Appendix 3: Ergative Analysis of GLIMPSE in Parasol, Icy, and Heat

Parasol: GLIMPSE

Cl. no	MEDIUM	PROCESS	AGENT	BENEFIC/ RANGE	CIRCUMSTANCE
1.	enough sunlight and heat	is reflecting	a hazy umbrella of sulfur particles		back into space to offset global warming.
2.	You	might think		good news	
3.	that'	s			
4.		think			again

Icy: GLIMPSE

Cl. no	MEDIUM	PROCESS	AGENT	BENEFIC/ RANGE	CIRCUMSTANCE
1.	thicker ice	has brought	a warmer climate		in the past,
2.	if this	happened			in a greenhouse world of the future
3.	sea levels	would fall			
4.	(sea levels)	not rise			

Heat: GLIMPSE

Cl. no	MEDIUM	PROCESS	AGENT	BENEFIC/ RANGE	CIRCUMSTANCE
1.	the earth's climate	threaten	chemical wastes spewed into the air		

Appendix 4

Ergative Analyses of BRIDGING in 'Parasol', 'Icy', and 'Heat'

BRIDGING: PARASOL 1

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Those colorless combinations of oxygen and sulfur [...]	have: Rel (Att)		a chemical affinity for water	
2.	free-floating moisture	pull: Mat	They		out of the air : Loc (spatial)
3.	it (free-floating moisture)	and condense: Mat		into droplets of liquid water and acid:	
4.	sulfates	are: Rel (Att)		the acid in acid rain.	
5.	a bunch of these droplets	Put: Mat			together: Acc (com)
6.	a cloud	get: Mat	and you		
7.	excess aerosols,	are: Rel (Exs)			So wherever : Loc (spatial)
8.	clouds	are: Rel (Att)		more numerous,	
9.	the planet.	further shading: Mat			
10.	the water droplets [making up the clouds,]	will be: Rel (Att)		the smaller	
11.	the available water vapor	will be condensing: Matrial			around a larger number of particles : Loc (spatial)
12.	That	has: Rel (Att)		a cooling effect.	
13.	equal amounts of table salt and rock salt	"try putting: Mat			on a black tablecloth: Loc (spatial)
14.	you	'll see: Men		it,"	
15.	Charlson	says: Vb			
16.	"You	can see: Men		the table	through the rock salt : Loc (spatial)
17.	fewer particles [...]	are: Rel (Exs)			
18.	Everything else	held: Rel (Att)		constant	
19.	the cloud with more droplets	will be: Rel (Att)		brighter than one with fewer droplets	
20.		are not yet understood: Men			well enough [for Charlson or any other expert to make a good estimate of the scope of this indirect cooling effect,] (Manner; quality)
21.	but few in the field	doubt: Men			
22.	that it	's: Rel (Att)		large	

BRIDGING: PARASOL 2

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Charlson	point out: Vb			
2.	a number of subtleties to the parasol effect [.. ‖..]	are: Rel (Exs)			
2.eb		[suggesting: Vb			
2.eb	global warming veering	are more likely to send: Mat	aerosols,		
2.eb		preventing: Mat		a greenhouse world]	
3.		To understand: Men			why: Cause (reason)
4.	« he	says » : Vb			
5.	you	have to take a closer look at: Beh		the haze	
6.	A certain amount of aereosol haze	occurs: Mat			naturally: Manner (means)
7.	Twenty-two million tons of sulfur	are emitted: Mat	by minuscule, single-celled marine algae,		every year : Ext (temporal)
8.	its faintly musty smell.	giving: Mat		the sea	
9.	its share.	contributes: Mat	The occasional volcano		
10.	But this natural background	isn't: Rel (Id)		the cause of modern haze.	
11.	industry	is to blame.: Vb			For that: Cause (reason) squarely: Manner (quality)
12.	sulfur	has been busy adding: Mat	humanity		Over the past 150 years: Ext (temporal) to the natural background: Loc (spatial)
13.	the element out of the earth in the form of coal, metal ores, and oil.	gouging: Mat			
14.		being cooked: Mat			
15.	with oxygen	links up: Rel (Id)	sulfur		
16.		and emerges: Rel (Id)		as sulfur dioxide gas	from smokestacks : Loc (spatial)
17.	Charlson	estimates: Vb			
18.	some 90 million tons of sulfur	puts out: Mat	that, worldwide, industry		every year : Ext (temporal) --almost 500 million pounds Ext: (spatial) every single day: Ext (temporal)
19.	"It	's like: Rel (Att)		having lots of volcanoes erupting 24 hours a day,..."	
20.	he	says: Vb			
21.	many of the atoms of this gas	recombine to form: Rel (Id)		trillions of tiny sulfate particles	
22.	These particles	stay up: Rel (Att)			for no more than a few days: Ext (temporal)
23.	before they	fall back: Mat			to Earth: Loc (spatial)
24.	Only sulfates from the most powerful of volcanic eruptions	ever reach: Mat			the stratosphere, [.. ‖ ..]: Loc (spatial)
25.	Those produced by human beings	stay: Rel (Att)			in the lower atmosphere--below 36,000 feet at the middle latitudes,...: Loc (spatial)

BRIDGING: PARASOL 2 (cont.)

26.	aerosols	can push: Mat	The gentler winds of this part of the atmosphere		only about 600 miles at most : Ext (spatial)
27.	before they	come back: Rel (Id)		often as acid rain	to Earth: Loc (spatial)
28.	So Seattle air, [...]	is: Rel (Id)		far less aerosol-laden than the stuff people are breathing in, ...	
28. eb		[blows in: Mat	which		after a 6,000-mile journey : Ext (spatial) over the industry-free Pacific] (: Loc (spatial))
29.	the aerosol concentration	is: Rel (Att)		so great	everywhere east of the Mississippi [that people [who grew up in that part of the country] don't even know ‖ what the sky is supposed to look like]. (: Loc (spatial))
30.	« he	says » : Vb			
31.	The sky [they know]	is: Rel (Att)		murky--	
32.	visibility	is: Rel (Att)		perhaps 20 miles, as opposed to the 100 miles or more ...	
33.	"When you	have: Rel (Att)	lots of photons [...]		
33.eb		[bouncing: Mat			around in a scatter: Manner (quality)]
34.	the sky	goes: Rel (Att)		from blue to a whitish color,"	
35.	Charlson	says.: Vb			
36.	you	look up: Beh			"From the ground anywhere...: Loc (spatial) on an otherwise sunny day: Loc (temporal)
37.	and the sky directly overhead	may be: Rel (Att)		blue or bluish,	
38.	it (sky)	'll be: Rel (Att)		whitish	but off at angles : Loc (spatial)
39.	That white sky [you see]	is: Rel (Att)		due to aerosol (Att: cir)	in the East : Loc (spatial)
40.	That	doesn't happen: Mat			very often : Ext (temporal) in Montana : Loc (spatial)

BRIDGING: PARASOL 3

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	The prototype	sits: Mat			on a bookshelf in his office.: Loc: spatial
2.	It	's: Rel (Att)		gunmetal gray, roughly the size and shape of a bazooka.	
3.	aerosol-laden air	sucks: Mat	a tiny pump		Through an inlet on the bottom,: Loc: spatial into a chamber.: Loc: spatial
4.	a halogen movie-projector lamp.	is: Existential			On one side of the cylindrical chamber, about halfway down its length,: Loc: spatial
5.	an electric light detector-- the technologically more sophisticated great-grandson, « 6. » ...	is: Existential			At one end of the chamber: Loc: spatial
6.	Charlson	says: Vb			
7.		by determining: Men			
8.	how much light	makes: Mat		it	through an air sample: Extent: spatial to the light detector : Loc: spatial
9.	[how much light is being deflected by aerosols in the sample].	can measure: Mat	Charlson		accurately: Manner: quality
9.eb	how much light	is being deflected: Mat	by aerosols		in the sample ; Loc: spatial
10.	the 'scattering efficiency,"	gives: Mat	It	you	
11.	Charlson	says: Vb			
12.	You	might think of: Men		it	as the amount of a light beam [that a particle blocks out per gram of material].": Role
12.eb		blocks out: Mat	a particle		
13.	a complete measure of optical scattering,	To get: Mat			
14.	Charlson	explains: Vb			
15.	"you	make: Mat		a measurement	with a nephelometer,: Manner: means
16.	the air,	filter: Mat	you		simultaneously: Loc: temporal
17.	the particles	get: Mat			out of it,: Loc: spatial
18.		do: Mat		a chemical analysis of the material.	
19.	an amount of sulfate per cubic meter of air.	gives: Mat	That	you	
20.	the ratio of the scattering to the concentration of material.	take: Mat	you		
21.	[what allows you to say ‖ that « given X amount of sulfate in the air », there will be Y amount of scattering]."	's: Rel (Identifying)	That		
21.eb	you	allows to say: Vb			
21.eb	X amount of sulfate in the air »,	given: Mat			
21.eb	Y amount of scattering	will be: Existential			

BRIDGING: PARASOL 4

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Some of Charlson's findings about the parasol effect	suggest: Vb			
2.	that it	won't help: Mat			at all with some seroius aspects of the global warming problem :
3.	some warming effects	may even make: Rel (Att)	Sulfate aerosols	worse,	
4.	Charlson	says: Vb			
5.	The reasons	lie: Rel (Att)		in the fundamental difference between greenhouse gases-- [....[...]]	
6.	Because sulfates	have: Rel (Att)		such a limited range,	
7.	almost all man-made aerosols	are floating: Mat			above the Northern Hemisphere: Loc (spatial)
8	90 percent of industrial activity	is still concentrated: Rel (Att)			where : Loc (spatial)
9.	almost no such "protection" from man-made sulfates.	gets: Mat	the Southern Hemisphere		By contrast: Manner (com)
10.	"the amount of light [scattered by haze]	is: Rel (Att)		probably 10 to 100 times higher [...]	in the relatively clean air of Seattle
11.	Charlson	says: Vb			
12.	while the other	is protected by: Mat	an umbrella of pollution,		with one hemisphere bearing the full brunt of global warming: Acc (com)
13.	he	says: Vb			
14.	seas	still rise: Mat			uniformly: Manner (quality) all over the globe: Loc (spatial)
15.	as the warmer southern waters	expand: Mat			
16.	the Maldives, ...	can't save: Mat	sulfates		In other words: Manner (com)
17.	But a rise in sea level, « ... »	might be: Rel (Att)		the biggest effect to worry about	
18.	« Charlson	says»: Vb			
19.	Much more important, «...»	could be: Rel (Id)		the increased difference in temperature ...	
20.	« he	points out »: Vb			
21.	That	's likely to affect: Rel (Id)		the large-scale weather systems [on which people depend]	
22.	"More frequent occurrence of drought	is: Rel (Att)		a possibility"	
23.	Charlson	says.: Vb			
24.	"Or of violent storms				
25.	Or the opposite--less frequent storms				
26.	either chance	'd give: Mat	I		

BRIDGING: PARASOL 4 (cont.)

27.	The thing [people need to understand]	is: Rel (Id)			that a slight regional shift in any direction is a big concern	
28.	we	had: Rel (Att)			more precipitation as rain and less as snow than normal	Last year: Loc (spatial) in the mountains around Seattle: Loc (temporal)
29.	And the snowpack	is: Rel (Att)			our reserve of water [...]	
30.	So just because the balance of snow to rain	changed: Mat				
31.	we	had: Rel (Att)			a drought here."	

BRIDGING: ICY 1

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Antarctica's ice	comes: Rel (Att)		from snow and frozen sea (Att: cir)	
2.	Snow [...]	becomes: Rel (Id)		ice	
2. eb		accumulating: Mat			inland : Loc (spatial)
3.		flows: Mat			slowly: Manner (quality) down towards the shores: Loc (spatial)
4.		ending: Rel (Att)		in the floating ice shelves [...] (Att: cir)	
4. eb	*the continent*	*fringe: Mat*			
5.	ice volumes in the Antarctic	are: Rel (Att)		low	
6.	these shelves	retreat: Mat			towards the shoreline: Loc (spatial)
7.	a lot of ice,	is: Exs			
8.	the shelves	spread: Mat			around the continent : Loc (spatial)
9.	more ice	flows: Mat			outward from the land: Loc (spatial)
10.	the sea floor close to the shore	touch: Mat	the shelves		
11.	they	float: Mat			further out: Loc (spatial)
12.	sediments on the sea floor at a position [...]	begin to scrape away: Mat	they		
12. eb		known: Rel (Id)		as the grounding line	
13.	a complete sediment record	to collect: Mat			for a particular period of Earth history: Ext (temporal)
14.	a drill hole	has to be placed: Mat			beyond the grounding lines of the sheets [...] :Loc (spatial)
14. eb	that	were: Rel (Att)		active	then: Loc (temporal)
15.	three submarine troughs more than 500 metres deep,	chose: Mat	Domack's team		
16.		lying: Rel (Att)		between 30 and 130 kilometres offshore (Att: cir)	
17.	one site	was: Rel (Att)		near the Amery Ice Shelf (Att: cir)	
18.	which	lies: Rel (Att)		in front of the Lambert Glacier,...(Att: cir)	
19.	Each site	records: Vb		the same 10000-year story	
20.	mud and diatomaceous ooze	have accumulated: Mat			For the past 4000 years: Ext (temporal) in the troughs beneath an ocean free of solid ice: Loc (spatial)
21.	The ooze	is named after: Rel (Att)		diatoms - - the creatures [...]	
21. eb	[whose skeletons	form: Rel (Id)		the bulk of this sediment]	
22.	They	are: Rel (Att)		microscopic algae with silica shells	

BRIDGING: ICY 1 (cont.)

23.	countless numbers of them	live: Mat			in the top 200 metres of the ocean : Loc (spatial)
24.	no covering of ice	is: Exs			
25.	silty sands and gravels	were laid down : Mat			In the preceding 3000 years: Ext (temporal) from 4000 to 7000 years ago: Loc (temporal)
26.	these sediment types	are accumulating: Mat			Today : Loc (temporal) closer to Antarctica, beneath the ice shelves : Loc (spatial)
27.	The sediments	are made up of: Rel (Id)		debris [..[..||..]]	
27. eb		ploughed: Mat	by glaciers and ice sheets		from the Antarctic landmass; Loc (spatial)
27. eb	which	break up: Rel (Id)		into icebergs	eventually :Loc (temporal)
27. eb in eb	that	melt: Mat			into the ocean : Loc (spatial)
28.	fewer diatoms	are: Rel (Exs)			in these sediments : Loc (spatial)
29.	their growth	inhibit: Mat	the combination of fresh water from the melted ice ...		below the shelf : Loc (spatial)
30.	the oceans	were: Rel (Att)		free of ice	Before about 7500 years ago: Loc (temporal) at these sites : Loc (spatial) with conditions probably much like today: Con (condition)

BRIDGING: ICY 2

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	the growth of ice sheets	to follow: Mat			worldwide: Loc (spatial)
2.	Miller and de Vernal	concentrated: Men		on one of the tiniest forms of life in the oceans–...	
3.	shells of calcium carbonate	grow: Mat	these creatures		
4.	the proportion of two isotopes of oxygen (...) in the carbonate	varies: Mat			
5.	the ice sheets	wax: Mat			
6.		and wane: Mat			
7.	The link	is: Rel (Att)		in the sea water	
8.	water	evaporates: Mat			from equatorial regions of the Earth: Loc (spatial)
9.	a higher level of the lighter isotope, oxygen-16,	is: Exs			in the vapour : Loc (spatial)
9. eb		was: Exs			in the original sea water: Loc (spatial)
10.	Some of this water vapour	is carried: Mat			to the poles: Loc (spatial)
11.	it	falls: Mat			where : Loc (spatial)
12.		forms: Rel (Att)		the polar ice	eventually: Loc (temporal)
13.	The ice	has: Rel (Att)		a higher proportion of oxygen-16 than the sea,	
14					
14. eb		forms: Rel (Att)			at any one time: Loc (temporal)
15.					
16.	shells [...];	grow: Mat	organisms [...]		In glacial periods: Loc (temporal)
16. eb		are: Rel (Att)		rich in the heavier isotope	
17.	this tell-tale sign	is fossilised: Mat			in sediment : Loc (spatial)
18.	they	die.: Mat			
19.	a record of the balance of oxygen isotopes through time,	give: Mat	The shells of the forams		
20.	which	is linked: Mat		to the volume of water [...]	
20. eb		locked away: Mat			in the ice sheets : Loc (spatial)

BRIDGING: ICY3

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Similar signals	come: Rel (Att)			from the modern world: Loc (spatial)
2.		has warmed: Mat			by 0.6°C: Manner (quality) on average: Manner(quality) over the past century: Ext (temporal)
3.	short-term increases in the amount of snow at the poles:	have been: Rel (Exs)			
4.	snow lines in regions such as Arctic Canada, Baffin Island and Alaska	are moving: Mat			to lower altiitudes: Loc (spatial)
5.	The Greenland ice sheet	is thickening: Mat		at a rate equivalent to a fall in sea level of about 0.45 millimetres per year.	
6.	ice	have accumulated: Mat	Some coastal and interior sites in Antarctica		over the past 80 years: Ext (temporal)
7.		giving: Mat		a growth rate equivalent to a fall in sea level of 0.75 milimetres per year	
8.	But today's climate	is signalling: Vb		the opposite effect, too –	
9.	that the melting of ice	is accelerating: Mat			
10.	glacers in most mountain chains	are melting: Mat			
11.		are retreating: Mat			rapidly: Manner (quality)
11. eb	« that	began: Mat			a century ago » : Loc (temporal)
12.	some ice shelves on the Antarctic Peninsula	are disintegrating : Mat			
13.	fears [...]	fuelling: Mat			
14.	This confusing, contradictory behaviour also	shows up: Rel (Id)		in the geological record	
15.	Domack	notes: Vb			
16.	glaciers on the Antarctic Peninsula and islands ...	receded: Mat			in the Hypsithermal period: Loc (temporal) at the same time [...] : Loc (temporal)
16.eb	ice sheets	were growing: Mat			from the snouts of major ice-drainage streams : Loc (spatial)
17.		are to be understood: Men		these conflicting signals	How: Manner (means)
18.	The most likely explanation	is: Rel (Id)		that mild global warming brings a net increase in the amount of snow at the poles rather than a net melting.	

BRIDGING: ICY3 (cont.)

19.	more water	evaporates: Mat			In a warmer world: Loc (temporal) from the oceans: Loc (spatial)
20.		to be transported: Mat			to the poles : Loc (spatial)
21.		to become: Rel (Id)		snow.	
22.	this	happens: Mat			
23.	the feedback processes [...]	cannot be: Rel (Att)		important enough [to override the effect of air circulation]	
23.eb	ice sheets	strave: Mat			
23.eb	the effect of air circulation	to override: Mat			
24.	The key factor in the growth of ice sheets	seems to be: Rel (Id)		conditions [that do not melt or remove snow, || as exist today in the cold, dry climates of central Antarctica and norhthern Canada].	
24.eb		do not melt: Mat			
24.eb	snow	or remove: Mat			
24.eb		exist: Mat			today: Loc (temporal) in the cold, dry climates of central Antarctica and northern Canada: Loc (spatial)
25.	Miller and de Vernal	found: Men			
26.	that a change to warmer, wetter winters alternating with cooler, ...	is: Rel (Att)		ideal for retaining snow	all year round: Ext (spatial)
27.	Domack and his colleagues	suggested: Vb			
28.	other climatic factros [...]	may be: Rel (Exs)			
28.eb	the preservation of snow	affect: Mat			
29.	They	think: Men			
30.	that katabatic winds on ice sheets	may play: Rel (Id)		a part.	
31.	These winds	develop: Mat			
32.	air [...]	becomes: Rel (Att)		dense enough [...]	
32.eb		cooled			on high ground: Loc (spatial)
32.eb		to flow: Mat			downhill: Loc (spatial)
33.	they	descend: Mat			
34.	fallen snow	remove: Mat	they		recently : Loc (temporal)
35.	katabatic winds	reach: Rel (Att)		tremendous speeds,	In Antarctica: Loc (spatial)
36.		averaging: Rel (Att)			75 kilometers per hour: Manner (quality) at some places on the Antarctic plateau : Loc (spatial)
37.	the world	was: Rel (Att)		warmer	
38.	the drop in temperature with height	reduced: Mat			
39.	the strength of katabatic winds	would diminish: Mat			
40.	more snow	would survive: Mat			

BRIDGING: HEAT 1

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Atmospheric scientists	have long known: Men			
2.	broad historical cycles of global warming and cooling:	are: Rel (Exs)			
3.	most experts	believed: Men			
4.	the earth surface	began warming: Mat			gradually: Manner (quality)
5.	the last ice age	peaked: Rel (Att)		18,000 years ago (Att: cir)	
6.	it	has dawned: Mat			only recently: Loc (temporal) on scientists : Loc (spatial)
7.	these climatic cycles	can be affected: Mat	by man		
8.	Stephen Schneider,...	Says: Vb			
9.	the earth's surface	are altering: Mat	"Humans		
10.	the atmosphere	changing: Mat			at such a rate [that we have become a competitor with natural forces [that maintain our climate]]. (Manner: quality)
10.eb	we	have become: Rel (Att)		a competitor with natural forces [that maintain our climate]].	
10.eb in eb	our climate]	maintain: Mat			
11.	[What is new]	is: Rel (Att)	the potential irreversibility of the changes [...]		
11.eb	What	is: Rel (Att)			
11.eb		[are taking place : Mat			now: Loc: temporal)]

BRIDGING: HEAT 2

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Potentially more damaging than ozone depletion, and far harder to control,	is: Rel (Id)	the greenhouse effect,		
2.		caused: Mat	by carbon dioxide (CO_2)		
3.	The effect of CO_2 in the atmosphere	is: Rel (Att)		comparable to the glass of a greenhouse:	
4.	the warming rays of the sun	lets in: Mat	it		
5.	excess heat	keeps from reradiating back: Mat			into space : Loc (spatial)
6.	a global warming trend [that could raise average temperature between 2°F and 8°F by the year 2050—or between five and ten times the rate of increase [that marked the end of the ice age]]	may be hastening: Mat	man-made contributions to the greenhouse effect, mainly CO [that is generated by the burning of fossil fuels],		
6.eb		is generated: Mat	by the burning of fossil fuels		
6.eb	average temperature	could raise: Mat			between 2°F and 8°F by the year 2050—or between five and ten times the rate of increase [...](Ext: spatial)
6.eb in eb	[the end of the ice age	marked] : Rel (Id)			
7.	the ecological face of North America."	revamped: Mat	that change		"completely: Manner (quality)
8.	Schneider,	notes: Vb			

BRIDGING: HEAT 3

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	the arena [...]	is: Rel (Id)		the atmosphere, ...[...]	
1.eb	such projected climatic warming	will first be played out: Mat			
1.eb	the earth	blankets: Mat			
2.	it (the atmosphere)	is: Rel (Att)		a remarkably thin membrane	
3.	the earth	were: Rel (Att)		the size of an orange	
4.	the atmosphere	would be: Rel (Att)		only as thick as its peel	
5.	the bottom layer of the peel, the troposphere	is: Rel (Id)		where all global weather takes place	
6.	it	extends: Rel (Att)		from the earth's surface ... (Att: cir)	
7.	air warmed by the earth's surface	rises: Mat			
8.	colder air	rushes down: Mat			
9.	it (air)	to replace: Mat			
10.	the troposphere	is churning: Mat			constantly: Manner (quality)
11.	a permanent air flow	streams: Mat			from the poles to the equator ...: Loc (spatial)
12.	prevailing winds [...]	generate: Mat	these swirling air masses «...»		
12.eb	weather	drive: Mat			across the hemisphere: Extent (spatial)
13.		« distorted : Mat	by the rotation of the earth»		
14.	the spread of pollutants	aid: Mat			in the troposphere: Loc (spatial)
15.	the stratosphere	extends: Rel (Att)		upward to about 3 miles: (Att: cir)	above this turmoil: Loc (spatial)
16.	rising air [...]	begin to turn: Rel (Att)		warmer	in the lower stratosphere: Loc (spatial)
16.eb		has been growing: Rel (Att)		colder	at higher and higher altitudes: Loc (spatial)
17.	Ozone (O_3)	is: Rel (Id)		a form of oxygen [...]	
17.eb		occurs: Mat			rarely: Extent (temporal) naturally: Manner (quolity) in the cool reaches of the troposphere: Loc (spatial)
18.	It (Ozone (O_3))	is created: Mat			
19.	ordinary oxygen molecules	are bombarded: Mat	with solar ultraviolet rays		usually: Ext (temporal) in the stratosphere: Loc (spatial)
20.	the oxygen molecule	shatters: Mat	this radiation		
21.	some of the free oxygen atoms	recombine with O_2 to form		(O_3)	
22.	a property [...]	gives: Mat	the configuration	it	
22.eb	two-atom oxygen	does not have: Rel (Att)			

BRIDGING: HEAT 3 (cont.)

22.eb	ultraviolet light	can absorb: Mat	it (a property)		efficiently: Manner (quality)
23.	oxygen	protects: Mat	ozone		in doing so: Manner (means) at a lower latitude: Loc (spatial)
24.		being broken up: Mat			
25.	most of these harmful rays	keeps: Mat			
26.		penetrating: Mat			to the earth's surface: Loc (spatial)
27.	the ozone	heats up: Mat	the energy of the absorbed radiation		
28.	warm layers	creating: Mat			high in the stratosphere [...] : Loc (spatial)
28.eb		act: Mat			as a cap: Role on the turbulent troposphere below: Loc: spatial
29.	ozone molecules	are being made: Mat			constantly: Manner (quality)
30.	they (ozone molecules)	can be destroyed	by any of a number of chemical processes ...		
31.	regular injections of nitrogen bearing compounds,...	receives: Mat		the stratosphere	
32.		produced: Mat	by microbes ...		
33.	the gas	rides: Mat		the rising air currents	to the top of the troposphere: Loc (spatial)
34.		forced: Mat	by the tramendous upward push of tropical storms		higher: Loc (spatial)
35.	it (the gas)	enters: Mat			finally: Ext (temporal)
36.		perlocates: Mat			slowly: Manner (quality) into the stratosphere: Loc (spatial)
37.	nitrous oxide	tends to stay: Rel (Att)		there (Att: cir)	
38.	a recent National Academy of Sciences report	likened: Men		the upper atmosphere ...	
39.	it	leaves: Mat		the ground	as long as five years ...: Ext (temporal)
40.	N_2O	may reach: Rel (Att)		altitudes of 15 miles..	
40.eb	it	is broken: Mat	by the same ultraviolet radiation		
40.eb in eb	ozone	creates: Mat			
41.		attack: Mat	the resulting fragments--called radicals--		
42.	more ozone molecules	destroy: Mat			
43.	another ozone killer	is: Rel (Att)		methane, [...]	
43.eb		produced: Mat	by microbes		in swamps ... : Loc (spatial)
44.	the process of ozone production and destruction	has been: Rel (Att)		more or less in equilibrium	for millenniums: Ext (temporal)
45.	a non-toxic inert gas [...]	invented: Mat	a group of chemists ...		then in 1928: Loc (temporal)
45.eb		was used			as a coolant in refrigerations: Role
46.	similar compounds, ...	were using: Mat	manufacturers		by the 1960s: Loc (temporal)

BRIDGING: HEAT 4

CL no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	CFCs	are: Rel (Att)		immune to destruction.	In the troposphere: Loc (spatial)
2.	they	break apart: Mat			in the stratosphere: Loc (spatial) easily: Manner (quality) under the glare of ultraviolet light: Loc (spatial)
3.			the result		
4.	ozone	attack: Mat			
5.	chlorine monoxide (ClO) and O_2	to form: Rel (Id)			
6.	The ClO	combines: Mat			then: Loc (temporal) with a free oxygen atom: Acc (com)
7.		to form: Rel (Id)		O_2 and a chlorine atom.	
8.	The chain	repeats: Mat		itself.	then: Loc (temporal)
9.	"100,000 molecules of ozone	are removed: Mat			"For every chlorine atom [...]," (Cause: reason) from the atmosphere: Loc (spatial)
9.eb		release: Mat	you		
10.	Rowland,	says: Vb			

BRIDGING: HEAT 5

CL no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.		did not mean: Rel (Id)	the existence of an ozone hole		necessarily: Manner (quality)
2.		were to blame: Vb		CFCs	
3.		were proposed: Vb		a number of alternative explanations	
4.	the notion [...]"	was: Rel (Exs)			Among them: Loc (spatial)
5.	Dan Albritton,	says: Vb			
6.	An interruption in the movement of air from the tropics, « ... », to the poles	could result: Rel (Att)		in less ozone reaching the Antarctic.	easily: Manner (quality)
7.	most ozone	is created: Mat			
8.			Another theory:		
9.	more ozone-destroying nitrogen radicals than usual,	created: Mat	the sunspot activity [that peaked around 1980]		perhaps: Manner (quality)
10.		would be activated: Mat	by sunlight		each spring : Ext (temporal

BRIDGING: HEAT 6

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Scientists	are: Rel (Att)		sure	completely: Manner (quality)
2.	the hole	remains: Rel (Att)		centered on the Antarctic	why: Cause (reason)
3.	the depletion	is: Rel (Att)		so severe	why: Cause (reason)
4.	the peculiar nature of Antarctic weather.	may have to do with: Mat	It		
5.	the stratosphere over the region	is actually sealed off: Mat	by the strong winds [...]		In winter: Loc (temporal) from the rest of the world: Loc (spatial)
5. eb		[swirl: Mat	that		around it] Loc (spatial)
6.		forming: Rel (Id)		an all but impenetrable vortex.	
7.	Cicerone:	Says: Vb			
8.	[Looking down at the South Pole]	is: Rel (Att)		like [watching || fluid draining in a sink].	
8.eb		Looking: Men		at the South Pole	
8.eb		watching: Men			
8.eb	fluid	draining: Mat			in a sink: Loc: spatial
9.	It	's: Rel (Att)		like an isolated reactor tank.	
10.	All kinds of mischief	can occur: Mat			
11.					
12.	Rowland	Explains: Vb			
13.	you	don't get: Rel (Att)		in the stratosphere	"Mostly: Manner (quality)
14.	most of the water	has been frozen out: Mat			
15.	the temperature	gets: Rel (Att)		low enough	
16.	the rest."	start freezing out: Mat	you		
17.		may prove to be: Rel (Id)	ice	a central cause of the ozone hole,	
18.	surfaces	provides: Mat	it		
18.eb		[associated: Vb		with reactions in the atmosphere	only recently,] : Loc (temporal)
19.	molecules	bounce: Mat			In a gaseous state: Role around : Loc (spatial)
20.	one another.	hit: Mat	some		eventually: Loc (temporal)
21.	the reactions considerably.	speeds up: Mat	[adding a surface [for the molecules to collect on]]		
21.eb	a surface [...]	adding: Mat			
21.eb in eb	[for the molecules]	to collect: Mat			

BRIDGING: HEAT 7

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.		can be said		The same	for the greenhouse effect: Matter
2.	it (to tell whether unusual global warming has indeed begun)	is: Rel (Att)		too soon	
3.	the greenhouse effect	is: Rel (Att)		a natural phenomenon with positive consequences	Unlike ozone depletion: Manner (com)
4.	"the earth	would be: Rel (Att)		uninhabitable	without it: Acc (com)
5.	«Climate Modeler Jeff Kiehl,	points out »: Vb			
6.	It	is: Rel (Id)		[what keeps us from being an ice frozen planet like Mars.]"	
6.eb		keeps: Rel (Att)			
7.	the sun's energy	did not trap: Mat	gases like CO_2		
8.	the earth's mean temperature	would be: Rel (Att)		0°F,	rather than the current 59°: Manner (com)

BRIDGING: HEAT 8

Cl. no	MEDIUM	PROCESS	AGENT	BENEFICI/ RANGE	CIRCUMSTANCE
1.	Such changes	may already be: Rel (Att)		under way	
2.	Climatologists	have noted: Men		an increase in mean global temperature of about 1°F...	
3.					
4.	the greenhouse effect	is: Rel (Att)		on the rise	
5.	"climate	is: Rel (Att)		a complicated thing,	
6.	«Roger Revelle,	warns » : Vb			
7.	the changes seen so far	may be: Rel (Att)		due to some other cause [...] (Att: cir)	
7.eb	[we	don't yet understand] : Men			
8.	the theory	does not disprove: Mat	The absence of a clear-cut signal,		
9.	Scientists	expect: Men		any excess greenhouse warming to be masked for quite some time	by the enormous heat absorbing capacity of the world's oceans: Manner (means)
10.	which	have: Rel (Att)		more than 40 times the absorptive capacity of the entire atmosphere	
11.	ourselves to a climatic warming ...	ve committed: Mat	"we'		"Right now," : Loc (temporal)
12.	« V.Ramanathan,	declares » : Vb			
13.	we	haven't seen: Men		the effect	
14.	This extra heat, « », « »	should be released: Mat			over the next 30 to 50 years--: Ext (temporal)
15.		trapped: Mat			now : Loc (temporal) in the ocean : Loc (spatial)
16.	«he	says, » : Vb			
17.	it	counteracts: Mat	an event like a big volcanic eruption		
18.	Ramanathan:	Notes: Vb			
19.	it (to stop the heating that had already occured)	will be: Rel (Att)		too late	by the time: Loc (temporal)
19.eb	we	know: Men			
19.eb	our theory	is: Rel (Att)		correct,	
20.	Schneider	sees: Men			
20.eb		to wait: Mat			
21.	he:	Says: Vb		no need	
22.	"The greenhouse effect	is: Rel (Att)		the least controversial theory in atmospheric science."	
23.	"It	's like: Rel (Att)		a Rube Goldberg machine... [...]	

BRIDGING: HEAT 8 (cont.)

24.	One of the most fundamental elements of the Rube Goldberg machine	is: Rel (Id)		the three astronomical cycles [...]	
25.	The swings, « ... » its tilt and the shape of its orbit around the sun,	occur: Rel (Att)			every 22,000, 41,000 and 100,000 years, respectively: Loc (temporal)
26.	long-term variation in the wobbling of the earth's axis, »	involve: Mat	« which		
27.		determine: Men	they		Together: Acc (com)
28.	how much solar energy the earth	receives: Mat			
29.	the earth's periodic major ice ages every 100,000 years or so, as well as shorter-term cold spells	cause: Mat			
30.	Milankovitch cycles only	scratch: Rel (Att)		the surface of climate change	
31.	veils of dust [... ‖ ...]	send up: Mat	Volcanoes, for example,		
31.eb		reflect: Mat		sunlight	
31.eb		act: Mat			
31.eb	the planet	to cool: Mat			
32.	sunlight,	reflect: Mat	Deserts, with their near white sands, also		
33.		as do: Mat	the polar ice caps.		
34.	Tropical rain forests, however,	have: Rel (Att)		the opposite effect:	
35.	solar radiation;	absorbs: Mat	their dark green foliage, like the dark blue of the ocean,		
36.	the planet	tend to warm: Mat	both		
37.	Clouds, «...»	are: Rel (Id)		another important climate factor	
38.	about half the earth's surface at any given time »	shade: Mat	« which		
39.	James Coakley	Says: Vb			of the National Center for Atmospheric Research: Loc (spatial)
40.	the atmosphere	heat up: Mat	if you		
41.	more water	and pump: Mat			
42.	clouds	will change.: Mat			
43.	But how clouds	(will change: Mat)			
44.	We	don't know.: Men			
45.	" Water vapor, for examper,	is: Rel (Id)		yet another greenhouse gas,	
46.	solar energy.	reflect: Mat	the white-grey surfaces of clouds		
47.	Which effect	predominates: Mat			
48.	Answer				
49.	it	depends on: Men		the cloud	

BRIDGING: HEAT 8 (cont.)

50.	60% of incoming solar rays.	reflect: Mat	The bright, low-level stratocumulus clouds		
51.	solar heat	let: Mat	long, thin monsoon clouds		
52.	infrared radiation	preventing; :Mat			
52.eb		escaping: Mat			
53.	Another contributor to climatic change	is: Rel (Id)		the biosphere [....]	
54.	it	is: Rel (Identifying)		the biosphere [that thretens | to tip the balance]]	
54.eb	[the balance	threatens to tip: Mat	that]		
55.	many of its effects	are: Rel (Att)		natural	
56.	and as such	have long been: Rel (Att)		part of the climatic equilibrium	
57.	enormous amounts of gas	produce: Mat	Termites, for example,		
58.	woody vegetation:	digest: Mat	as they		
59.	five liters of methane	can emit: Mat	a single termite mound		a minute: Ext (temporal)
60.	The methane	escapes: Mat			into the atmosphere: Loc (spatial)
61.	ozone	can destroy: Mat	it (methane)		
62.		act as: Rel (Id)		a greenhouse ...	
63.	"Termites," «...»	"could be: Rel (Att)		responsible for as much as 50% of the total atmospheric methane budget."	
64.	«Environmental Chemist Patlrick Zimmerman,	says » : Vb			of the National Center for Atmospheric Research: Loc (spatial)
65.	the biosphere	becomes: Rel (Att)		a problem only	
66.	when humans	get involved: Rel (Att)			
67.	the Amazon rain forest, «... »	has been slashed: Mat			In Brazil : Loc (spatial) by an estimated 10% to 15%: Manner (com)
68.	«which	covered: Mat		3 million sq.mi., »	once: Loc (temporal)
69.	as the region	has been developed: Mat		for mining and agriculture;	
70.	an additional 20%	has been seriously disturbed.: Mat			
71.	When the downed trees	are burned: Mat			
72.		or rot: Mat			
73.	CO_2 and other greenhouse gases	are released: Mat			
74.	the world	may already be helping to make: Mat	The same kind of deforestation in Africa,... « ... »	warmer	
75.	experts »,	« say: Vb			