Summary and Action Items
DEEPWAVE Science and Operations Planning Meeting
University of Canterbury, Christchurch NZ
21-22 January, 2014

The DEEPWAVE Science and Operations Planning Meeting was held on 21-22 January 2014 at the University of Canterbury in Christchurch, New Zealand. This report provides key outcomes of the meeting, especially proposed additional ground measurements by regional collaborators, and a comprehensive list of possible model products and action items. A site survey of the Christchurch area was also conducted in preparation for the project deployment beginning in late May 2014. That information is included in a separate site survey report.

DEEPWAVE Science and Operations Planning Meeting Overview

Prof. Andy Sturman, Chair of the Geography Department, at the University of Canterbury, hosted the meeting. The meeting lasted 2 days on 21-22 January 2014. There ware approximately 30 people (Appendix 1) in attendance for at last a portion of the discussions. EOL has prepared an interactive agenda on the EOL DEEPWAVE web page that will included all scientific and operational support presentations made by the participants. It is found through the EOL DEEPWAVE Project web page at:
http://www.eol.ucar.edu/field_projects/deepwave

or directly at: https://www.eol.ucar.edu/node/4646 .

The first day of the meeting included a wide variety of presentations and discussion about the key aspects of the project. Scientific goals and research facilities already approved for the project were introduced by the U.S. Science Team members. This was followed by information from New Zealand and Australian scientists on other additional potential collaborations. Table 1 below is the preliminary list of possible facilities and support from regional institutions and agencies.

Table 1. Potential DEEPWAVE Collaboration from regional institutions/agencies

Institution/PI	Facilities	Measurements	Cost
Univ of Canterbury, Katurji	High mountain mesonet	TT, RH, WW, DD, micro pressure	
Univ of Canterbury, Baggeley	Meteor radar, ST radar	High alt winds, turbulence, all sky imager, interferometer	
NIWA, Uddstrom	3 models, sfc network, Lauder lidar, 10 high altitude Wx stations Weekly ozone sondes-Lauder	Multiple model parameters, sfc met, sounding winds and temps, ozone	Possible added pressure sensors to high elevation stations, snd expendables
NZ MetService, Kreft	Models, sfc array, aviation weather, volcanic ash, weather alerts	Multiple model parameters, sfc met obs, SIGMETS,PIREPS	
NZ MetService, Kreft	Regional WRF, other models, 5 cm natl radar network, AMDAR, TAFS, local forecasts	Winds, turbulence, sounding winds, temps, flt level winds, temp, RH	Hi-res sounding data, extra sondes
DLR, Bernd Kaifler, Hans Schlager	Ground sodium lidar, rawinsonde, ECMWF grids, DLR models, Flt plan tool	Winds, turbulence, sounding winds temps	
AAD, Simon Alexander	Tasmania Rayleigh Lidar, supplemental raobs (Hobart, McQuarie. Is.	High level temps, clouds, sounding data	
Sam Dean, NIWA	HadGEM3	Model, GW scheme	

The second day of the meeting was focused on operational considerations, the daily planning process and data management support to the project. The science team will be bringing the NSF/NCAR GV aircraft and the DLR Falcon 20 aircraft. Both planes will be equipped with a variety of sensors for in-situ measurements and remote sensing up to near 100km. The project will have the benefit of being able to use the excellent aircraft and operational support facilities that are part of the U.S. Antarctic Program (USAP) located at the International Airport in Christchurch. Further details are provided in the site survey report as noted above. There will be follow-up with the regional scientists to determine specific instrumentation and products that will be added during the field campaign.

Every project needs a logo. The DEEPWAVE Project is proud to present the following logo for consideration (Figure 1). It was prepared by Ron Smith's spouse and has a theme used in local Maori art. NIWA will assist in getting the project vetted and approved by the local Maori officials to avoid any problems or inadvertent misunderstanding about the cultural meaning of such a logo.

Project Data Management Support

A proposed data management strategy and requirements were presented and discussed. This included: (1) a description of project web pages; (2) in-field data collection, use of an on-line Field Catalog to collect, disseminate, and archive real-time products and reports; (3) structure and access of the final long-term project archive; and (4) development of a project data policy. DEEPWAVE data management milestones (schedule) were also discussed. In addition, various side meetings with participating collaborating groups were held to discuss further details of data flow, content, formats, etc. All this information and input (including action items) will be digested to refine data management approaches and reviewed during the next DEEPWAVE Planning Meeting scheduled for March 2014.

Items of immediate concern included establishment of a list of expected data products and availability of the Field Catalog, working out logistical details of data resolution, ingest, and access for supporting datasets, decisions on required model output fields, time steps, and forecasts, submission of research data to the GTS, and finalizing the data policy.

Modeling Activities

One of the outcomes of this meeting was the recognition that there are lots of models producing output and products that will be useful in the prediction and analysis of wave action over and near New Zealand. Most of the modeling groups were represented at the meeting. There were good discussions held among the various modeling groups. A preliminary list of models, organizations, domains, resolutions, time steps, and other characteristics are included in Table 2. Standard products (parameters, levels, frequency, etc.) are summarized in Table 3.

TABLE 2 – Proposed DEEPWAVE Model Summary

DEEPWAVE Model Summary (Draft)

Model	Type	Org.	Horizon Res.	Vertical Levels	Top	Fcst Length	Freq./ day	Purpose
GFS	Global	NCAR	27km	64?	50km?	240 h	4x	Medium range
IFS	Global	DLR	16km	137	100km	240 h	4x	Medium range – high alt GWs
NAVGEM	Global	NRL	37km	50	70 km	120 h	4x	Medium range
UM	Global	NIWA	17km	70	80 km	144 h	4x	Medium range – high alt GWs
NZLAM	Meso	NIWA	12km	70	80 km	72 h?	4x	GWs, meso
NZCSM	Meso	NIWA	1.5km	70	40 km	36 h?	4x	Fine scale GWs, local mesoscale
COAMPS	Meso	NRL	10-15km	80	50 km	48h	4x	GWs, meso
WRF	Meso	Inns.	6 km		50 km	48h	2x	GWs, meso
WRF	Meso	Yale	3 km		30 km	48h	2x	Fine scale GWs,
Cosmo	Meso	BGS	2.8 km			48h	2x	Fine scale GWs,
COAMPS Adjoint	Meso	NRL	20 km	60	30 km	48h	4x	Targeting

TABLE 3 – Summary of Standard Model Output Products

Standard Products (Rough Draft)

Variables	Levels	Time Frequency	Forecast Length
SLP, 3-h rain fall hPa, mm	Sea level	Every 3 h	120 h global 48 h mesoscale
Heights-Winds Meters, m/s vectors	850, 700, 500, 300, 200, 100, 50, 10, 2mb	Every 3 h	120 h global 48 h mesoscale
Vertical velocity m/s	850, 700, 500, 300, 200, 100, 50, 10, 2mb	Every 3 h	120 h global 48 h mesoscale
Divergence 10**3 /s?	850, 700, 500, 300, 200, 100, 50, 10, 2mb	Every 3 h	120 h global 48 h mesoscale
Theta, vertical velocity, horizontal wind	3 standard cross sections Top at model top	Every 3 h	48 h mesoscale
Targeting products	Vertically integrated energy, u, v, t, q sensitivity for 850, 700mb etc.	Every 3-6 h	24 h sensitivity with various lead times
Theta, vertical velocity, horizontal	Meridional cross section	Every 3 h	

Action Items

The consolidated list of action items that came from the Christchurch Science and Operations Planning meeting is included below. Responsible people (if known) have been assigned to the tasks. Other assignments will be added in the future.

- Coordinate model attributes and products—work from Doyle list and provide to agencies so testing can begin
- Consider model working group (*Doyle*)
- Bring catalog on-line ~3 weeks ahead of field project start (*Stossmeister, EOL*)
- Identify forecast team participants; identify a chair of the Forecast team
- Prepare staffing calendar for forecast team
- Prepare staffing list for PI team
- Prepare staffing list for operations team (*J. Moore*)
- Finalize data policy --define *investigator*-- (*Williams/PIs*)
- Develop and prepare project badges for CHC and USAP access. Approval of logo—NIWA to assist

- DEEPWAVE Operations Meeting in boulder 2-3 days, last 2 weeks of March.
  Those dates have been set for 26-28 March, NCAR Foothills Campus
- Agenda for March meeting (flight planning)
- Flight plan team to develop straw man plans for discussion prior to March, including DLR/NCAR coordinated flight ops
- Hokitika accommodations need to be made as soon as possible (read The *Luminaries)*
- Decisions related to added observations by collaborators and ordering of expendables will be made by the science participants
- Decisions on deployment locations of added available instrumentation
- Produce common map of all ground observation sites, instrumentation, data/product access
- Prepare associated table with ground sites, responsible group for instrumentation, contacts, etc.
- Access list for NZ MetService web sites/data and products (*Kreft/Williams*)
- Access list for NIWA data/products (*Uddstrom/Williams*)
- Establish time line for products to the catalog
- Address field catalog questions (*Stossmeister/Williams*)
- Operations Plan preparation for March meeting– assign writing for chapters

Appendix 1: List of DEEPWAVE Science and Operations Planning Meeting

Attendees:

Andy Sturman	U. of Canterbury, NZ
James Moore	NCAR/EOL, USA
Steve Williams	NCAR/EOL, USA
Steve Cohn	NCAR/EOL, USA
Tom Quayle	NZ Met Service, NZ
Peter Kreft	NZ Met Service, NZ
Hans Schlager	DLR, Germany
Ron Smith	Yale University, USA
Dave Fritts	GATS, Inc, USA
Jim Doyle	NRL Monterey, USA
Mike Green	Aurecon, NZ
Michael Uddstrom	NIWA, NZ
Tony Bromley	NIWA, NZ
Mike Revell	NIWA, NZ
Ed-Yang	NIWA, NZ
Sam Dean	NIWA, NZ
Stuart Moore	NIWA, NZ
Ben Liley	NIWA, NZ
Richard Turner	NIWA, NZ
Murray Poulter	NIWA, NZ
Marwan Katurji	U. of Canterbury, NZ
Jack Baggaley	U. of Canterbury, NZ
Adrian McDonald	U. of Canterbury, NZ
Kathy Hogarth	U. of Canterbury, NZ
Kerry Chuck	USAP, NZ
Phil Ambler	USAP, NZ
Art Brown	NSF/OPP
Geoff Austin	SALPEX Project, NZ
Simon Alexander	AAD, Aus
Steve Eckermann	NRL, USA