Free and Open Source Software in Environmental Prediction

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(NIWA)

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Outline

–NIWA

–EcoConnect

–FOSS

–Demo

NIWA

- Crown Research Institute

- Research and Consulting
  - Atmosphere and Climate
  - Freshwater
  - Coasts and Oceans
  - Fisheries
  - Aquaculture

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NIWA

- Govt. (National and local), Commercial clients
- 750 Employees
- 12 sites in .nz
- 80% of Unidata PTY in Perth

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EcoConnect

- Operational realtime forecasting and data delivery

- "Not what the Weather is, what the weather does"

- Coupled modelling systems
  - Numerical weather prediction
  - Wave
  - River flow
  - Innundation
  - Tide

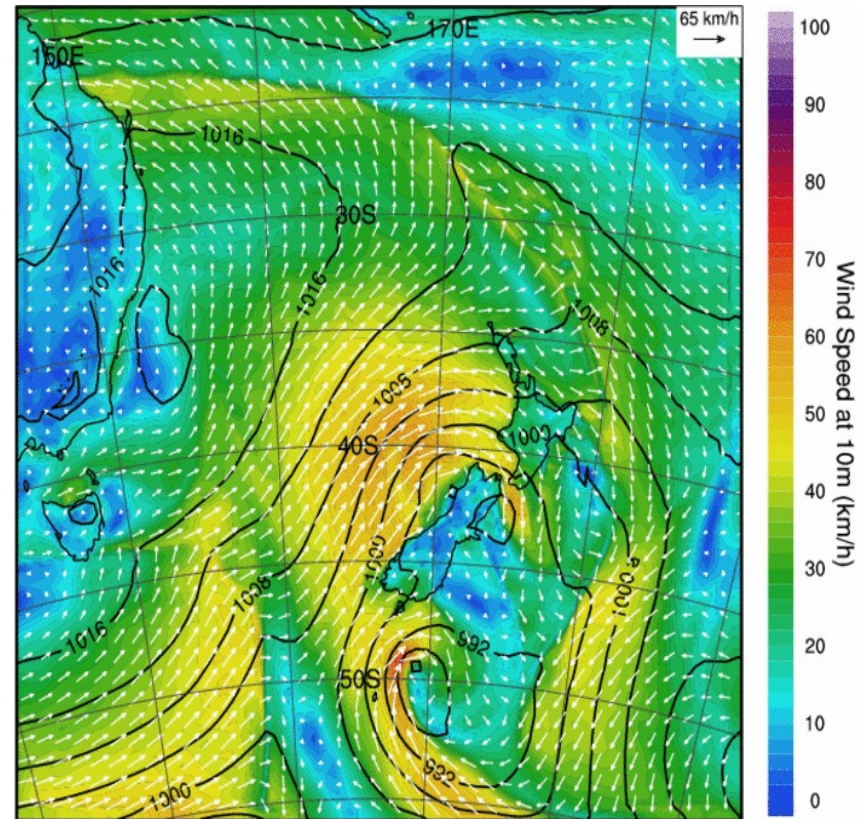eco connect

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Team

- Scientists
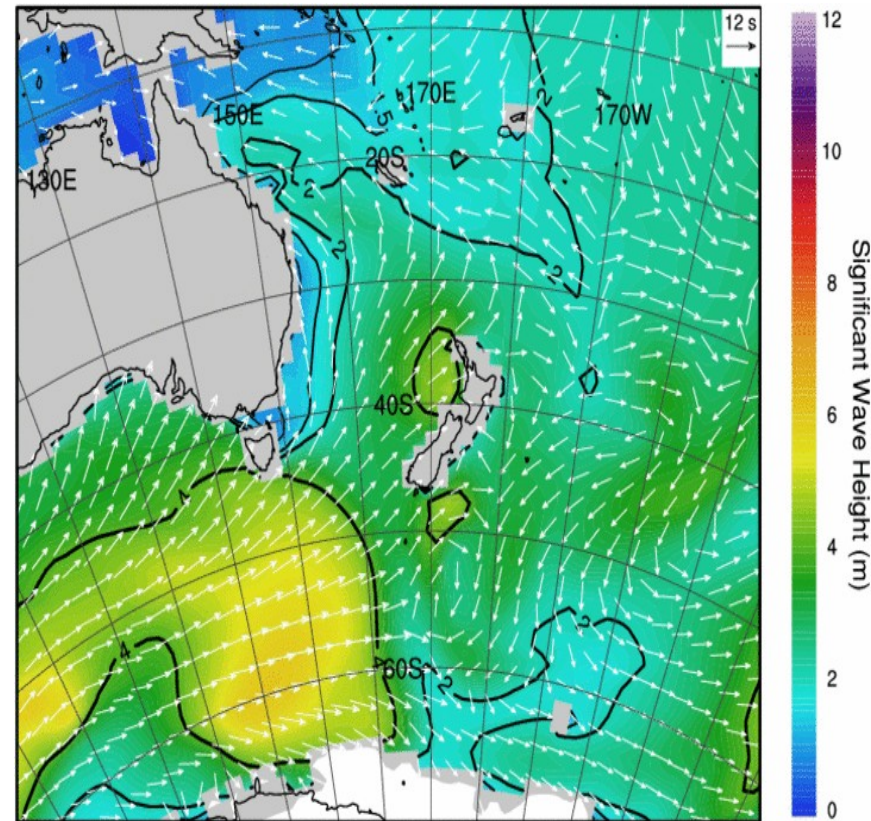- Software Developers
- Sysadmins

NZLAM-12

- NZ limited area model (12 km grid)

- UKMO unified model

- Large domain

- LBCs from global model

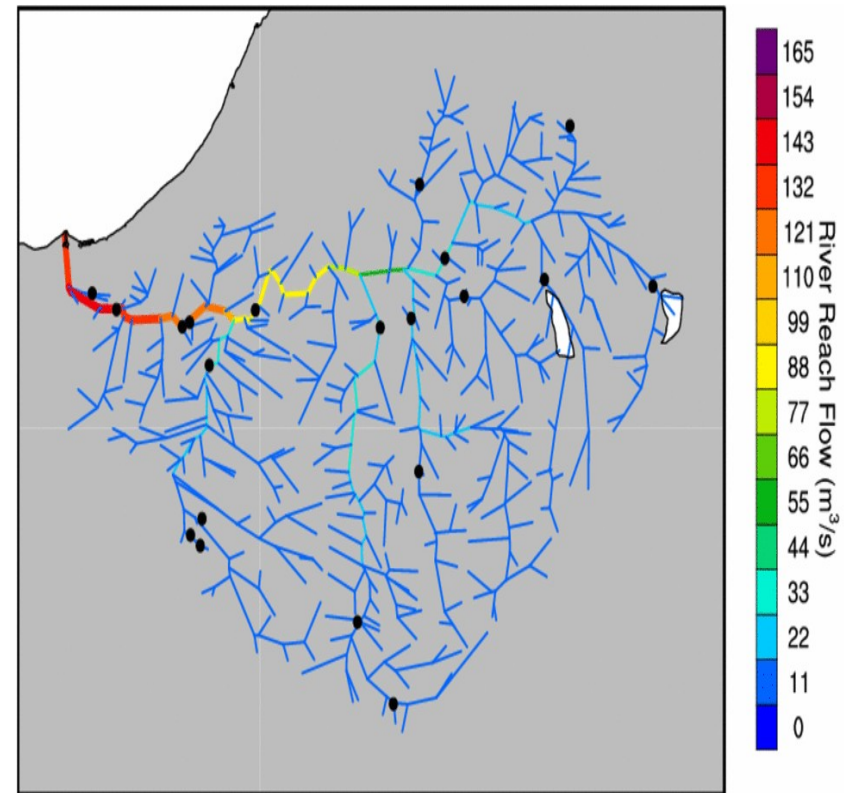- Data assimilation

- 4x daily warm cycled

Globalwave and NZWAVE

- WaveWatch III
- NOAA/NCEP
- Global - 6 days
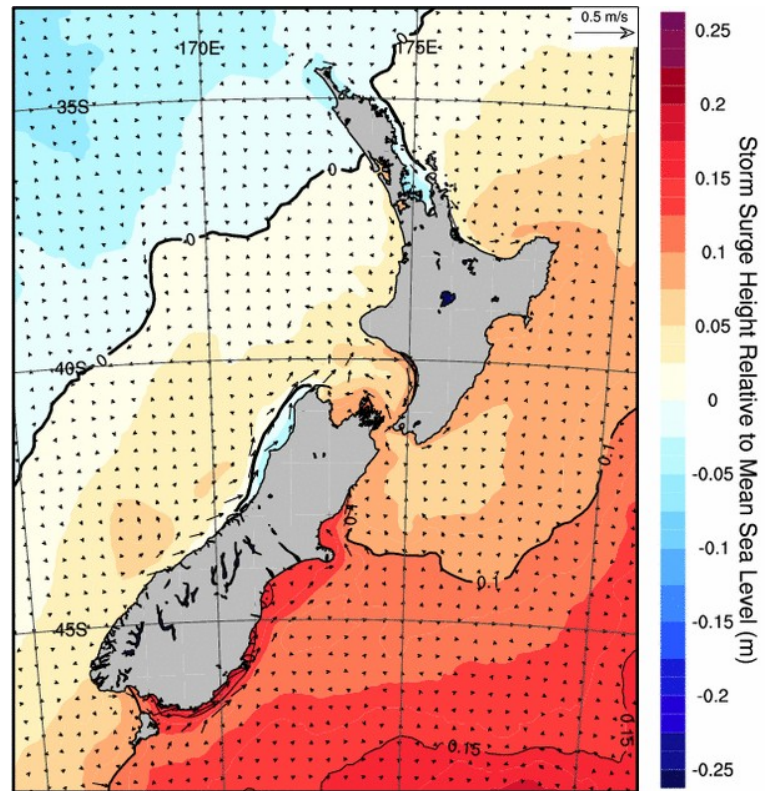- NZLAM domain (12 km grid) – 2 days
- Local (1 – 2 km grid)

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Topnet – Hydrological Model

- River network

- Catchment model

- Data assimilation

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RiCOM

- Rivers
- Coasts
- Oceans

NZtide

- Tide height

Generic Model Workflow

Computing Systems

- Supercomputer to run NZLAM, NZWAVE, GLOBALWAVE

- 4 socket dual core server for sequencing, other models and post processing

- Database and J2EE app server

- Small server for source code management, bug tracking and documentation

- Infrastructure e.g. monitoring

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Operating Systems

- RHEL 5.x + EPEL repo
- Unicos/mk (not FOSS but use Cray Open packages)
- Previously Fedora now SLED for desktops

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FOSS used in model development

- $EDITOR

- Darcs, svn

- F77/90 gfortran

- GNU make – not just for source code

- scons

- Gdb, strace, lsof

- Hibernate

- Axis

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FOSS tools for data

- Netcdf
  - CF compliant -- climate + forecasting metadata
  - Software ecosystem: nco, ncview, ncregrid

FOSS tools for analysis and plotting

- Ncl, ncarg

- R

- ImageMagick, ghostscript

- Gthumb

FOSS used in Ecoconnect operations

- Async event loop: Bash, python (pyro)
- Batch queing GenericNQS, OpenPBS, torque, torque+maui
- Monitoring: nagios + local scripts, cacti, syslog
- Alerting: sendmail, sendpage
- Issue tracking: trac

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FOSS network utilities

- .nz <-> .uk: LFN (350ms, 200 kb/s)

- Wget, curl, lftp

- Ftp, scp/ssh, rsync

Non FOSS

- Unicos/mk + MPI libs

- Oracle db + appserver

- Rational Rose, Calibre RM

- RIA - .net WPF

- Commvault backup/HSM

- models

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Demo?

Questions?