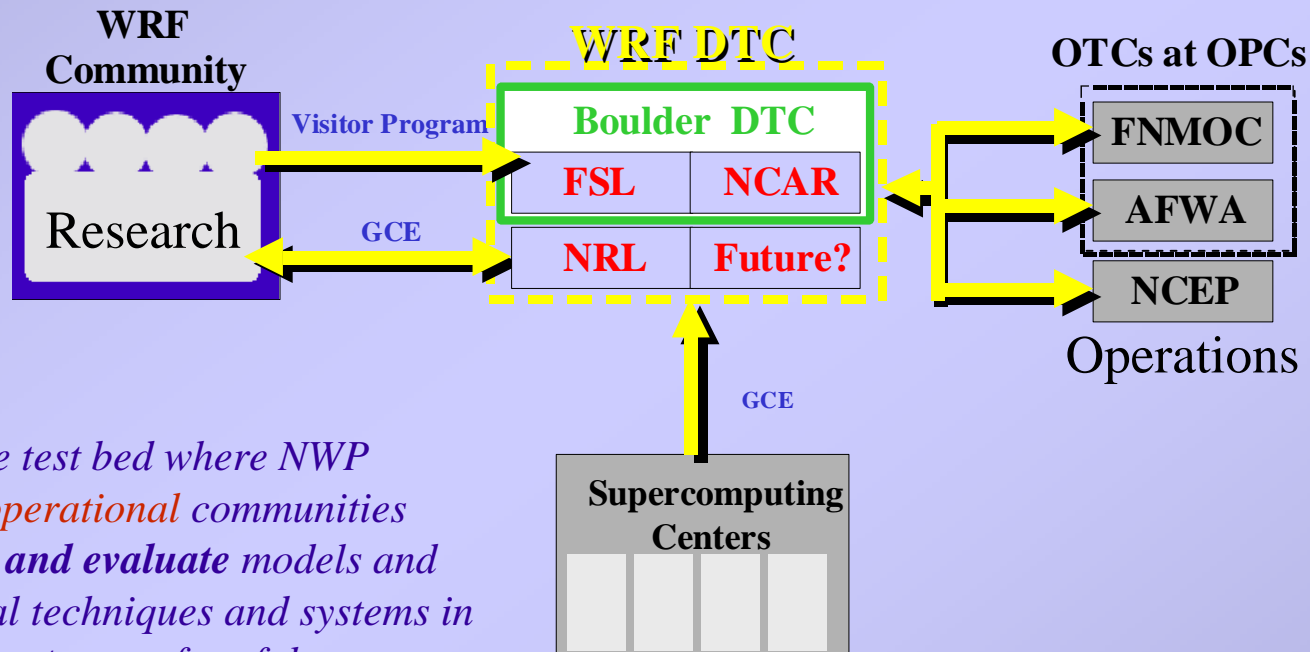


5-Report of the WRF DTC

The WRF DTC Architecture



A collaborative test bed where NWP research and operational communities interact to test and evaluate models and other numerical techniques and systems in order to accelerate transfer of these technologies to operational users, and to test research models and techniques used as tools to provide a better scientific understanding of atmospheric physical processes

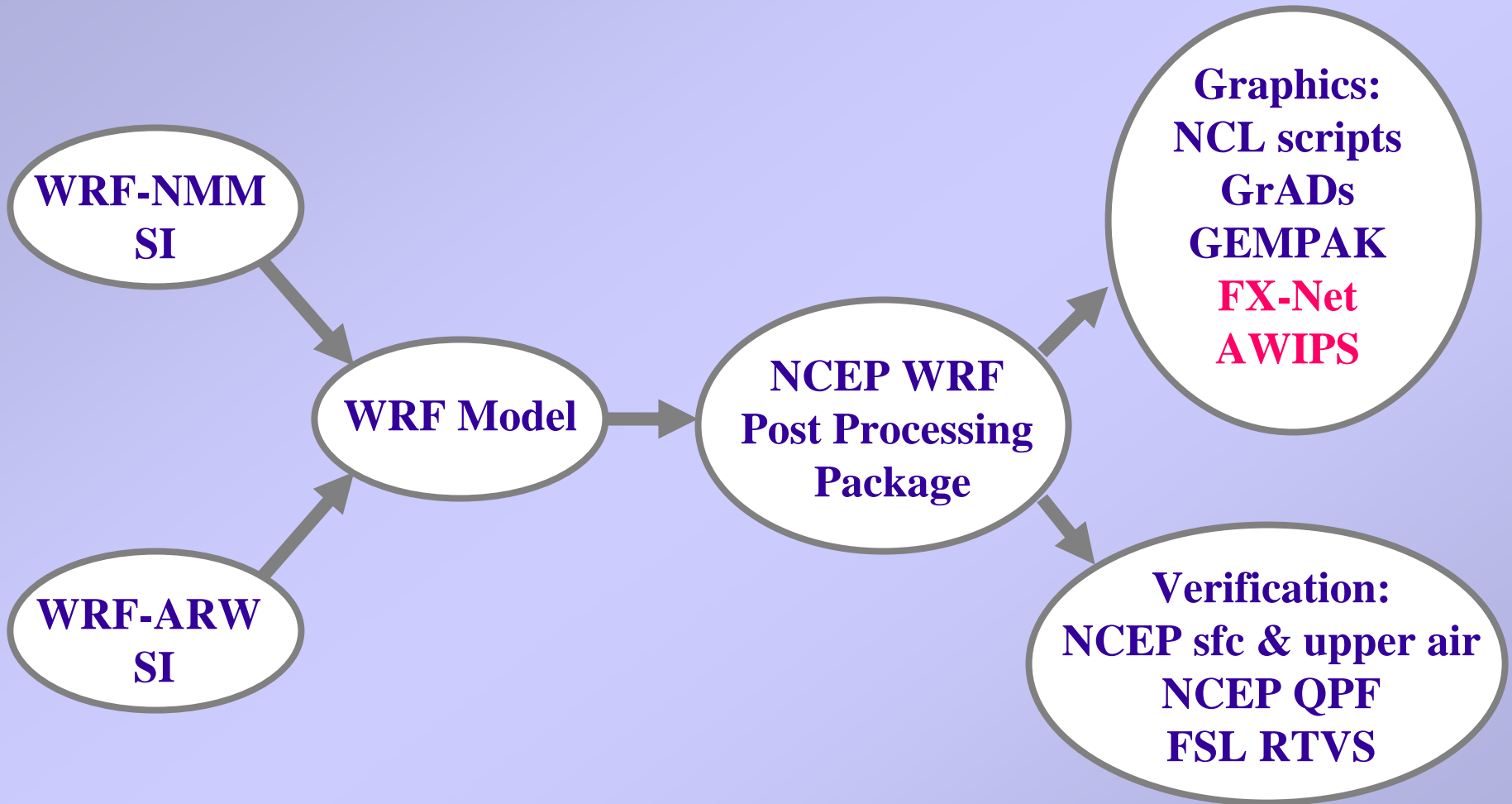
WRF Executive Oversight Board

5 January 2005

FY05 Accomplishments

- Conducted DWFE and disseminated model products to NWS via web, FX-Net, and AWIPS
- Made the NCEP and RTVS verification systems part of the suite of model components available through the DTC
- Released an announcement of opportunity for visiting scientists to work at the DTC
- Released NMM documentation to community
- Released NMM core code to the community as part of the Reference Code
- Held First NMM tutorial held in Boulder Sept 20-22, 2005.
- A full end-to-end WRF reference code system is now available to the community
- Prepared conference papers and final report on DWFE results. (presented at WAF/NWP conference Aug 1-5)
- Created and convened the DTC Advisory Panel
- Established the NRL component of the DTC

WRF DTC End-to-End System



Some Observations from DWFE

- DWFE results indicated that the skill of the two cores were very similar
- Clearly demonstrated the value of confidence intervals for verification statistics
- There was considerable participation with the operational forecast community
- Demonstrated the power of FxNet
- DWFE frequently mentioned by the regions during the product suite review
 - They are interested in working with the research community on DWFE like projects
 - They would like to be involved early in setting priorities for future projects.
- More discussion of DWFE results in next talk

WRF NMM Tutorial

- Held 1st tutorial 27-29 September 2005
- Plan to offer 2 per year (next 7-10 February, 2005)
- Very Important Contribution to the Tutorial from EMC
 - This has lead to a very close collaboration between DTC and NCEP

	<u>Applicants</u>	<u>Current Class</u>
Government	16	14
University	32	16
Private	8	4
<u>Foreign</u>	<u>6</u>	<u>2</u>
	62	36

DTC Visitor Program

- First Announcement of Opportunity for the FY 05 visitor program was released February 16, 2005
 - 33 applications were received
 - Reviewed by: Surgi (NCEP), DeMego (NCEP) , Brown (FSL), Hodur (NRL), Davis (NCAR), Wegiel (AFWA)
 - 10 proposals were funded (88% from universities)
- There will be a new Announcement of Opportunity each year (February?) depending on funding.
- Funding for up to 1 month salary, travel, and per diem
- Access to DTC computational resources
- Priorities for the AO will be determined by the Advisory Board
- Proposals in the future will be reviewed by DTC Advisory Board

2005-06 WRF DTC Visitor Program

Hsiao-Ming Hsu	NCAR/RAL	Multiscale Verification Method
Caren Marzban	University of Washington / University of Oklahoma	Cluster analysis for verification of WRF precipitation fields
Paul Roebber	University of Wisconsin – Milwaukee	Event-oriented verification
Mark Stoelinga	University of Washington	Verification methods for simulated reflectivity
Dale Barker James Drake Jianjun Xue	NCAR/MMM AFWA JCSDA	Development of tools for WRF Data Assimilation
Ming Xue Shun Liu Ming Hu	University of Oklahoma	Implementation & evaluation of WSR-88D radial velocity & reflectivity data assimilation via 3DVAR
Peter Bogenschutz	University of Utah	Comparison of DWFE results with limited area models as part of the Coastal Storms Initiative
Dave Dempsey	San Francisco State University	Analysis of DWFE results. Impact of Damping in NMM and ARW
Joe Galewsky	University of New Mexico	Resolution dependence of convective parameterizations
Bill Gallus Isidora Jankov Eric Aligo	Iowa State University	Impacts of grid spacing and physical parameterizations for convective systems

Status of DTC TOR

- DTC TOR was approved by the WExOB at it's April 2005 meeting
- Original plan was to have formal signatures on the TOR
 - NCAR, NWS, OAR and NRL
- With the formal development of an MOA for the WRF Program, the DTC TOR will become a subcomponent of that document and hence doesn't require a separate signature process.
- The development of the TOR is complete
 - However it is proposed that NCEP/EMC be added as a formal node of the DTC
 - This will require WExOB approval of the this change to the TOR

NRL DTC and Boulder DTC Activities

- Current joint activities are focused on participation in TREX
- NRL DTC and Boulder DTC activities in TREX have been discussed in several meetings
 - AT NRL 6 May, 2005, 20 June 2005
 - During WRF Workshop and WAF/NWP conference
 - Boulder DTC participation in TREX telecons
 - Primary point of contact at NRL is Jim Doyle
- Boulder DTC participation discussed in detail in Task Plan
 - Boulder DTC will run the ARW and NMM cores for TREX IOP cases in retrospective mode
 - These runs will compare the three cores for high amplitude mountain wave
 - NRL DTC will provide real-time forecast guidance for TREX
- It is possible that there could be a coordinated COAMPS/NMM tutorial next summer

FY06 Activities and Priority Setting

DTC Advisory Board Membership

Organization	Number	Member
• NOAA/NCEP	2	Geoff DiMego and Naomi Surgi
• NOAA/OAR	1	Tom Schlatter
• NAVY/FNMOC	1	Mike Sestak
• NAVY/NRL	1	Simon Chang
• AFWA	2	Jerry Wegiel Chris Finnigsmier
• ARL	1	Bob Dumais
• FAA	1	Roy Rassmussen
• NCAR	1	Greg Holland
• Academic Community	3	Brian Colle (SUNYSB) Ming Xue (UOK) Paul Roebber (UWisM)

• Total	13
Research	Operations

DTC Advisory Board

- Met by telecon 15 September, 2005
- DTC presented the Board with 11 possible projects that it might undertake in FY06
 - Brief 1-2 page descriptions of each project was provided to panel prior to the meeting
 - Each project was discussed by the board
- Board was then asked to provide a numerical value of their priority for each project
 - 100% of the Board responded
- In FY 06 we expect that the board will continue to meet by telecon to reduce costs.
 - Meetings will be twice per year

DTC Advisory Panel Priorities

Project Summary

Projects	Criteria						
	Relevance to DTC Mission	Feasibility	Research to OPS	Synergism with other DTC Activities	Importance to WRF Project	Indentifiable Customer/Outcome	Project Averages
Tutorials	4.9	4.6	3.7	4.2	4.8	4.5	4.5
Reference Code Support	4.7	4.3	4.0	4.0	4.4	4.1	4.2
Verification Development	4.5	3.6	3.6	4.5	4.6	4.3	4.2
WRF Rapid Refresh	4.2	4.1	4.4	4.1	4.0	4.3	4.2
Case Study Data Sets	3.9	4.2	3.6	4.1	4.2	3.7	4.0
Infrastructure Development and Support	4.2	2.9	3.5	3.8	4.2	4.0	3.8
T-REX	3.5	4.1	3.7	4.0	3.3	3.4	3.7
NCEP Priority List	3.4	3.1	4.1	3.5	3.6	3.7	3.6
Model Physics Test	3.8	3.1	3.5	3.7	3.8	3.3	3.5
Participation in LEAD	2.5	2.5	1.9	2.8	2.4	2.8	2.5
CuPido Forecasting	1.9	2.1	2.0	2.0	1.8	1.7	1.9
Category Averages	3.8	3.5	3.5	3.7	3.7	3.6	

DTC Advisory Panel Priorities

Projects	Summary Averages	Research Averages	Ops Averages	NCEP Averages
Tutorials	4.5	4.0	4.3	4.8
Verification Development	4.2	3.8	3.9	3.8
Reference Code Support	4.2	3.6	4.2	4.1
WRF Rapid Refresh	4.2	3.7	4.3	4.1
Case Study Data Sets	4.0	3.7	3.7	2.4
Infrastructure Development and Support	3.8	3.2	3.8	5.0
T-REX	3.7	2.8	4.1	3.3
NCEP Priority List	3.6	2.9	4.3	4.5
Model Physics Test	3.5	3.5	3.5	2.3
Participation in LEAD	2.5	2.5	2.4	2.0
CuPido Forecasting	1.9	1.4	2.5	1.9

WRF DTC FY06 Activities

- WRF-NMM Tutorials – February 7-10 and summer
- Clean Comparison of ARW and NMM Cores. RR testing and evaluation
- Publication of DWFE results (4 papers)
- TREX
 - Near real-time runs to inter-compare NMM, ARW and COAMPS ability to forecast high amplitude/breaking mountain waves.
- Supporting NMM to the Community
- Announcement of Opportunity for a new round of visitor proposals. Feb '06 if funding available
 - Continuation of FY05 visitor program.
- AFWA Operational Model Comparison

DTC Accomplishments FY06

- DWFE noted earlier
- A Strong Collaboration has been established between the Boulder DTC and NCEP
- NMM released to the Community
 - Code
 - Documentation
 - Tutorial
- A substantial visitor program (13 participants in FY05-06)
- RR testing discussions
 - DTC promoted extensive discussions involving the RR development team and the FAA PDTs in planning and executing the evolution nfrom RUC to RR
 - Represents a major opportunity to influence the direction of a major operational implementation

FY06 DTC Budget

FUNDING:		99,000	275,000	500,000	50,000	275,000	50,000	85,000	1,334,000
Task		FY05 Visitor Commitments	GSD CO-SP	NWS/USWRP	NCEP	NCAR	AFWA	FAA	Total
1	NMM Tutorial	-	16,563	29,401	20,000	12,837	-	-	78,801
2	WRF-RR core tests	-	73,286	114,817	-	-	-	85,000	273,103
3	DWFE Publications	-	41,196	76,941	-	35,745	-	-	153,882
4	T-REX	-	55,555	84,720	-	29,165	-	-	169,440
5	NMM support	-	21,843	33,584	20,000	-	-	-	75,427
6	Visitors	-	14,579	48,035	-	33,456	-	-	96,070
7	Operational Test	-	-	-	9,724	-	50,000	-	59,724
8	Administration/Management	-	45,141	125,698	-	106,297	-	-	277,136
SALARIES									
		-	268,163	513,195	49,724	217,500	50,000	85,000	1,183,582
	Visitors	99,000	-	-	276	5,000	-	-	104,276
	Advisory	-	-	-	-	-	-	-	-
	Travel (management & presentation of DTC results)	-	6,837	26,837	-	20,000	-	-	53,674
	Materials & Supplies	-	-	7,500	-	7,500	-	-	15,000
TOTAL EXPENSES									
		99,000	275,000	547,532	50,000	250,000	50,000	85,000	1,356,532
REMAINING FUNDS									
		-	-	(47,532)	-	25,000	-	-	(22,532)

*Nance = 3/4 time for 1st qtr of 06

*Eliminate FY05 visitor AO

*No purchase of additional visitor computers

End

Backup Slides

Some notes on the Joint Numerical Testbed

This is where the NCAR DTC will reside

JNT Structure

The JNT would consist of two parts:

- The NCAR DTC (Developmental Testbed Center)
 - Funded by NOAA, NCAR, NSF, AFWA and FAA
- A facility within RAL to perform testing and evaluation of weather prediction systems
 - Expert systems, statistical models...
 - Testing of systems of particular interest to RAL Programs—homeland security, aviation weather, road weather...
 - Funding would be separate from the NCAR DTC funding but the two components would leverage each other.

Only the first part of proposed JNT currently exists!

JNT Strategic Goal

Establish a central collaborative facility within RAL and a national distributive network of collaborators for developing, testing, and validating weather predication systems for various atmospheric parameters important to operational decision makers.

FY06 NCAR DTC Full Budget

		FUNDING:							All at 85% LOADED SALARIES						
		99,000	225,000	50,000	275,000	50,000	42,500	741,500	320,092	139,338	123,870	42,912			
Task		FY05 Visitor Commitments	NWS/USWRP	NCEP	NCAR	AFWA	FAA	Total	Gall	*Nance	Demeritas	Johnson	FTE	TOTALS	
1	NMM Tutorial	-	12,838	20,000	12,837	-	-	45,675	-	20,901	24,774	-	0.35	45,675	
									-	15%	20%	-			
2	WRF-RR core tests	-	41,531	-	-	-	42,500	84,031	32,009	33,441	18,581	-	0.49	84,031	
									10%	24%	15%	-			
3	DWFE Publications	-	35,745	-	35,745	-	-	71,490	32,009	20,901	18,581	-	0.40	71,490	
									10%	15%	15%	-			
4	T-REX	-	29,165	-	29,165	-	-	58,330	32,009	13,934	12,387	-	0.30	58,330	
									10%	10%	10%	-			
5	NMM support	-	11,741	20,000	-	-	-	31,741	-	6,967	24,774	-	0.25	31,741	
									-	5%	20%	-			
6	Visitors	-	33,456	-	33,456	-	-	66,912	32,009	13,934	12,387	8,582	0.50	66,912	
									10%	10%	10%	20%			
7	Operational Test	-	-	9,724	-	50,000	-	59,724	32,009	15,327	12,387	-	0.31	59,723	
									10%	11%	10%	-			
8	Administration/Management	-	80,557	-	106,297	-	-	186,854	160,046	13,934	-	12,874	0.90	186,853	
									50%	10%	-	30%			
SALARIES			245,032	49,724	217,500	50,000	42,500	604,756	320,092	139,338	123,870	21,456	3.50	604,756	
	Visitors	99,000	100,000	276	105,000	-	-	304,276							
	Advisory	-	-	-	-	-	-	-							
	Travel (management & presentation of DTC results)	-	20,000	-	20,000	-	-	40,000							
	Materials & Supplies	-	22,500	-	22,500	-	-	45,000							
TOTAL EXPENSES		99,000	387,532	50,000	365,000	50,000	42,500	994,032							
REMAINING FUNDS		-	(162,532)	-	(90,000)	-	-	(252,532)	100%	100%	100%	50%			

*Nance = 3/4 time for 1st qtr of 06

FY06 NCAR DTC Barebones Budget

FUNDING:								All at 85% LOADED SALARIES						
								320,092	139,338	123,870	42,912			
Task	FY05 Visitor Commitments	NWS/USWRP	NCEP	NCAR	AFWA	FAA	Total	Gall	*Nance	Demeritas	Johnson	FTE	TOTALS	
1	NMM Tutorial	-	12,838	20,000	12,837	-	-	45,675	-	20,901	24,774	-	45,675	
								-	15%	20%	-	0.35		
2	WRF-RR core tests	-	41,531	-	-	-	42,500	84,031	32,009	33,441	18,581	-	84,031	
								10%	24%	15%	-	0.49		
3	DWFE Publications	-	35,745	-	35,745	-	-	71,490	32,009	20,901	18,581	-	71,490	
								10%	15%	15%	-	0.40		
4	T-REX	-	29,165	-	29,165	-	-	58,330	32,009	13,934	12,387	-	58,330	
								10%	10%	10%	-	0.30		
5	NMM support	-	11,741	20,000	-	-	-	31,741	-	6,967	24,774	-	31,741	
								-	5%	20%	-	0.25		
6	Visitors	-	33,456	-	33,456	-	-	66,912	32,009	13,934	12,387	8,582	66,912	
								10%	10%	10%	20%	0.50		
7	Operational Test	-	-	9,724	-	50,000	-	59,724	32,009	15,327	12,387	-	59,723	
								10%	11%	10%	-	0.31		
8	Administration/Management	-	80,557	-	106,297	-	-	186,854	160,046	13,934	-	12,874	186,853	
								50%	10%	-	30%	0.90		
SALARIES			245,032	49,724	217,500	50,000	42,500	604,756	320,092	139,338	123,870	21,456	3.50	604,756
	Visitors	99,000	-	276	5,000	-	-	104,276						
	Advisory	-	-	-	-	-	-	-						
	Travel (management & presentation of DTC results)	-	20,000	-	20,000	-	-	40,000						
	Materials & Supplies	-	7,500	-	7,500	-	-	15,000						
TOTAL EXPENSES		99,000	272,532	50,000	250,000	50,000	42,500	764,032						
REMAINING FUNDS		-	(47,532)	-	25,000	-	-	(22,532)	100%	100%	100%	50%		

*Nance = 3/4 time for 1st qtr of 06
*Eliminate FY05 visitor AO
*No purchase of additional visitor computers

FY06 NCAR DTC Barebones Plus Budget

		FUNDING:							LOADED SALARIES					
		99,000	225,000	50,000	275,000	50,000	42,500	741,500	376,578	139,338	123,870	42,912		
Task		FY05 Visitor Commitments	NWS/USWRP	NCEP	NCAR	AFWA	FAA	Total	Gall	*Nance	Demeritas	Johnson	FTE	TOTALS
1	NMM Tutorial	-	12,838	20,000	12,837	-	-	45,675	-	20,901	24,774	-		45,675
									-	15%	20%	-	0.35	
2	WRF-RR core tests	-	25,882	-	10,000	-	42,500	78,382	26,360	33,441	18,581	-	0.46	78,382
									7%	24%	15%	-		
3	DWFE Publications	-	32,921	-	32,921	-	-	65,842	26,360	20,901	18,581	-	0.37	65,842
									7%	15%	15%	-		
4	T-REX	-	26,341	-	26,341	-	-	52,681	26,360	13,934	12,387	-	0.27	52,681
									7%	10%	10%	-		
5	NMM support	-	1,741	30,000	-	-	-	31,741	-	6,967	24,774	-	0.25	31,741
									-	5%	20%	-		
6	Visitors	-	30,632	-	30,632	-	-	61,264	26,360	13,934	12,387	8,582	0.47	61,264
									7%	10%	10%	20%		
7	Operational Test	-	4,075	-	-	50,000	-	54,075	26,360	15,327	12,387	-	0.28	54,075
									7%	11%	10%	-		
8	Administration/Management	-	72,670	-	104,769	-	-	177,439	150,631	13,934	-	12,874	0.80	177,439
									40%	10%	-	30%		
SALARIES			207,100	50,000	217,500	50,000	42,500	567,099	282,434	139,338	123,870	21,456	3.25	567,098
	Visitors	99,000	-	-	5,000	-	-	104,000						
	Advisory	-	-	-	-	-	-	-						
	Travel (management & presentation of DTC results)	-	20,000	-	20,000	-	-	40,000						
	Materials & Supplies	-	7,500	-	7,500	-	-	15,000						
TOTAL EXPENSES		99,000	234,600	50,000	250,000	50,000	42,500	726,099						
REMAINING FUNDS		-	(9,600)	-	25,001	-	-	15,401	75%	100%	100%	50%		

*Nance = 3/4 time for 1st qtr of 06
*Eliminate FY05 visitor AO
*No purchase of additional visitor computers
*Gall at .75 FTE (2080)

FY06 GSD DTC Budget

Task	FUNDING:				LOADED FTE SALARIES (includes IRA)													FTE	TOTALS		
	% OF TOTAL	NOAA/OAR	NWS/USWRP	GSD CO-SP	Total	Koch	Bernardet	McCaslin	Schultz	Smart	Collander	Jamison	Szoke	Mahoney	Loughe	Middlecoff	Harrop				
	0	275,000	275,000	550,000		361,127	222,034	218,434	306,973	293,700	135,349	130,122	206,875	245,600	233,208	300,959	196,630				
1 NMM Tutorial	-	16,563	16,563	33,125		-	10%	5%	-	-	-	-	-	-	-	-	-	-	-	0.15	33,125
2 WRF-RR core tests	-	73,286	73,286	146,572		5%	15%	-	-	-	10%	-	-	3%	15%	-	20%	-	-	0.68	146,572
3 DWFE Publications	-	41,196	41,196	82,393		18,056	33,305	-	-	-	13,535	-	-	7,368	34,981	-	39,326	-	-	0.35	82,393
4 T-REX	-	55,555	55,555	111,110		18,056	33,305	-	-	-	-	-	31,031	-	-	-	-	-	-	0.45	111,110
5 NMM Support	-	21,843	21,843	43,687		10%	5%	-	10%	-	10%	-	-	-	-	-	-	-	10%	0.20	43,687
6 Visitor Program	-	14,579	14,579	29,158		36,113	11,102	-	30,697	-	13,535	-	-	-	-	-	-	-	-	0.10	29,158
7 Operational Test	-	-	-	-		-	-	20%	-	-	-	-	-	-	-	-	-	-	-	0.10	29,158
8 Administration/Management	-	45,141	45,141	90,282		-	-	43,687	-	-	-	-	-	-	-	-	-	-	-	0.25	90,282
SALARIES	-	268,163	268,163	536,325		5%	5%	-	-	-	-	-	-	-	-	-	-	-	-	2.18	536,325
Visitors	-	-	-	-		18,056	11,102	-	30,697	-	27,070	-	31,031	7,368	34,981	-	58,989	-	-		
Advisory	-	-	-	-		90,282	-	-	-	-	-	-	-	-	-	-	-	-	-		
Travel (management & presentation of DTC results)	-	6,837	6,837	13,674		-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TOTAL COSTS	-	275,000	275,000	549,999																	
FUNDING - COSTS	-	0	0	1		50%	50%	25%	10%	0%	20%	0%	15%	3%	15%	0%	30%				