

Willis Research Network

Developing new science supply chains through the modelled world.

**UNFCCC Loss & Damage Workshop, Tokyo
James Beedle, CEO Willis Re, Japan**

March 26 2012

The Willis logo is displayed in white text on a dark blue rectangular background. The text is in a serif font, with the 'W' being significantly larger and more prominent than the other letters. The logo is positioned in the bottom right corner of the slide, which has a yellow and orange gradient background.

Grand Challenge for Global Society: Managing Extremes

- How populations share the cost of extreme events & natural catastrophes
 - At local & international scales
 - Via Public (taxation) or Private (insurance) mechanisms
- Insurance and Reinsurance are the ultimate community products
- Forms part of a wider and more generic challenge for business, government and wider society – **how to identify, evaluate and manage extremes.**
- At the heart of delivering resilience and sustainability
- A challenge for science, finance and policy makers

From Grand Challenges to the Fundamental Questions

- Where is catastrophe risk located?
- What loss scenarios are of greatest concern (now and in the future)?
- What is maximum probable loss in [1-250] return period?

Who is asking?

- Governments (on behalf of populations and civil authorities)
- Regulators (on behalf of policy holders)
- Rating Agencies (on behalf of investors)
- Media (on behalf of audiences and the public)
- Insurers and Reinsurers (on behalf of their capital providers)

Extreme Risk & Resilience in the Modelled World

- Reinsurance and the management of extremes is now undertaken inside a modelled world.
- A development of last 20 years, particularly property catastrophe reinsurance. Immense benefits, with new challenges.
- A developing continuum – science, cat modelling, capital modelling, regulatory and credit modelling. New industry supply chains
- Risk based modelling is creating new, unified, rules of the game.
- The integration of public science and re/insurance is driving the response to the current generation of modelling challenges
- Public science is recognising the unique role of the re/insurance industry to both understand and confront some of our greatest challenges.

The Geography of Financial Risk is Changing

- Within 5-10 years, assuming penetration rates rise as anticipated
Beijing-Tainjin (quake) & Shanghai (wind/flood)
join Florida (wind) California (quake) Japan (quake) and NW Europe (wind) as the global reinsurance natural catastrophe peak zones
- In 30 years, Chinese Typhoon/EQ could be single largest exposure.
- Mirrored by growing exposures in Latin America, India and across Asian Megacities
- Will be amplified and accelerated by macro forces and influences
 - Growing inter-governmental move toward nat cat management
 - National & Regional Cat Risk Financing (insurance) Schemes
 - Re/Insurance Regulation, demanding greater nat cat analysis

Willis Research Network Membership

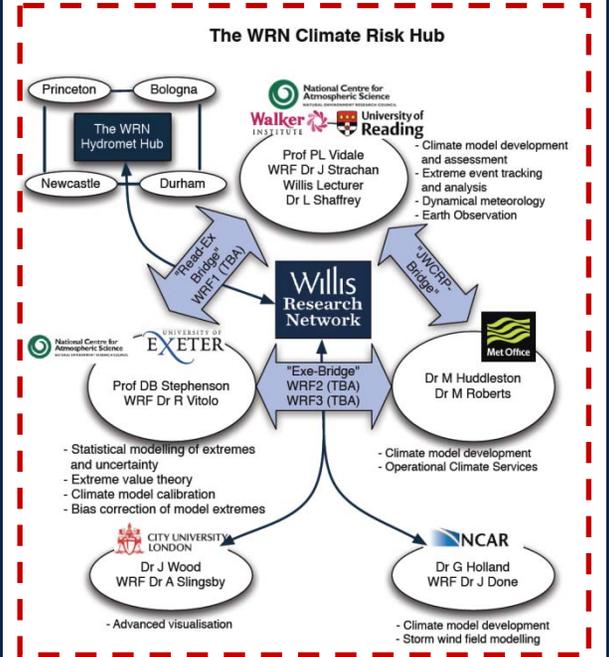
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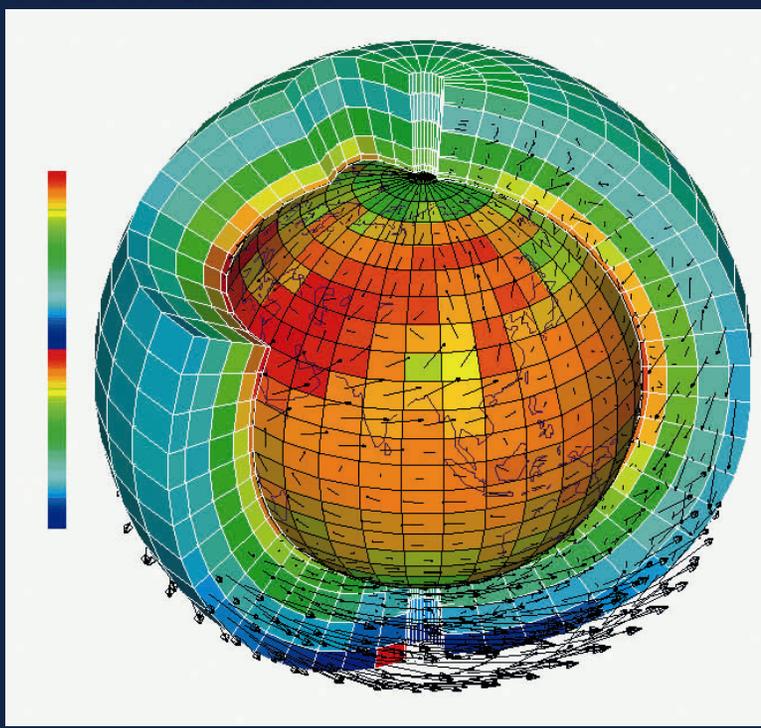
Models, Tools, Knowledge & Advice

CRH

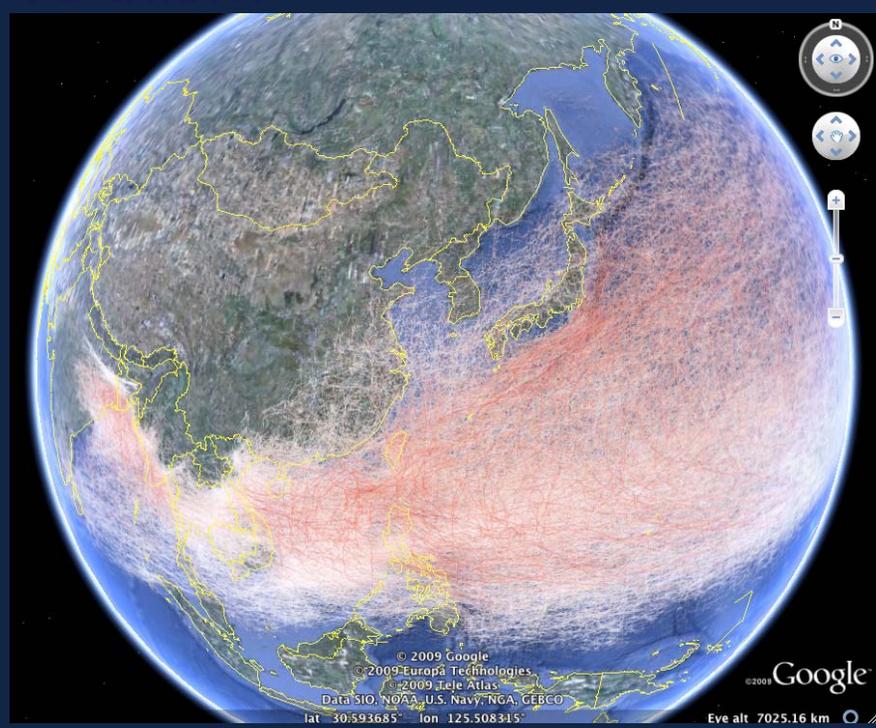
- Non-Modeled Risk, Multi-Hazard, Extremes, Economic Impact, Risk Sharing/Financing, & Growth
- WRN Hubs:
 - Climate Risk Hub (CRH),
 - Earthquake Risk Hub (ERH),
 - Hydrological Risk Hub (HRH),
 - Impact and Resilience Risk Hub (IRH),
 - Financial Risk Hub (FRH),
 - Geospatial, Platforms & Service Hub,



The Big One: Harnessing the power of the supercomputer... from climate to weather models



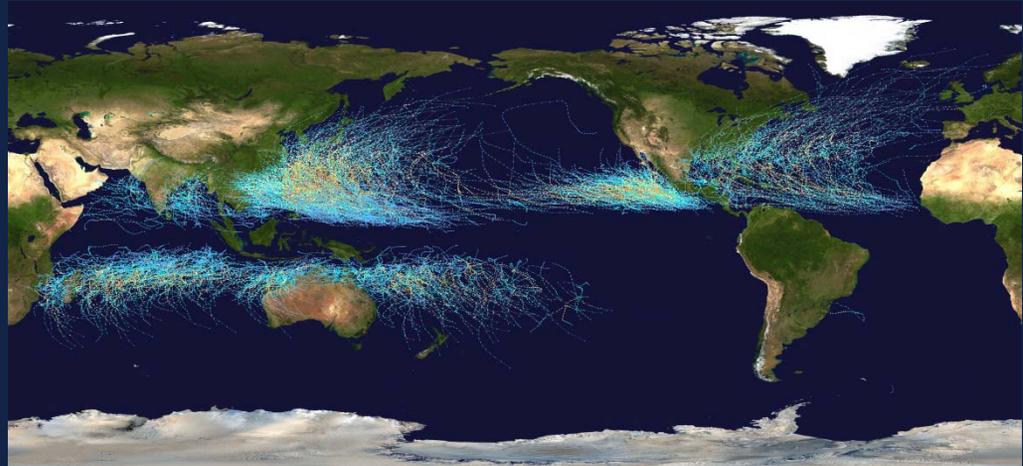
High resolution global climate models



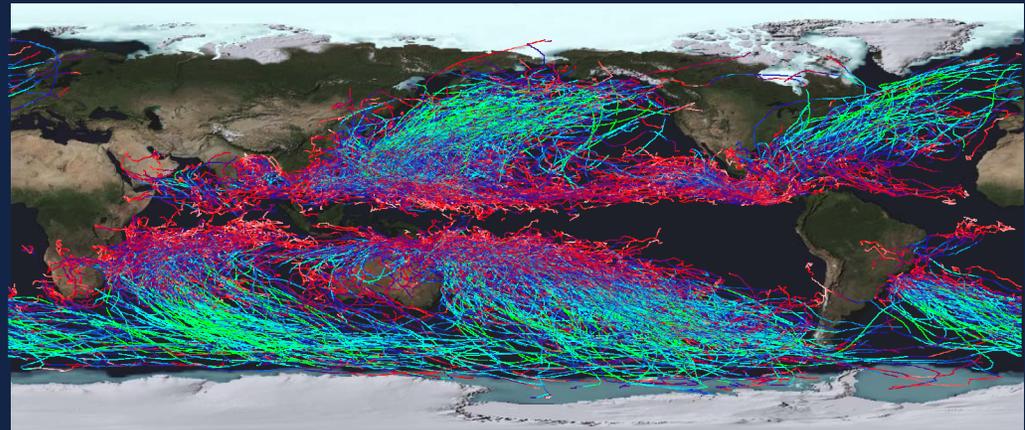
Extreme weather features as a direct output of climate model

Creating global models that represent real weather features

- Tropical and extra tropical cyclone tracks are output directly from the models
- Characteristics are in line with observed but show wider range of possible events
- Can identify black swan events (Brazilian hurricanes) or clustered events (in a season) or consecutive high activity years – not seen in the observed record



Observed record of tropical storms

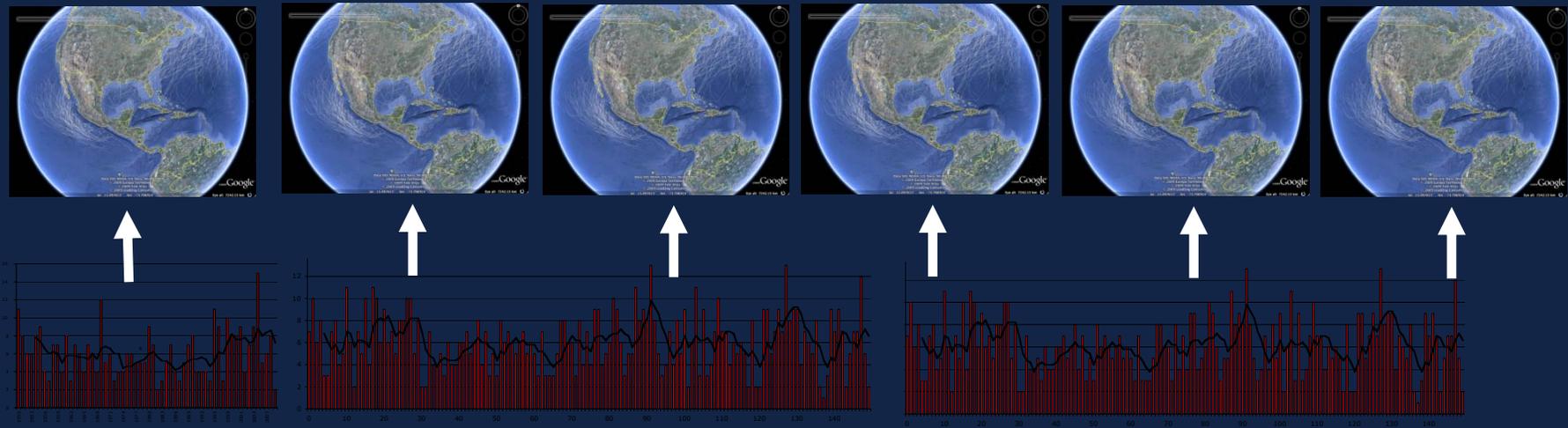


A 20 year "time slice" of GCM simulated tropical storms

Modelling the black swans – with groundbreaking science

Historical storms – truth?

Alternative (plausible) climate scenarios – including strong/weak El Nino or La Nina, Atlantic Multidecadal Oscillation and other drivers of hurricane activity



50 years
Observed



300 years
Modelled

Global Models: Consistent Views of Risk

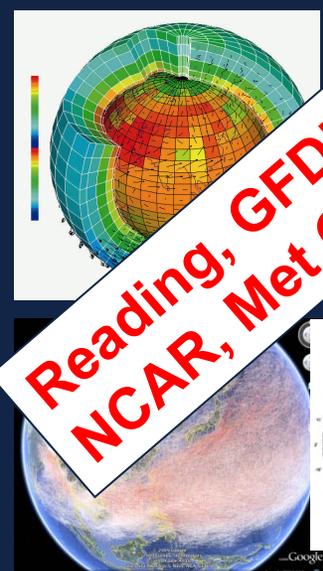
GWM, Global
Windstorm
Model and
Risk indices

GEM, Global
Earthquake
Model and
Exposure

GFM, Global
Flood Model,
Risk and
Mitigation

GVM, Global
Volcano
Model, Risk
and Data

GCM, GRM, SEI
Global
Convective
Model, Risk
Tools and Socio-
Economic Impact



**Reading, GFDL,
NCAR, Met Office**

**150 scientists,
Ins., Governments**

**WRN, ESRI, IBM,
Met Office,
Deltares, ...**

**Bristol, USGS,
Smithsonian...**

**Met Office, ESRI,
CEDIM, Leeds...**



WRN related global model programmes

WRN Integrating Re/Insurance, Public Science & Funding Agencies

WRN Extreme Weather & Climate Liaison Group

Global Science Institutions with Global Re/Insurers

Developing shared agenda and plans for climate research and services

Operational climate forecasting and risk assessment

From climate, to hazard to risk

Re/insurance as a proxy for wider public & private sector needs



Developing climate services for insurers

WCC-3 HIGH-LEVEL DECLARATION, Geneva Sept 2009

DO 1 We, Heads of State and Government, Ministers and Heads of Delegation present at the High-level Segment of the World Climate Conference-3 (WCC-3) in Geneva, noting the findings of the Expert Segment of the Conference;

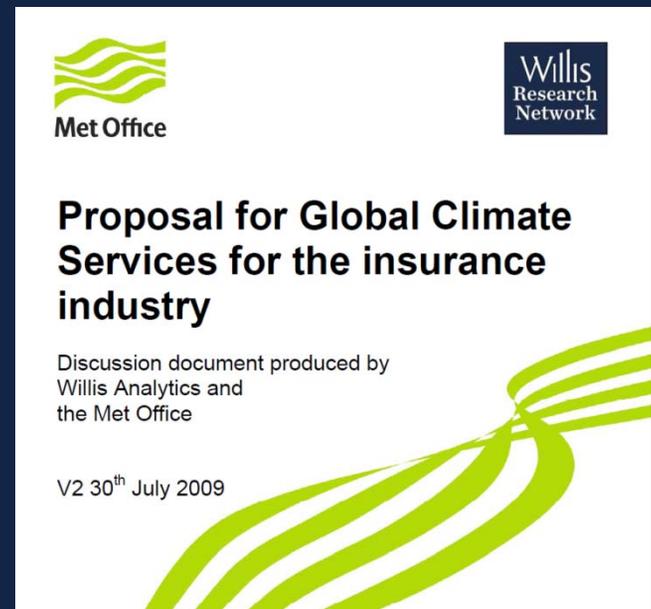
OP 1 *Decide* to establish a Global Framework for Climate Services (hereafter referred to as “the Framework”) to strengthen production, availability, delivery and application of science-based climate prediction and services;

OP 2 *Request* the Secretary-General of WMO to convene within four months of the adoption of the Declaration an intergovernmental meeting of member states of the WMO to approve the terms of reference and to endorse the composition of a task force of high-level, independent advisors to be appointed by the Secretary-General of the WMO with due consideration to expertise, geographical and gender balance;

OP 3 *Decide* that the task force will, after wide consultation with governments, partner organizations and relevant stakeholders, prepare a report, including recommendations on proposed elements of the Framework, to the Secretary-General of WMO within 12 months of the task force being set up. The report should contain findings and proposed next steps for developing and implementing a Framework. In the development of their report, the taskforce will take into account the concepts outlined in the annexed [Brief Note](#);

OP 4 *Decide* further that the report of the task force shall be circulated by the Secretary-General of WMO to Member States of the WMO for consideration at the next WMO Congress in 2011, with a view to the adoption of a Framework and a plan for its implementation; and

OP 5 *Invite* the Secretary-General of WMO to provide the report to relevant organizations, including the UN Secretary-General.



New Supply Chains for the 21st Century

- **Mastering and Leading the 'Modelled' World is key because:**
- **Global and Micro Decision making across public, industrial and financial domains now takes place, principally, in a *modelled* world**
 - as does most academic science research and science services
- **Creates a remarkable new vehicle of unification and integration across traditional disciplines and industry/science/finance boundaries.**

The developments in climate and weather science and related insurance and risk management services are among the leading examples of this trend.