

CALPUFF WORKSHOP SYDNEY 30-31 May 2006

1. Introduction

The workshop identified 20 items for potential enhancements of CALPUFF, either in data treatment or code modifications. These are addressed in **Section 2** of this document. The workshop also dealt with the question of whether there was a need for User Guidance to be developed through ModSIG. There was a general agreement that this was desirable, and **Section 3** details this aspect of the workshop.

2. Suggested Model Enhancements

For each item of proposed model enhancement, individuals have been nominated in **Table 1** either as being responsible for specific actions or as ‘sponsors’ of the item. A sponsor is requested to ensure that this item is progressed, even if he/she is not directly responsible for specific actions that are identified in ‘Specific Action Items’ of **Table 2**. The IUAPPA conference in Brisbane in September 2007 will be the occasion for the next major update workshop, at which progress will be reported on all items.

TABLE 1: INDIVIDUAL ACTION KEY (SEE TABLE 1 FOR DETAILS)

Initials	Name	Specific Action Items	Sponsor-only Items ¹
JS	Joe Scire	3,4(A,C),5,6,7,9,10,12,13,14,15,16,19,20,21	
OP	Owen Pitts	2(B,C,D),3,4(B),7,19	4,10,12,13,14,19,21
KR	Ken Rayner	1,8,10	15,16
GR	Graeme Ross	1,6	
PD	Peter D’Abreton	2(A,B),4(A, B),5	
AM	Andrew Martin	2(A,B)	
JC	Judith Cox	11	9
JT	John Taylor		5,17
AB	Adrian Blockley		2,18
JG	Jenny Godfrey	10	

¹ Person not identified here if also responsible for a specific action

TABLE 2: SUGGESTIONS FOR DEVELOPMENT/ENHANCEMENTS: MASTER LIST

Item No.	Item Description	Who will do it?	Priority	Difficulty	ModSIG 'sponsor'
1	<p>Improved/more direct TAPM data incorporation</p> <p>There are interpolation errors introduced when using CSUMM format to input TAPM data to Calmet. Also 3-D temperature fields are ignored. Options:</p> <p>A) TAPM could produce 3D.DAT file for input to CALMET (reduced effort, use other fields e.g., temp, which are not used when importing by the CSUM method).</p> <p>B) CALMET could be modified to read directly TAPM .OUT file. JS would need to know TAPM output format, sigma level system, units etc.</p> <p>C) Develop independent software to take output from TAPM and format into CALMET. This could also potentially produce a CALMET output file from TAPM data.</p> <ul style="list-style-type: none"> • Subsequent to workshop Peter Hurley advised that transforming TAPM terrain-following cords to MM5 pressure-coords for the purposes of transforming back to Calmet height-shifted coords is bad practice (which is likely to introduce interpolation errors). Therefore best solution appears to be for CALMET to be modified to accept TAPM output. 	<p>Recommended option is option B). This will require funding most likely from industry and/or consultants.</p> <p>KR & GR to be available to liaise with JS and CSIRO if industry / consultant sponsors are forthcoming.</p>	VH	L-M	<p>Awaited</p> <p>KR, GR to assist</p>
2	<p>Improved geophysical databases:</p> <p>A) Improved Data Bases</p> <p>i) Fine resolution terrain, land use, roughness length (e.g., methods developed by PAE) and</p> <p>ii) Soil moisture (e.g., AussieGRASS</p>	<p>CASANZ/local (PAE/SKM) – need plan to be formulated</p> <p>A(i) PD to develop proposal for developing large-area prepared data</p> <p>A(ii) investigate availability of Bowen</p>	VH	L	<p>DP, AM, AB, PD</p>

Item No.	Item Description	Who will do it?	Priority	Difficulty	ModSIG 'sponsor'
	<p>developed by Qld DNR)</p> <p>B) Develop default Aust/NZ geophysical data tables for CALMET</p> <p>C) The same information should be provided in TAPM database format to allow consistency between the models</p> <p>D) Provide links for acquisition of data</p>	<p>Ratio data directly from AussieGRASS (AM)</p> <p>B) interim best guess (OP, AM, PD), with more substantial proposal based on analysis of suitable available measurements (OP)</p> <p>C) OP to liaise with Peter Hurley</p> <p>D) OP to liaise with CASANZ webmaster</p>			
3	Input required for CALPUFF model evaluation statistics report being developed by TRC.	JS to send information, then OP to circulate ModSIG and ask for additional suggested evaluation statistics	H	L	OP
4	<p>Stable nocturnal heat fluxes estimates</p> <p>A) Improved cloud data. Either from:</p> <p>i) Satellite</p> <p>ii) Prognostic models</p> <p>B) Alternative schemes not using cloud data – net radiation, delta T (JS: lower priority if A) is not feasible)</p> <p>C) consider current limit on u_* to 0.05 m/s</p>	<p>A(i) JS to investigate</p> <p>A(ii) JS and PD</p> <p>B) PD and OP to liaise. Need to encourage JS</p> <p>C) JS to investigate</p>	H	M-H	OP
5	Investigate/implement nocturnal anthropogenic heat flux effect on mixing height	JS – has funding. PD to liaise and report to MODSIG regularly on progress.	H	M	PD, JT
6	Update CALPUFF converter for AUSPLUME input file equivalence	JS to implement GR to liaise with EPAV re input file structure	M-H	L	GR
7	Validation of slope flow under light wind stable conditions - role of radiative heat loss at low u_*	JS to investigate and report back to OP	M	L	OP
8	Investigate implications of meander and minimum σ_v for odour assessments	KR as part of OSIG Modelling Task Force. Major update Sept 07 (IUAPPA)	M	H	KR
9	Incorporate Pit retention of pollutants within CALPUFF	JS - Needs funding.	M	M	JC

Item No.	Item Description	Who will do it?	Priority	Difficulty	ModSIG 'sponsor'
10	Prediction of sub 1-hr concentrations and averaging time status of sigmas	KR to provide some data to JG/JS KR as part of OSIG Modelling Task Force. Major update Sept 07 (IUAPPA)	M	M	KR, OP
11	Mobile source module	May be funding available from various sources (or co-funding) incl. Australia. JC to provide update report to ModSIG Sept 07	M	M	JC
12	Incorporate ability to use sodar only wind profiles. I.e where no temperature profile data exist.	JS	L-M	M	OP
13	R(NZ) – array to provide for all heights instead of just two lower layers	JS	L-M	L	OP
14	Investigate Ψ_m function for stable conditions	JS	L-M	L	OP
15	Investigate calculation of mixing height with respect to convective and mechanical forcing	JS	L	M	KR
16	Estimating Delta T for use in plume penetration of elevated inversions: examine alternatives to present scheme by using CALMET data	JS to consider whether worth carrying data from temperature profiles into CALMET	L	L	KR
17	Data on downwash effects from field studies, esp. w.r.t. stable flows - Alaska dataset – flow off glacier in highly stable flow - Evaluating CFD & wind tunnels	JS to provide data; other approaches looked at as possible Long-term research project	L	H	JT
18	BPIP enhancement: PRIME-specific, decisions on building selection and parameters	Long-term research project, expensive	L	H	AB
19	Ability to use PRIME with slugs	JS to investigate	L	M	OP
20	Intermediate wind profile curves (i.e., = high roughness rural): Irwin curves are too extreme for many common applications	OP: ModSIG to investigate other datasets, define values, push with EPAV JS can then change code	L	L	OP
21	Polygon area sources	JS	L	L	OP

A letter to be sent to the USEPA from ModSIG (OP) detailing the CASANZ ModSIG concerns (Items 4,5,7,9,10,11,15,17,18)

Point of contact for Joe Scire (OP)

3. User Guidance for CALPUFF

Several questions were put to the workshop on user guidance:

Should ModSIG develop a guidance document? The consensus was that ModSIG should develop user guidance.

If so, who should do it, how and when? What should be the extent of guidance? It was agreed that any guidance should be adopted in a non-prescriptive way, that it be developed by ModSIG members and that it be in the form of ‘information sheets’ or ‘helpful hints’ or FAQs and allow for a hierarchy of information from fundamental (e.g., data quality, validation) to case-specific considerations.

Table 3 sets out suggested topics for which user guidance could be developed. No priorities or individuals for specific actions were identified. In some cases, individuals were identified as ‘sponsors’ of that item.

TABLE 3: SUGGESTIONS FOR CALPUFF USER GUIDANCE IN AUSTRALIA AND NEW ZEALAND

Priority	Item	Who will do it?	ModSIG ‘sponsor’
	Area source modelling		
	Dispersion coefficients		OP
	Line source modelling		
	Treatment of observations in complex terrain <ul style="list-style-type: none"> - R1 and R2 - Representativeness of winds w.r.t. slopes - No. of obs 		
	Set-up of prognostic met models to achieve most realistic inputs to CALMET		
	Careful selection of pseudo-observations from TAPM for input to CALMET (not necessarily from subject site) in complex terrain		
	Biases through to Step 2 <ul style="list-style-type: none"> - setting of R2 small to preserve levels 		KR
	Intermediate wind exponents		OP
	Power law adjustments – appropriate values for p (source type, distance, met)		KR

Priority	Item	Who will do it?	ModSIG 'sponsor'
	Calculation of 1-hr averages for odour taking into account meander effects, min σ_v		KR
	Selection of min σ_v		OP
	PG vs micromet for low-level sources		
	Guidance on consistency with AUSPLUME		GR
	Stable heat fluxes - guidance on use / interface with AERMET		OP
	Building wake effects: <ul style="list-style-type: none"> - uncertainty issues - guidance on identifying issues for more complex analysis and/or modelling - e.g., define better building dimensions - limits on PRIME for long buildings - multiple buildings – look at possible options e.g. test each building 		JT
	Appropriate inputs for particle dispersion/deposition – alternative to default		DP
	Optimising geophysical inputs – develop CALMET default table for Aust/NZ		PD
	Pit retention and associated Froude no. adjustments		
	Model time step within CALPUFF		