management

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- Overview
- Damage
- Risk & Planning
- Public Health
- Communicable Disease
- Roles of NGO, Gov, Military
- Prehospital and Hospital
- Command, Control & Communication
- Logistics
- Media
- Security
- Forensics
- Psychological Aspects of Disasters
- Recovery
- Education and Training
- Ethics and Law

- Tabletop/Emergo Exercise
- Natural Disasters
- Cyclones
- Transport Disasters
- Terrorism
- Mass Gatherings
- Industrial Disasters

- Complex Humanitarian Emergencies (CHE) - covered in Refugee Health
- Chemical, Biological, Radiological (CBR) as part of number sessions/also covered in new subjects (e.g. public health and bioterrorism)

Classroom work

- Lectures in morning
- Case Material and Syndicate Exercises in afternoon
- Video effectively used to help experience events

- Plus

Tabletop Exercise

Fieldwork

- Townsville Hospital
  - Major tertiary referral hospital
  - Close by!
  - Casualty simulation exercise

EMERGO Training

Group Presentations

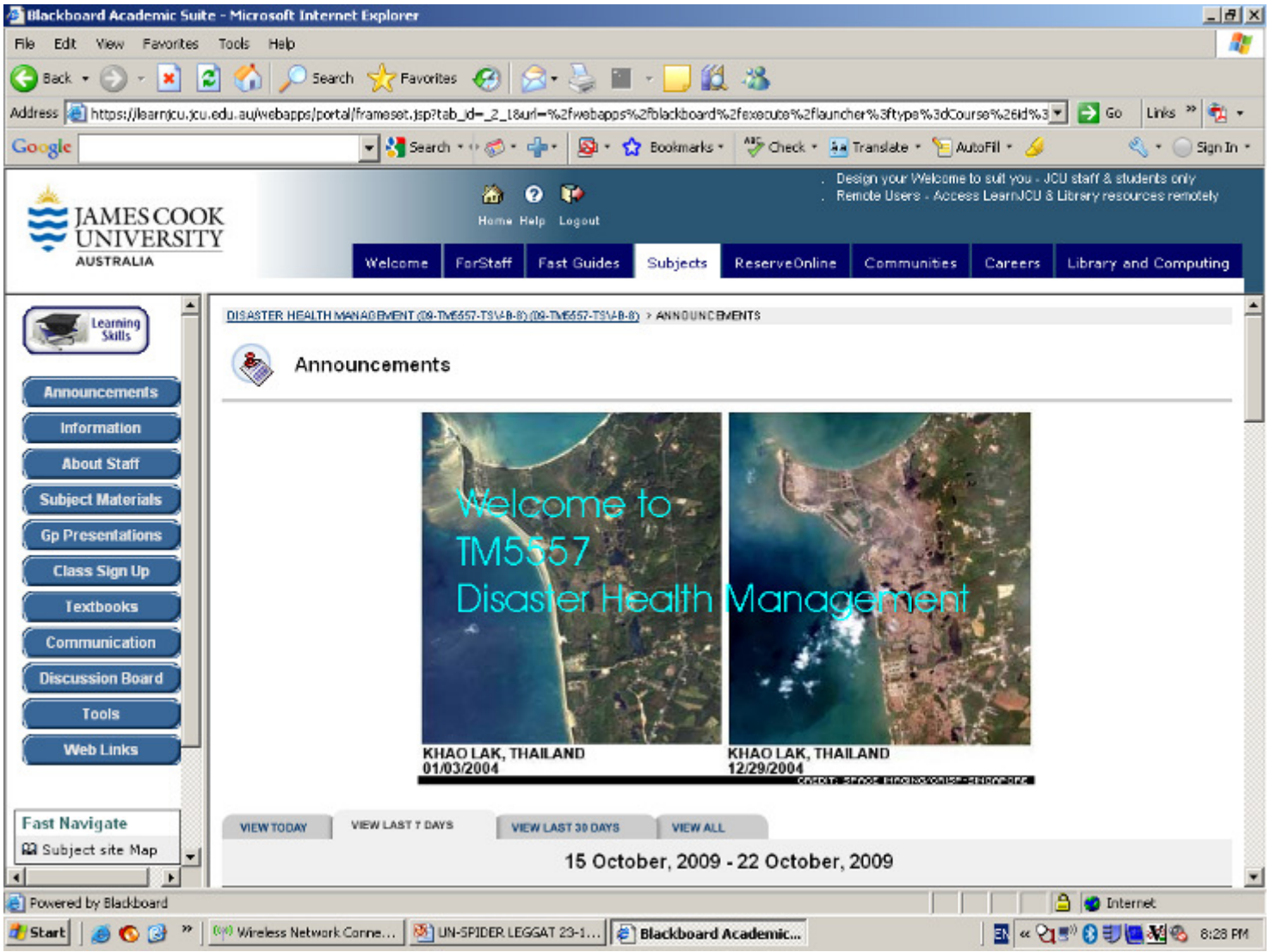
TOPICS

- *Aitape Tsunami*
- *Hillsborough*
- *Ash Wednesday Fires*
- *Bhopal*
- *Hurricane Andrew*
- *Anthrax and US Post*

FRAME WORK FOR PRESENTATION

- Mechanism of the Disaster
- Scope of the Impact and Damage
- Response
- Epidemiology and risk
- Public Health Measures
- Command, Communications and Control
- Psychological Impact
- Media Aspect
- Recovery
- Preparedness
- Lessons Learnt

Electronic Networking



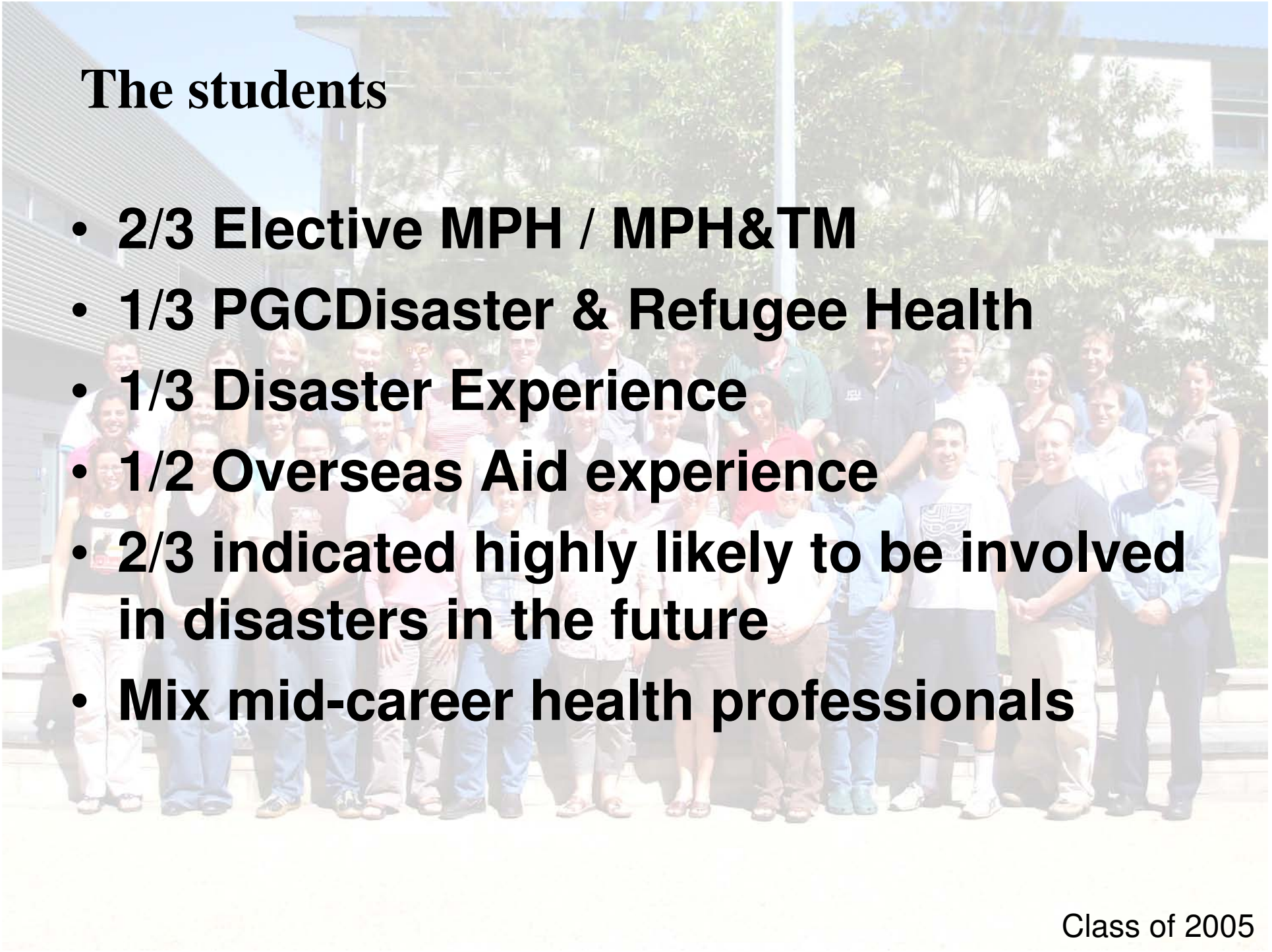
Informal networking

The students

Class of 2005

The students

- 2/3 Elective MPH / MPH&TM
- 1/3 PGCDisaster & Refugee Health
- 1/3 Disaster Experience
- 1/2 Overseas Aid experience
- 2/3 indicated highly likely to be involved in disasters in the future
- Mix mid-career health professionals



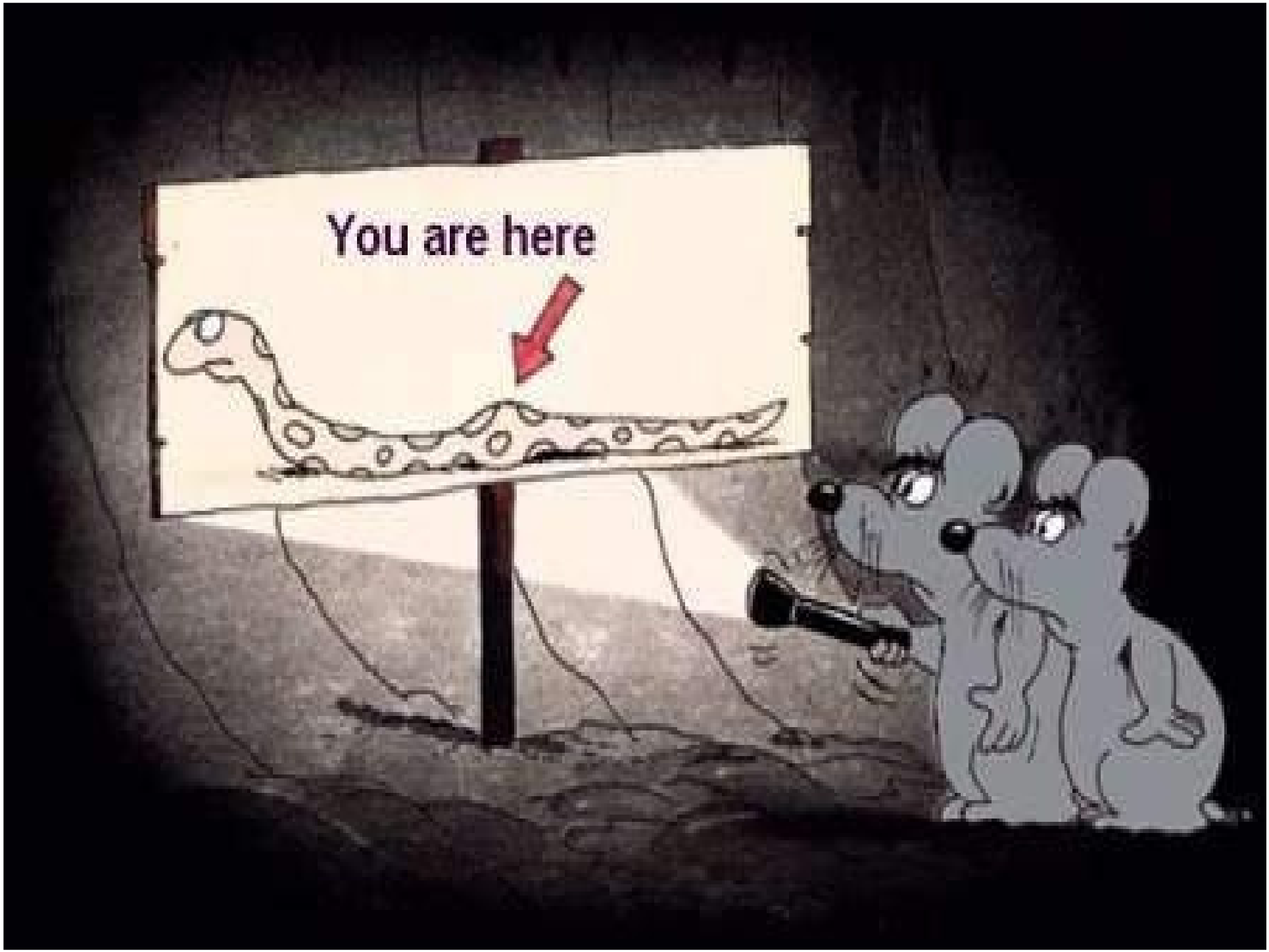
Class of 2005

Examples of Instructors Backgrounds

- Faculty, Emergency Management Australia (Federal agency)
- State Emergency Health Services/Disaster Coordinator
- Senior Medical Officer, & Chief Military Police Major Military Base
- Chief, TV News desk/Media Advisor
- NGO Staff

- Logistician
- Senior Meteorologist
- Clinical Psychologist
- Forensic Police
- Public Health Physicians
- Environmental health officer
- Emergency Physicians
- Aeromedical Retrieval staff

Head of School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Incorporation of space-based technologies?

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- How can we incorporate space-based technologies in our education programs?
- What do we cover/include?

Role of communication and Earth observation satellites

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- **Jayaraman et al, Acta Astronautica 1997; 40(2-8):291-325.**
  - ***"While communication satellites help in disaster warning, relief mobilisation and telemedicinal support, Earth observation satellites provide the basic support in pre-disaster preparedness programmes, in disaster response and monitoring activities, and post-disaster reconstruction." (p291)***

Role for Telecommunication systems in disasters

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Garshnek and Burkle Ann Emerg Med 1999; 34: 213-218.

- “For relief teams in remote or severely devastated areas, satellites have played a significant role in providing mobility and land-line independence for telemedicine.”

Global systems to support disaster management

- **Kasturirangan, Space Policy 2007; 23: 159-166.**
  - "Warning of an impending disaster and getting to the right people are the crux of disaster management strategies.
  - Often the time available is so little, and……the gap between information generation and final delivery needs to be very short to be effective."

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Review of space application support for disaster and emergency medicine

UN - SPIDER Woori Moon
August 2008

Which space technologies can be adapted in disaster health and epidemic control?

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UN - SPIDER (Woori Moon, 2008)

- Geographic Information Systems
- Global Positioning Systems
- Telecommunication, including telemedicine
- Epidemic control/improved epidemiology (CRED)/information (Knowledge Portal)

GPS/GIS

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- The Global Positioning System (GPS) is a satellite-based navigation system which provides exact position on the Earth anytime, anywhere, in any weather.
- Geographic Information System (GIS) is analysis that combines relational databases with spatial interpretation and outputs often in form of maps.

GPS/GIS Examples

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- GIS data from satellites can help workers clarify the contaminated region and separate it immediately.
- Early warning systems using satellite communication, GIS & GPS technology provide a fast & resilient way to distribute over geographical areas alarms & information to the population/workers to facilitate adequate protective measures for safeguarding health/safety in catastrophic events, such as a tsunami.
- GIS are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk management measures.

Space supports for medical care in disaster

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	Earth Observation & Navigation	Satellite communication
Improve Surge capacity	Find the location of isolated patient in hidden area Provide map and navigation tools for vehicle tracking system for transport urgent patient European Geostationary Navigation Overlay Service (EGNOS)	Field based patient registration and transportation between health care facilities
Medical resource Management	Monitor real time status of critical medical resources availabity by map data provided by satellite	Communication with health center to estimates of resource availability, including personnel, vehicles, hospital beds and/or specialized equipment for search and rescue or decontamination
Manage infection and Contamination	Mapping the area exposed to infection source or Toxic materials by GIS mapping	Just-in-time distance education—HEPA filters, PPE suits, sanitation rule, decontamination
Provide real time medical care	Global Positioning System (GPS) for navigating rescue helicopter, ambulance for any time medical rescue	Real time co-operated surgery by real-time communication tools Rapid patient data transmission for telediagnosis, teleconsualation, telemanagement
Provide situational awareness	Mapping the dangerous neighborhood area for warning and prevention	Direct feedback form field to remote disaster management center

Telecommunication, incl. telemedicine

- Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve patients' health status.
- Currently extensively used ground based technology.
- In a disaster, may predominantly use satellite-based technology

Various forms of telecommunication in disaster health

Use of telecommunication in disaster medicine	Description
Telemedicine	The practice of medicine over distance with the use of telecommunications equipments
Telemanagement	The range of telecommunication activities designed to maintain control over disaster and emergency situation and to provide a frame work for helping at risk persons to avoid or recover from the impact of the disaster
Teleconsulation	A medical team or expert in a hospital gives assistance in diagnosis and treatment to a doctor or rescuers with victims using telecommunication facilities
Telediagnosis	Telediagnosis is involves the doctor making an assessment without physical exam, but rather based on data transmitted from a remote location using telecommunications.
Information for transportation	The use of telecommunications to request helicopters, ambulances and other mans of transportations, to assign patients to the proper treatment area and to establish maintain communication with medical facilities

Satellite technology can be used in communicable disease/epidemic control

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	Earth observation and Navigation	Satellite communication
Epidemic surveillance and prevention	Provide geographic information required to monitor the risks of epidemic outbreaks and create prediction models Support maps to monitor the risk of epidemic outbreak in ordinary times *Ex. WHO public health & GIS Earth observation technology for predicting malaria risk in Africa*	communications tools for data transmission with field-level epidemic surveillance teams in remote areas *Ex. SAFE(Satellite for Epidemiology)*
Early warning	Provide the essential geographic information to evaluate the risk of the reigion round primary disease area dangerous contaminated area from safe region in epidemic crisis Tracing the immigration route of vector animal *Ex. HEWS - Health Early Warning Systemas a source of infection (ESA)*	Urgent mobilization of Health security system in the levels of region, nation and world.
Response	Infection population and medical resource assessments Fast arrangements of medicine, human, decontamination facility to high risk area	Fast access to medical information to limit spread disease Rapid Communication between health center and high risk outbreak region

UN-SPIDER Knowledge Portal

So, what are the possible directions for our Disaster Health Education in Australia?

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- Train the trainer
- New Module/integration into subject activities simply providing an additional dimension for consideration
  - Role of International Agencies
    - UNOOSA / UN-SPIDER / International Charter
  - Applications of Space-based technologies
    - Space support for medical care in disasters
      - Satellite communication/telemedicine
      - GIS in medical management of disasters
      - GPS in safety of deployed staff
    - Epidemic control/improved epidemiology

Thank you
Red Spider Nebula