DEEPWAVE Operations Support Considerations

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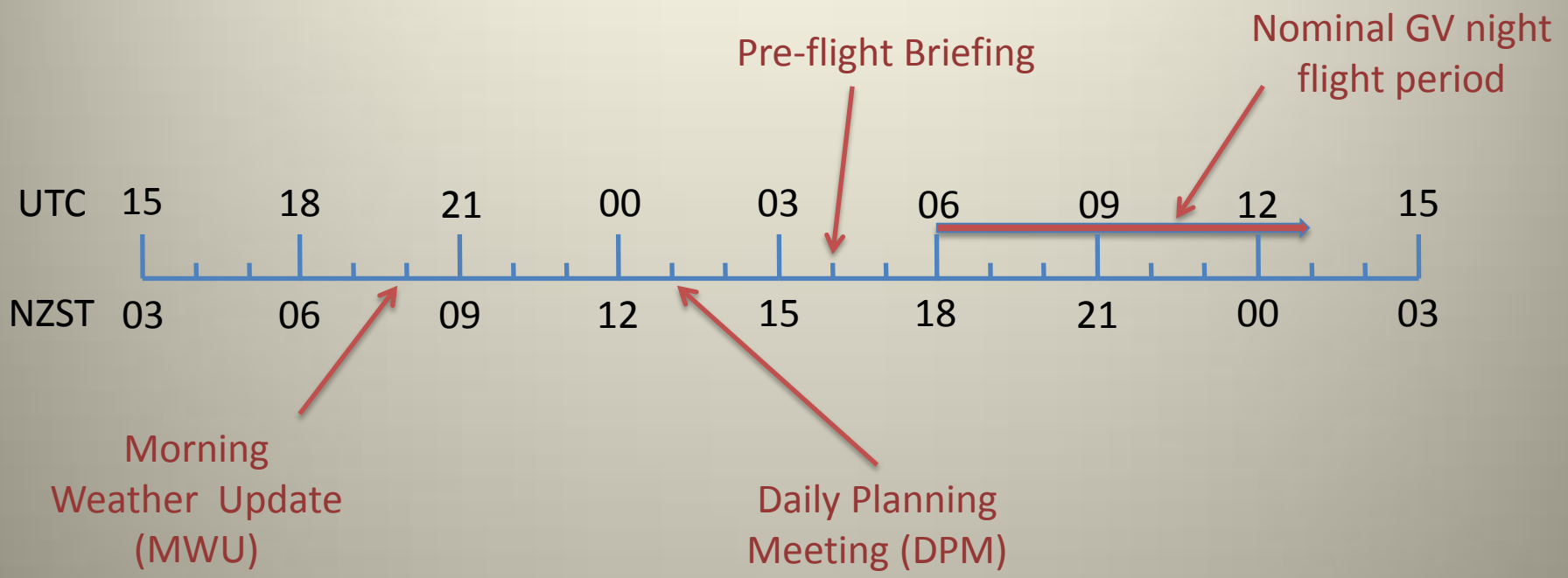
NCAR/EOL

DEEPWAVE Science and Operations Meeting

22 January 2014

DEEPWAVE Daily Schedule



Assumptions:

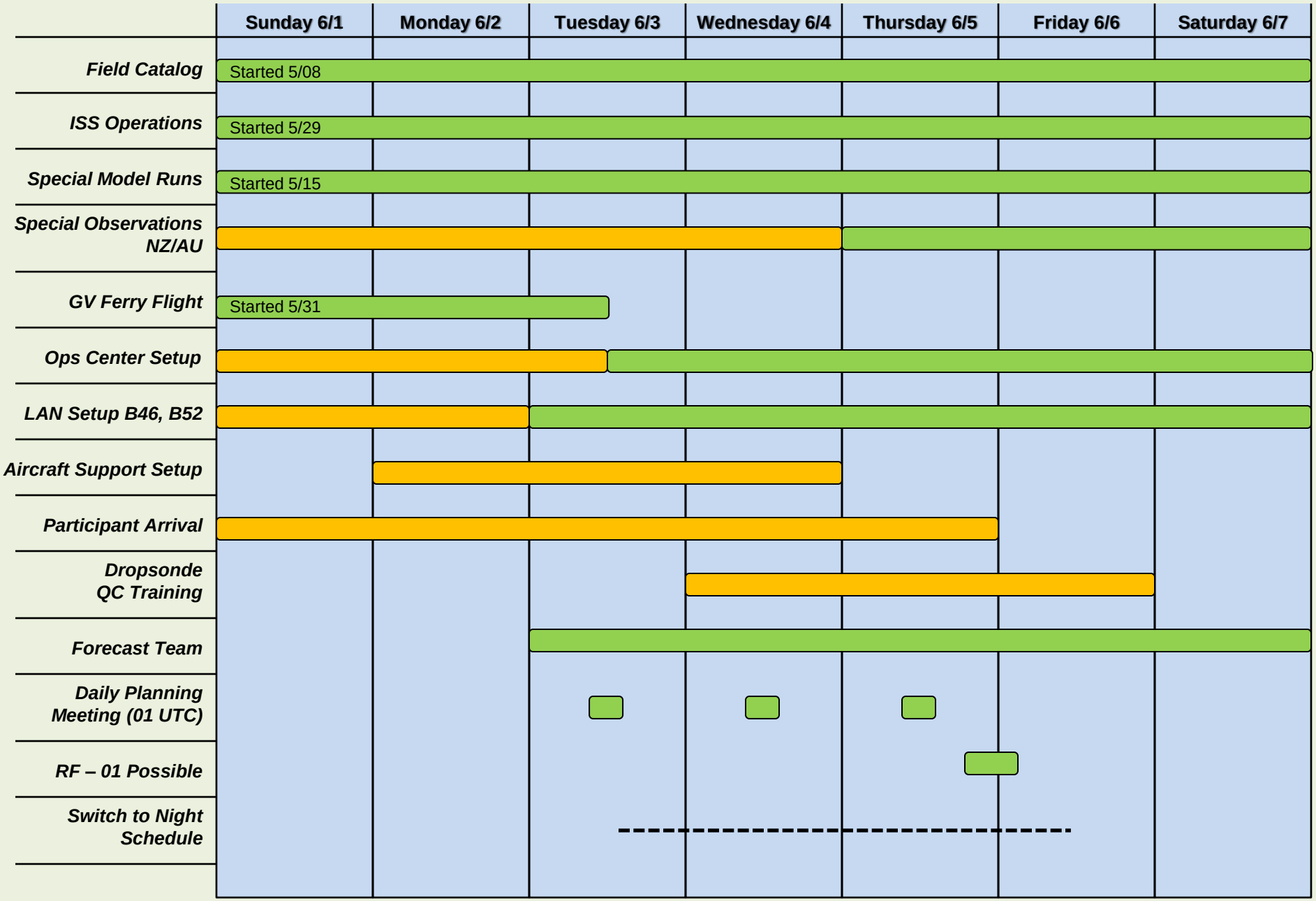
- Times are in UTC and New Zealand Standard Time (NZST) [winter time]
- Morning update focus on this evening's mission
- Daily Planning Meeting 7 days week, 01 UTC (focus on next days)
- Timing of Morning Update and DPM to allow for 00/12 UTC model run use
- Pre-flight briefing nominally 2 hours before GV take-off
- Single crew flight duration (~7 hour) night time flight is shown

Daily Planning Meeting Outline

- Project Status (planned down day, recent flight summary, etc.)
- Instrument/facility status (catalog summary)
- Update for this evening's flight (adjust flight plan)
- Weather forecast (for next days)
- Science Proposals for next days flight
- Any logistics/general announcements

DEEPWAVE Timeline, Week of 6/1 (first week)

Latest Update 3/21/14



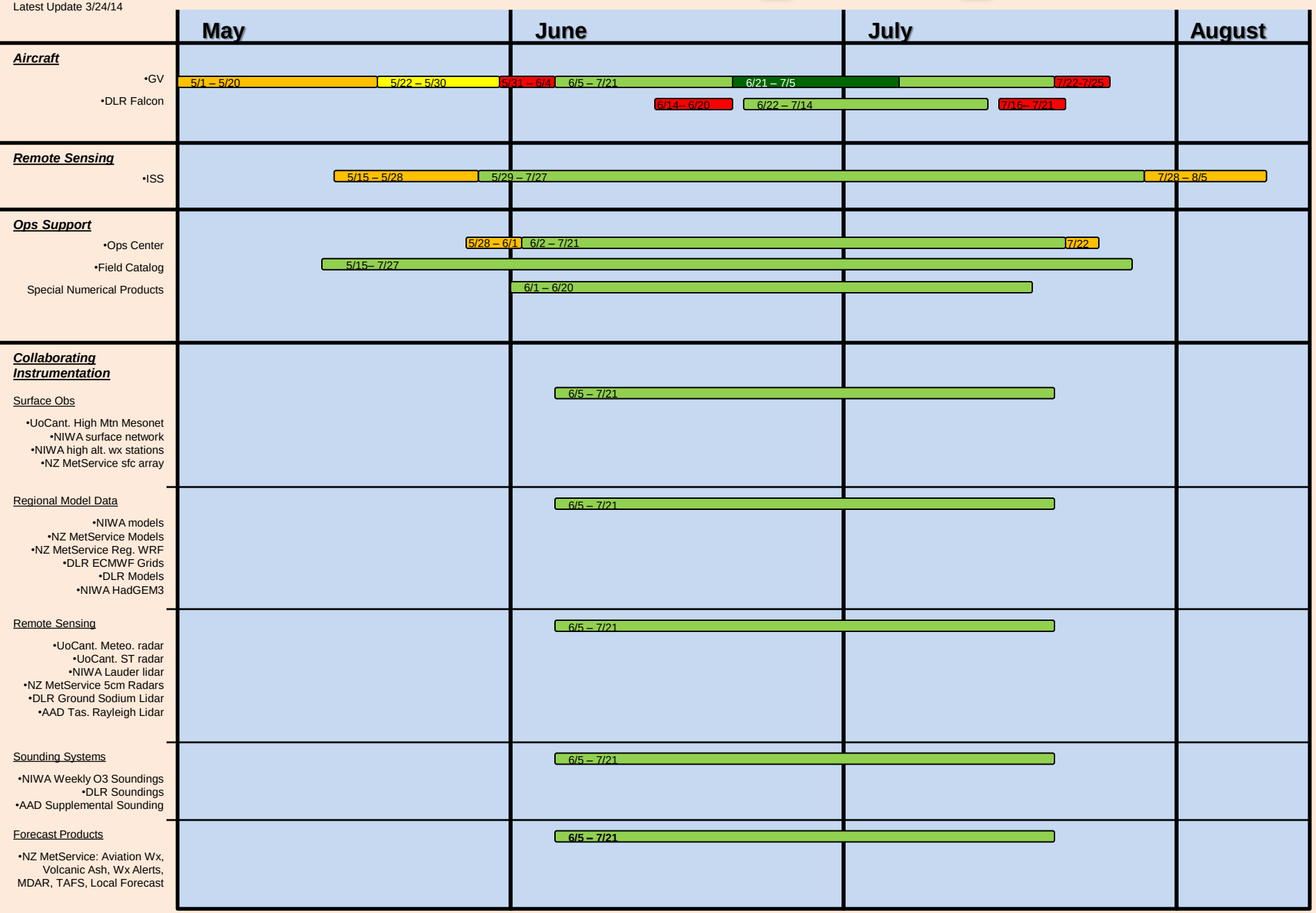
EOL Operations Center Support

- Operations Coordination– J. Moore (29 May -- 2 July), Vidal Salazar (24 June – 23 July)
- Field Catalog– Greg Stossmeister (29 May – 22 June), E. Johnson (20 June – 4 July)
- Systems Administration– T. Russ (30 May – 15 June, M. Paxton (15 June – 4 July), B. Slayton (4 July – 25 July)
- Dropsonde training and support (if students are on site)– Kate Young (1 June – 12 June)
- Forecasting Support – Mike Charnick (20 June – 4 July)

DEEPWAVE Facility Operations Timeline (2014)

Setup/Teardown / Test Flights — Ferry Operations — Enhanced Operations

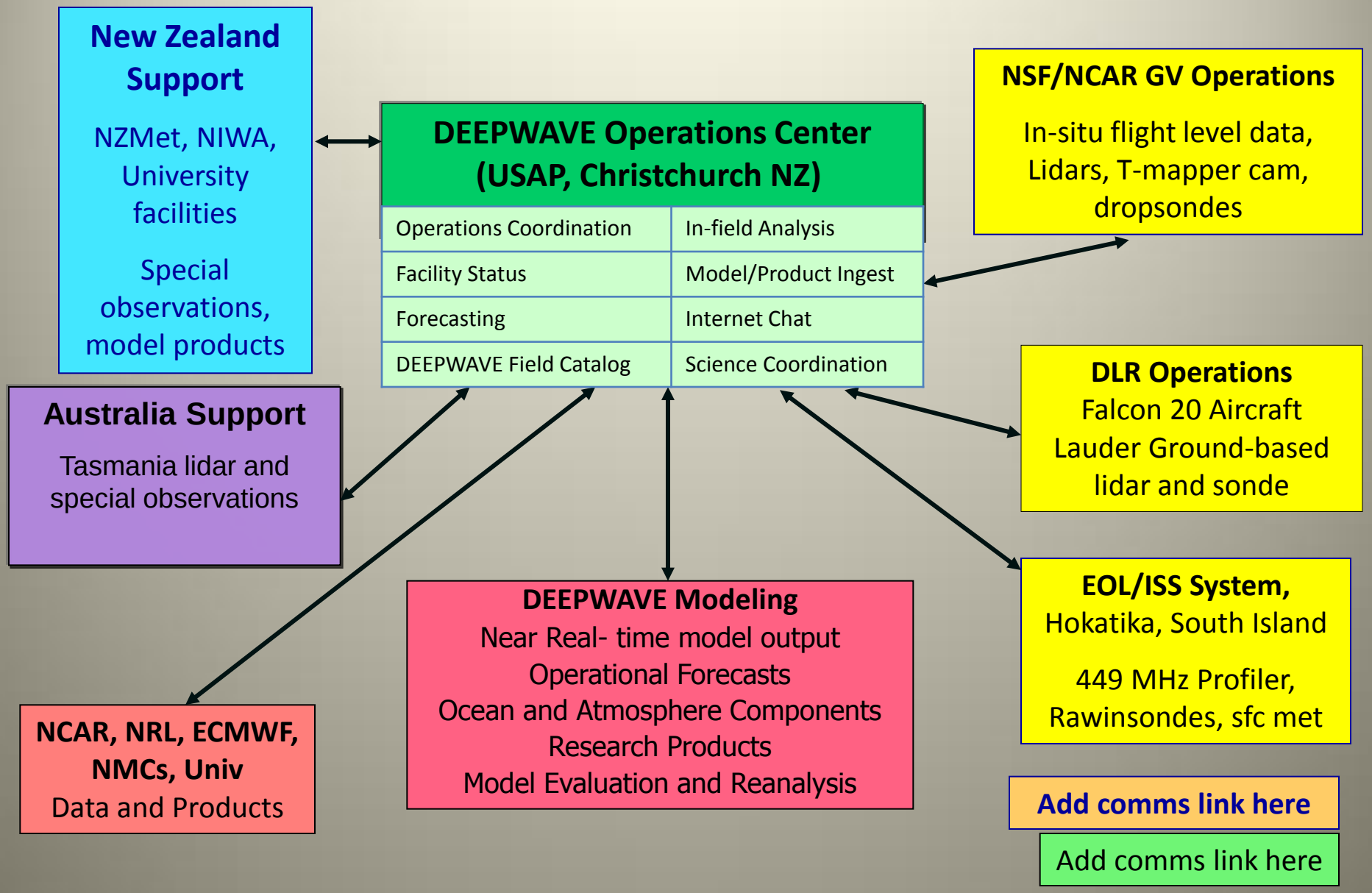
Latest Update 3/24/14



The Variety of DEEPWAVE Communication Tools

- Satellite communications (chat, image transfer, mission coordinator display, AEROS, remote instrument control)
- Internet (Global access, LAN, local storage, etc.)
- Telephone conferencing (Ready Talk)
- ftp (file, image transfers)
- Project Web site (field catalog)
- Email
- Cell phone

DEEPWAVE Communications Overview



Operations Assumptions

- A science steering committee
- A rotating assigned science director for the full deployment
- An operations director for the full deployment
- Other specific operations support (e.g. aircraft and surface facility coordinators)
- A DEEPWAVE Field Catalog reporting, products and preliminary analysis
- A staffed forecast team
- A facility status coordinator to monitor expendables, flight hours, etc. usage

Operations Functions Positions

- Operation coordination (Ops Director)
- Facility status (Status Coordinator)
- Aircraft Facility PM (RAF, DLR)
- Forecasting (Forecast Team, lead forecaster)
- Field Catalog (catalog specialist)
- Systems Administration support (LAN, user support)
- Logistics (coordination with PAE, local suppliers)
- Science Director (PI for the week, IOP definition)
- Mission Scientist/ground mission coordinator (PI for the day)
- Ground Systems Coordination (special research soundings, scheduling IOPs)

DEEPWAVE Operations Decision Making Process

- Project specific forecast preparation (include short term (today's weather and long term– planning for the future)
- Consider crew duty limits back-to-back flights, other crew duty limits for ground crews, science team fatigue
- Define the Intensive Observing Period (IOP)
- Establish timing of the start and stop of all special observations in the IOP (aircraft, soundings, ground based lidar operations, special model runs, etc.)
- Identify science objectives for the IOP mission and logistics for the aircraft flights

DEEPWAVE Operations Decision Making Process

- Identify mission scientist (typically after DPM)
- Develop flight plans for the aircraft (mission scientists, pilots and operations director)
- Identify scientific flight crews (flight scientist, etc.) and ground support personnel (e.g. nowcaster, aircraft coordinator, etc)
- Propose primary and secondary mission objective
- Develop a project score card/report card

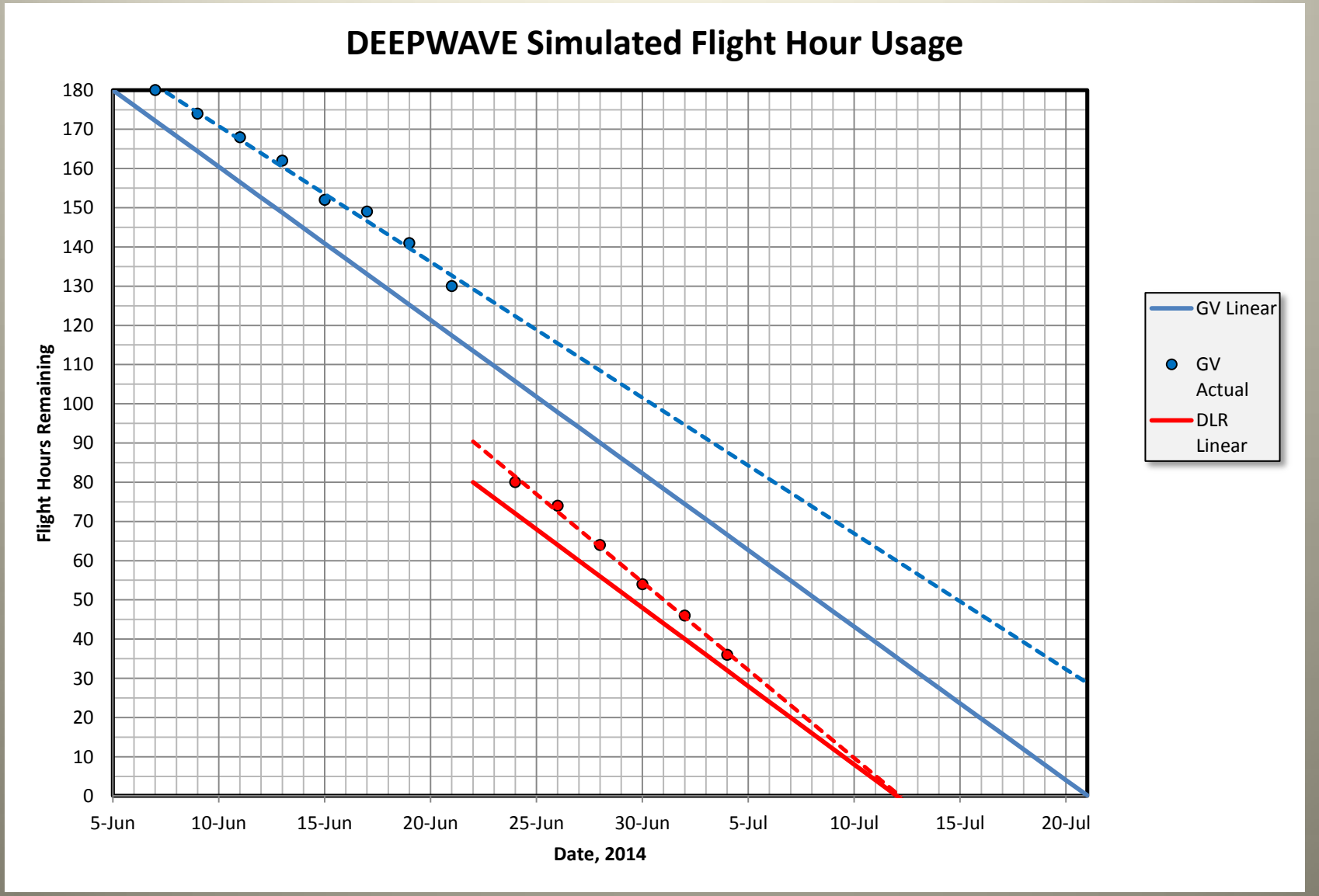
DEEPWAVE Mission Summary

Date; August	chair	critic	Forecast	Take Off 06Z On Aug.	NGV flight	DWS NGV	Falcon	Soundings	Goal	Score high	Score Low 200 hPa
5 Mon	D	E	AR	6	no		no	no			
6 Tues	D	E	AR	7*	NZ (6hr)	12	NZ	ISS	OroWave	1	1
7 Wed	E	D	AR	8*	NZ (6hr)	12	NZ	ISS	OroWave	3	4
8 Thurs	E	D	AR	9	no		no	no			
9 Fri	F		JD	10*	Tasmania (9hr)	12	no	Hobart	OroWave	1	3
10 Sat	D		CR	11	no		no	no			
11 Sun	D	K	CR	12	no		no	no			
12 Mon	F		AR	13*	Southern Ocean (8hr)	12	no	Macquarie	Non-OroWave	2	-
13 Tues	S		AR	14	no		no	no			
14 Wed	S		QJ	15*	NZ & SO (9)	20	NZ	ISS, Macquarie	OroWave&(Non-Orowave)	9 (3)	2-7 (1)

DEEPWAVE Science Report Card

Mission/IOP number/date	Science Objective (s) met—quality score	Flight hours used	Upsondes/dropsondes used
IOP-1 (00 UTC 6June- 00 UTC 7 June	Orographic GW near Tasmania	DLR 4 GV 6	ISS 6, DLR 4, McQuarie 2, Hobart 2, GV 12

Flight Hour Usage



DEEPWAVE Operations Plan Outline

- Project overview (project summary, science objectives) PIs
- Experiment design and deployment strategies (general project schedule) PIs
  - Aircraft research flights (division of resources for different science objectives
  - Ground observations (locations, observation strategies)
- Operations coordination (Division of resources, decision making process, daily schedule, aircraft coordination, facility status, staffing and responsibilities) Moore
- Operations Center (location, layout capabilities, functions) Moore
- Daily schedule (Daily Planning Meeting, Morning Update, Pre-flight brief) Moore
- Project communications Moore

DEEPWAVE Operations Plan Outline (continued)

- Aircraft operations—NSF/NCAR GV, DLR Falcon (capabilities, payload, crew duty, functions, flight plans, upload schedule and requirements Romashkin, Dornbrack
- Surface based observations (ISS, rawinsondes, lidars, surface met) – [measurements, schedules, locations, product availability (Brown, NIWA, NZ MetSe4rvice, Universities
- Forecasting and nowcasting support (staffing, products, dissemination) PIs
- Modeling support and and products (source, timing and access schedule (Doyle)
- Satellite schedules, support and products (Eckermann)
- Data and information management (data policy, real time data, EOL Field Catalog, long-term data archive and access) (SFW, Stossmeister)
- Education and outreach (Rockwell)
- Appendices—emergency contact information, project staff and phone list

DEEPWAVE Forecast Support Considerations

- Understanding science objectives –generation of GWs– forcing by
  - Topography, circumpolar jet, frontal systems, etc.
- Consideration of geographic areas (Tasmania, NZ south island, open ocean, etc.)
- Forecast period
- Utilization of local knowledge and experience
- Involvement of young scientists and students in forecasting support
- Staffing for 24 hour day/night operations

Forecast Support Considerations (Types of Forecasts)

- Real time forecasting (nowcasting) 0-12 hr)
- Shorter term flight planning forecast (6-36 hr)
- Planning forecast (12-72 hr)
- Special aviation forecasts (TAFs, icing, strong winds, turbulence)
- MWU, DPM, Pre-flight brief, nowcast updates during IOPs—focused on flight operations

Collaborator facilities and participation-1

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	Mutiple model parameters, sfc met obs, SIGMETS	

Collaborator facilities and participation-2

Institution/PI	Facilities	Measurements	Cost
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	
DLR, Bernd	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, McQ. Is.	High level temps, clouds, sounding data	
Sam Dean, NIWA	HadGEM3	Model, GW scheme	

Participating Institutions

- University of Canterbury, NZ
- NCAR/EOL, USA
- NZ Met Service, NZ
- DLR, Germany
- Yale University, USA
- GATS Inc., USA
- NRL, USA
- Aurecon, NZ
- NIWA, NZ
- USAP, NZ
- SALPEX Project, NZ
- AAD, Australia