























































Atmospheric	Number of days	RP1	RP2	RP3	RP4	RP5	RP6	RP7	RPO	RP9	RP10	RP11	Winter	Spring	Summer	Autumr
AP1	51	49.0	33.3	0.0	2.0	0.0	0.0	5.9	5.9	2.0	0.0	1.9	43.1	17.6	5.0	32.4
AP2	71	46.5	23.9	15.5	0.0	1.4	0.0	0.0	2.8	1.4	4.2	43	54.9	18.3	1.4	25.4
AP3	84	35.7	36.9	0.0	1.2	4.8	1.2	8.3	8.3	2.4	0.0	1.2	20.2	19.0	6.0	54.8
AP4	105	30.5	36.2	4.8	0.0	0.0	1.0	8.6	2.9	12.4	1.9	1.7	25.7	29.5	3.8	41.0
AP5	58	22.4	25.9	0.0	12.1	15.5	5.2	8.6	0.0	6.9	1.7	1.7	25.9	36.2	0.0	37.9
AP6	78	17.9	15.4	5.1	7.7	21.8	9.0	17.9	3.8	0.0	0.0	1.4	29.5	33.3	9.0	28.2
AP7	100	13.0	9.0	25.0	4.0	3.0	2.0	2.0	14.0	25.0	2.0	1.0	22.0	35.0	8.0	35.0
AP8	76	2.6	13.2	15.8	1.3	3.9	0.0	10.5	23.7	21.1	6.6	1.3	7.9	42.1	23.7	26.3
AP9	86	2.3	8.1	41.9	3.5	0.0	1.2	2.3	16.3	4.7	10.5	9.2	45.3	29.1	9.3	16.3
AP10	28	3.6	10.7	0.0	0.0	10.7	14.3	14.3	28.6	3.6	7.1	7.1	46.4	10.7	0.0	42.9
AP11	70	1.4	1.4	4.3	2.9	4.3	11.4	11.4	30.0	20.0	7.1	5.8	5.7	30.0	41.4	22.9
AP12	23	0.0	0.0	0.0	8.7	4.3	69.6	0.0	4.3	0.0	8.7	4.4	47.8	17.4	0.0	34.8
AP13	66	1.5	3.0	0.0	3.0	28.8	40.9	12.1	4.5	1.5	4.5	0.2	53.0	19.7	3.0	24.3
AP14	56	3.6	3.6	8.9	3.6	17.9	16.1	21.4	3.6	14.3	5.4	1.6	8.9	35.7	33.9	21.5
AP15	25	4.0	8.0	0.0	16.0	20.0	4.0	24.0	0.0	8.0	8.0	8.0	16.0	32.0	12.0	40.0
AP16	73	4.1	4.1	0.0	9.6	16.4	8.2	6.8	20.5	0.0	17.8	12.5	12.3	28.8	38.4	20.5
AP17	52	0.0	3.8	0.0	5.8	9.6	36.5	0.0	1.9	0.0	19.2	23.2	30.8	23.1	15.4	30.7
AP18	86	2.3	2.3	8.1	0.0	4.7	7.0	2.3	17.4	2.3	24.4	29.2	26.7	41.9	8.1	23.3
AP19	87	0.0	1.1	1.1	4.6	1.1	5.7	1.1	10.3	1.1	37.9	36.0	34.5	40.2	4.6	20.7
	1275	13.7	13.6	8.5	3.8	7.8	91	75	10.9	75	91	83	20.2	20.0	12.1	20.0







































## PHYSICAL UNDERSTANDING OF CYCLONES AND THEIR EFFECTS

The great value of mesoscale numerical modeling ...

## **THE STUDY OF CYCLONES**

- Observations (limited in number, space and time)
- Theory (requires simplifications)
- Experimentation (*Numerical Modeling*)



















	n	
n fac	etors $\longrightarrow 2^n$	simulations
Experiment	Atlas orography	Latent heat exchange
Fo	no	no
F1	yes	no
F2	no	yes
F12	yes	yes



































Atmospheric battern	Number of days	RP1	RP2	RP3	RP4	RP5	RP6	RP7	RPO	RP9	RP10	RP11	Winter	Spring	Summer	Autumn
AP1		49.0	33.3	0.0	2.0	0.0	0.0	5.9	5.9	2.0	0.0	19	43.1	17.6	5.0	22.4
AP2	E	46.5	23.9	15.5	0.0	1.4	0.0	0.0	2.8	1.4	4.2	4.3	54.9	18.3	14	25.4
P3	C	35.7	36.9	0.0	1.2	4.8	1.2	8.3	8.3	2.4	0.0	1.2	20.2	19.0	6.0	54.8
.P4		30.5	36.2	4.8	0.0	0.0	1.0	8.6	2.9	12.4	1.9	1.7	25.7	29.5	3.8	41.0
P5	H	22.4	25.9	0.0	12.1	15.5	5.2	8.6	0.0	6.9	1.7	1.7	25.9	36.2	0.0	37.9
P6		17.9	15.4	5.1	7.7	21.8	9.0	17.9	3.8	0.0	0.0	1.4	29.5	33.3	9.0	28.2
P7	A	13.0	9.0	25.0	4.0	3.0	2.0	2.0	14.0	25.0	2.0	1.0	22.0	35.0	8.0	35.0
P8	M	2.6	13.2	15.8	1.3	3.9	0.0	10.5	23.7	21.1	6.6	1.3	7.9	42.1	23.7	26.3
P9		2.3	8.1	41.9	3.5	0.0	1.2	2.3	16.3	4.7	10.5	9.2	45.3	29.1	9.3	16.3
PIO	E.	3.6	10.7	0.0	0.0	10.7	14.3	14.3	28.6	3.6	7.1	7.1	46.4	10.7	0.0	42.9
P11 D12	Г	1.4	1.4	4.3	2.9	4.3	11.4	11.4	30.0	20.0	7.1	5.8	5.7	30.0	41.4	22.9
F12 D12	U I	0.0	0.0	0.0	8.7	4.5	69.6	0.0	4.3	0.0	8.7	4.4	47.8	17.4	0.0	34.8
P14	, in the second	1.5	3.0	0.0	3.0	28.8	40.9	12.1	4.5	1.5	4.5	0.2	53.0	19.7	3.0	24.3
P15	T	4.0	8.0	0.9	16.0	20.0	10.1	21.4	3.0	14.3	5.4	1.6	8.9	35.7	33.9	21.5
P16	11	4.0	4.1	0.0	0.6	16.4	4.0	6.9	20.5	8.0	17.9	8.0	10.0	32.0	12.0	40.0
P17	<u> </u>	0.0	3.8	0.0	5.8	9.6	36.5	0.0	1.9	0.0	10.2	73.7	30.8	20.0	15.4	20.5
P18	R	2.3	2.3	8.1	0.0	4.7	7.0	2.3	17.4	23	74.4	20.2	26.7	41.0	81	22.2
P19	E I	0.0	1.1	1.1	4.6	1.1	5.7	1.1	10.3	11	37.9	36.0	34.5	40.2	4.6	20.7
atal	12	12.7	12.6	0.5	2.0	7.0	0.1		10.0			0010	0.00	40.2	4.0	20.7
Jai		13.7	13.0	6.5	3.8	7.8	9.1	7.5	10.9	7.5	9.1	8.3	28.2	29.9	12.1	29.8
2( 1	)80 – 20 1 runnii	)99 1g						1) Sa 2) Si	ame r milai	elati	onshi ounts	p betv of pro	ween A	APs ar	nd RPs lue to th	ne RP



Atmospheric	Number	RP1	RP2	RP3	RP4	RP5	RP6	RP7	RPO	RP9	RP10	RP11	Winter	Spring	Summer	Autumn
battern	of days	것 한	2.8						5 - 1			비 및 요.			1223	
.P1		49.0	33.3	0.0	2.0	0.0	0.0	5.9	5.9	2.0	0.0	1.9	43.1	17.6	5.9	33.4
P2	E	46.5	23.9	15.5	0.0	1.4	0.0	0.0	2.8	1.4	4.2	4.3	54.9	18.3	1.4	25.4
.P3	C	35.7	36.9	0.0	1.2	4.8	1.2	8.3	8.3	2.4	0.0	1.2	20.2	19.0	6.0	54.8
P4		30.5	36.2	4.8	0.0	0.0	1.0	8.6	2.9	12.4	1.9	1.7	25.7	29.5	3.8	41.0
P5	H	22.4	25.9	0.0	12.1	15.5	5.2	8.6	0.0	6.9	1.7	1.7	25.9	36.2	0.0	37.9
P6		17.9	15.4	5.1	7.7	21.8	9.0	17.9	3.8	0.0	0.0	1.4	29.5	33.3	9.0	28.2
P/	A	13.0	9.0	25.0	4.0	3.0	2.0	2.0	14.0	25.0	2.0	1.0	22.0	35.0	8.0	35.0
P8	M	2.6	13.2	15.8	1.3	3.9	0.0	10.5	23.7	21.1	6.6	1.3	7.9	42.1	23.7	26.3
P9		2.3	8.1	41.9	3.5	0.0	1.2	2.3	16.3	4.7	10.5	9.2	45.3	29.1	9.3	16.3
PIU		3.6	10.7	0.0	0.0	10.7	14.3	14.3	28.6	3.6	7.1	7.1	46.4	10.7	0.0	42.9
PII	P	1.4	1.4	4.3	2.9	4.3	11.4	11.4	30.0	20.0	7.1	5.8	5.7	30.0	41.4	22.9
P12	R	0.0	0.0	0.0	8.7	4.3	69.6	0.0	4.3	0.0	8.7	4.4	47.8	17.4	0.0	34.8
P13	IX	1.5	3.0	0.0	3.0	28.8	40.9	12.1	4.5	1.5	4.5	0.2	53.0	19.7	3.0	24.3
P14	E	3.6	3.6	8.9	3.6	17.9	16.1	21.4	3.6	14.3	5.4	1.6	8.9	35.7	33.9	21.5
PIS		4.0	8.0	0.0	16.0	20.0	4.0	24.0	0.0	8.0	8.0	8.0	16.0	32.0	12.0	40.0
P10 D17	8	4.1	4.1	0.0	9.6	16.4	8.2	6.8	20.5	0.0	17.8	12.5	12.3	28.8	38.4	20.5
P17 D19	N	0.0	3.8	0.0	5.8	9.6	36.5	0.0	1.9	0.0	19.2	23.2	30.8	23.1	15.4	30.7
P10	11	2.5	2.3	8.1	0.0	4.7	7.0	2.3	17.4	2.3	24.4	29.2	26.7	41.9	8.1	23.3
F19	T	0.0	1.1	1.1	4.6	1.1	5.7	1.1	10.3	1.1	37.9	36.0	34.5	40.2	4.6	20.7
otal		13.7	13.6	8.5	3.8	7.8	9.1	7.5	10.9	7.5	9.1	8.3	28.2	29.9	12.1	29.8
19 1	71 – 19 1 runnii decade:	990 ng S			1		ΜΟΙ	DEL	VAI	.IDA	TIO	N / C.	ALIB	RATI	ON	















