

8 DR. MACDONALD: OKAY, WE'RE A TOUCH BEHIND,  
9 BUT WE HAVE SOME TIME FOR A FEW QUESTIONS FOR THE  
10 PANEL AND DISCUSSION THAT ANYBODY WOULD LIKE TO BRING  
11 UP. SO THE FLOOR IS OPEN.

12 DR. JENNINGS: MY NAME IS GERARD JENNINGS,  
13 FROM NATIONAL UNIVERSITY OF IRELAND. AND I'M COMING  
14 MORE FROM AN ATMOSPHERIC PERSPECTIVE. MY QUESTION IS  
15 MORE ADDRESSED TO RICHARD, WHO I THINK GAVE A VERY  
16 NICE SUMMARY OF THE SUMMARY OF THE IPCC. I'M QUOTING  
17 FROM THAT 20-PAGE SUMMARY, IN THE SECTION ON  
18 UNDERSTANDING AND ATTRIBUTING CLIMATE CHANGE, AND I  
19 QUOTE, AND PERHAPS SEEK A COMMENT FROM RICHARD OR  
20 OTHERS ON THE PANEL, POSSIBLY, AS WELL, AND I'M  
21 QUOTING, "IT IS VERY LIKELY THAT INCREASES IN  
22 GREENHOUSE GASSES CONCENTRATION WOULD HAVE CAUSED  
23 MORE WARMING THAN OBSERVED BECAUSE VOLCANIC AND  
24 ANTHROPOGENIC AEROSOLS HAVE OFFSET SOME OF THE  
25 WARMING THAT WOULD OTHERWISE HAVE TAKEN PLACE."

DR. SOMERVILLE: YES, THAT'S CORRECT. THE  
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1 IDEA HERE IS THAT ATMOSPHERIC AEROSOLS, WHICH CAN  
2 ABSORB OR REFLECT SOLAR RADIATION, HAVE IN FACT  
3 MASKED PART OF THE WARMING THAT WOULD OTHERWISE HAVE  
4 BEEN OBSERVED. AEROSOLS, AS YOU KNOW, ARE NOT LITTLE  
5 NEGATIVE CO2 MOLECULES; BUT NONETHELESS, IT'S QUITE  
6 CLEAR THAT ESPECIALLY IN REGIONS WHERE AEROSOL  
7 CONCENTRATIONS ARE HIGH, THEY HAVE TENDED TO OFFSET  
8 OR MASK OR REDUCE THE OBSERVED GREENHOUSE WARMING.  
9 THAT'S TRUE.

10 AEROSOLS ARE A MAJOR AREA OF UNCERTAINTY.  
11 THEY'RE NOT THE ONLY ONE. THEY MAY NOT BE THE MOST  
12 IMPORTANT ONE. BUT THEY'RE AN AREA WHERE THERE IS A  
13 GREAT DEAL OF RESEARCH TO BE DONE. IF YOU NOTICED ON  
14 MY BAR CHART I SHOWED RADIATIVE FORCINGS, THE  
15 AEROSOLS, WHICH HAVE IN GENERAL COOLING EFFECTS, HAVE  
16 VERY LARGE UNCERTAINTY AS TO WHAT'S ON THEM. AND  
17 THAT'S A VERY SUCCINCT WAY OF RESTATING WHAT I JUST  
18 SAID.

19 DR. ELKINS: MY NAME IS JIM ELKINS. WHAT  
20 HAPPENED TO THE MEDEA PROGRAM, WHERE THE CIA AND THE  
21 MILITARY GAVE DATA TO VARIOUS INDIVIDUALS? AND IS  
22 THERE ANY PROGRAM CURRENTLY SET UP SO THAT WE CAN GET  
23 SOME OF THAT DATA?

24 VICE ADMIRAL GAFFNEY: GREAT QUESTION.  
25 THANK YOU.

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1 THE DATA RELEASED, OF COURSE, IS AVAILABLE  
2 FROM VARIOUS SOURCES, THE NAVAL -- DEPENDING ON WHAT  
3 YOU WANT, THE NAVAL OCEANOGRAPHIC OFFICE, THE  
4 NATIONAL ICE CENTER, NOAA HAS MUCH OF IT. AND I  
5 SHOULD MENTION, IN FAIRNESS HERE, THAT WHILE THE  
6 DEFENSE AND INTELLIGENCE AGENCY WAS A SOURCE OF MUCH  
7 OF THIS INFORMATION, IT WAS GIVEN TO NOAA AND TO USGS  
8 TO SHEPHERD, AND THEY STILL DO. SO THE DATA THAT WAS  
9 RELEASED DURING THAT TIME PERIOD IS STILL AVAILABLE.  
10 IT'S NOT BEEN SHUT OFF OR ANYTHING.

11 MEDEA HAS NOT BEEN ACTIVE, BUT THERE IS

12 SOME INTEREST IN GETTING IT STARTED. I KNOW THAT  
13 PEOPLE HAVE HAD SOME DISCUSSIONS WITH ME ABOUT THAT,  
14 WITH PRESIDENT CICERONE, AS WELL; AND MY GUESS IS IT  
15 WOULD GET STARTED AGAIN. CERTAINLY, I AM EVANGELICAL  
16 ON THAT PARTICULAR POINT. BUT IT'S NOT IN THE  
17 CONGRESSIONAL BILL OR ANYTHING LIKE THAT AT THIS  
18 PARTICULAR MOMENT.

19 DR. BUTLER: JIM BUTLER WITH NOAA.  
20 A QUESTION FOR RICHARD; AND FOR PAUL, AS  
21 WELL, HERE: REFLECTING ON RALPH CICERONE'S TALK THIS  
22 MORNING, ONE OF THE THINGS HE THREW UP THERE AND THE  
23 QUESTION THAT FOLLOWED FROM JIM ELKINS TOLD ME THAT  
24 WE REALLY HAVE A BIT OF A CONUNDRUM IN FRONT OF US,  
25 AND THAT IS THE UNREADABLE SLIDE THAT RALPH PRESENTED

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1 FOR US, THE ONE THAT ADDRESSED ALL OF THE LEGISLATIVE  
2 BILLS THAT ARE COMING UP THAT FOCUS ONLY ON CAP AND  
3 TRADE AND THE COMPLICATIONS AND CONSIDERATIONS OF  
4 EACH OF THOSE. THIS IS A LOT. AND THEN WHEN JIM  
5 ELKINS FOLLOWS UP WITH A STATEMENT THAT SAYS, WHAT  
6 ARE THE STATES DOING AND WHAT ARE THESE OTHERS DOING,  
7 THESE SAY THAT IT'S GOING TO TAKE A GOOD DEAL OF  
8 EFFORT FOR SOCIETY TO MOVE FORWARD IN ADDRESSING  
9 CLIMATE CHANGE. YET WHAT I'M HEARING FROM RICHARD  
10 SOMERVILLE AND FROM OTHERS, THERE IS A REAL STRONG  
11 SENSE OF URGENCY, UNDERScoreD OFTEN BY JIM HANSEN.  
12 BUT, I THINK, HOW DO WE BALANCE THIS SENSE OF URGENCY  
13 IN THE FACE OF THIS ENTROPIC NIGHTMARE OF OPTIONS IN  
14 FRONT OF US? AND HOW WILL SOCIETY EVEN THINK ABOUT  
15 GETTING THINGS GOING IN THE NEXT FIVE YEARS?

16 DR. SOMERVILLE: THAT'S A WONDERFUL  
17 QUESTION, AND I WISH I WERE BACK IN THE AUDIENCE SO  
18 THAT I COULD HEAR THE ANSWER THAT PAUL WOULD GIVE.

19 (LAUGHTER)  
20 I THINK PART OF THE SOLUTION HAS TO BE TO  
21 RECOGNIZE THE INHERENTLY INTERNATIONAL NATURE OF THIS  
22 PROBLEM. I THINK WHAT IN THE LONG RUN WE DON'T WANT,  
23 ALTHOUGH ACTIONS LIKE THE CALIFORNIA ACTION I THINK  
24 ARE PRAISEWORTHY, WHAT YOU DON'T WANT IN THE LONG RUN  
25 IS A CRAZY QUILT PATCHWORK OF LOCAL INITIATIVES AND

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1 LOCAL BILLS COUNTRY BY COUNTRY. THIS HAS TO BE AN  
2 INTERNATIONAL EFFORT. THE GREENHOUSE GASSES GET  
3 CARRIED BY THE WIND, CO2 LASTS CENTURIES. THE  
4 CONCENTRATION IS ABOUT THE SAME FOR CLIMATIC PURPOSES  
5 ANYWHERE. AND SO I THINK THE REAL ONUS IS ON THE  
6 NATIONS OF THE WORLD TO COME TOGETHER, STARTING WITH  
7 THE BALI NEGOTIATIONS.

8 AND MY HOPE -- TECHNOLOGICALLY, I'M ALWAYS  
9 AN OPTIMIST. I THINK YOU'RE GOING TO HEAR, FROM ROB  
10 SOCOLOW AND OTHER LATER SPEAKERS, SOME OF THE REAL  
11 EXCITING AND PROMISING TECHNOLOGICAL OPTIONS.  
12 POLITICALLY, FOR WHAT IT IS WORTH, AS ONE CITIZEN OF  
13 THE PLANET, I'M NOT ALWAYS AN OPTIMIST. I'M KIND OF  
14 BIMODAL ABOUT THAT, OR BIPOLAR. AND I THINK THIS IS  
15 AN OPPORTUNITY, IN PART BECAUSE OF THE MEDIA  
16 ATTENTION AND IN PART BECAUSE OF THE NOBEL AURA, THE

17 NOBEL PEACE PRIZE SHARED BY THE IPCC AND AL GORE, IN  
18 PART BECAUSE THE MEDIA HAVE CAUGHT UP WITH THIS ISSUE  
19 IN MANY COUNTRIES, I THINK THERE'S GREATER  
20 OPPORTUNITY NOW THAN THERE HAS BEEN IN THE PAST AND A  
21 GREATER REALIZATION THAT THE SCIENCE IS SOLID, THE  
22 PROBLEM IS REAL, IT'S NOT GOING TO GO AWAY, AND THAT  
23 THE SCIENCE CAN HELP INFORM WISE POLICY MAKING.

24 AND WE'LL SEE, WE'LL SEE. IF NOTHING COMES  
25 OUT OF BALI BUT SPEECH MAKING AND PROCRASTINATION,

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1 THEN I THINK YOU CAN BE VERY PESSIMISTIC.

2 AS YOU KNOW, CHINA EITHER HAS OR IS ABOUT  
3 TO PASS THE U.S. AS A NET CO2 EMITTER, AND WITH HEAVY  
4 FUTURE EMISSIONS POTENTIAL COMING FROM OTHER LARGE  
5 DEVELOPING NATIONS. SO ALL THE THINGS GOING ON IN  
6 WASHINGTON ARE WELL-INTENTIONED AND MANY, I THINK,  
7 ARE WELL WORTHWHILE, BUT THIS IS AN INTERNATIONAL  
8 PROBLEM, AND THERE HAS TO BE AN INTERNATIONAL  
9 SOLUTION TO IT, THERE HAS TO BE AN INTERNATIONAL  
10 APPROACH TO ESSENTIALLY WEANING THE WORLD FROM FOSSIL  
11 FUELS AND LIMITING GROWTH IN EMISSIONS AND EVENTUALLY  
12 STABILIZING CO2; AND THE TIME IS SHORT.

13 VICE ADMIRAL GAFFNEY: THANKS, JIM.

14 WELL, SOME GOOD NEWS, I GUESS: ONE, A  
15 CERTAIN DANISH SCIENTIST HAS SHIFTED HIS POSITION A  
16 LITTLE BIT. NEWT GINGRICH HAS A NEW BOOK OUT THAT IS  
17 PRETTY SYMPATHETIC TO MANY OF THE THINGS THAT WERE  
18 SAID IN THIS ROOM. IT GOES TO PEOPLE THAT REACH A  
19 SIGNIFICANT AUDIENCE.

20 IT'S NOT REALLY BEEN A BIG ISSUE IN THE  
21 PRESIDENTIAL DEBATES YET, WHICH I THINK IS NOT SO  
22 GOOD. I THINK WE CAN GET A GOOD LESSON FROM -- I  
23 AGREE WITH WHAT RICHARD SAID ABOUT INTERNATIONAL  
24 OOMPH, EVERYBODY TRYING TO WORK TOGETHER. I THINK,  
25 BESIDES JIM HANSEN, ONE OF THE MOST -- THE MOST

0196

1 INFLUENTIAL SPEAKERS TO OUR GROUP WHEN WE MET WERE  
2 THE REPRESENTATIVES FROM THE UK. THEY SOLVED THEIR  
3 PROBLEM IN THE UK. THEY'VE ALL COME TOGETHER. BUT  
4 WE HAVE A DIFFERENT SYSTEM. AND, YOU KNOW, MAYBE  
5 IT'S NOT BAD NEWS THAT EVERY SINGLE COMMITTEE OF  
6 CONGRESS IS SAYING SOMETHING ABOUT IT, EVEN THOUGH  
7 IT'S NOT ALL GOING TOGETHER. AT LEAST THEY'RE SAYING  
8 SOMETHING ABOUT IT. THE WORST THING, LIKE MY  
9 GENERATIONAL-LONG FRIEND HERE, RICK SPINRAD, SAID,  
10 THE WORST THING THAT CAN HAPPEN IN WASHINGTON IS TO  
11 BE IGNORED, THAT'S THE WORST PUNISHMENT. SO THE FACT  
12 THAT THEY'RE SAYING SOMETHING IS BETTER THAN NOTHING.

13 I'M HAPPY THAT THE DEFENSE DEPARTMENT IS  
14 GOING TO START, EITHER ON THEIR OWN OR BEING  
15 REQUIRED, TO SAY SOMETHING ABOUT THIS ISSUE, BECAUSE  
16 WHETHER YOU LIKE IT OR NOT, IT'S A \$500 BILLION  
17 OPERATION EVERY SINGLE YEAR; IT'S GLOBAL; IT HAS LOTS  
18 OF FRIENDS; IT HAS LOTS OF INFLUENCE; AND GETTING  
19 THEM TO BE SPEAKING OUT ON THIS, I THINK, IS  
20 IMPORTANT FOR MOVING AHEAD.

21 AND I AGREE, THE MEDIA IS STARTING TO PICK

22 IT UP. WHEN I GOT ON THE PLANE YESTERDAY IN NEWARK,  
23 THE ARTICLE I READ ON THE FRONT PAGE OF "THE WALL  
24 STREET JOURNAL" WAS, THE SEVENTH WORST NATION AS A CO2  
25 EMITTER IS NOT A NATION AT ALL, IT IS THE

0197

1 INTERNATIONAL SHIPPING INDUSTRY, WHICH ONCE IT GETS  
2 BEYOND 200 MILES, IS UNREGULATABLE. SO PEOPLE ARE  
3 BRINGING UP THESE UNINTENDED CONSEQUENCE ISSUES THAT  
4 WE HAVE NEVER HEARD BEFORE. SO YOU MAKE PROGRESS A  
5 DAY AT A TIME. SO I THINK WE'RE STARTING TO EAT THE  
6 ELEPHANT HERE.

7 DR. MARQUIS: I'M MELINDA MARQUIS.  
8 I HAVE A QUESTION FOR BOTH RICHARD AND  
9 VICE ADMIRAL GAFFNEY. WHAT DO YOU THINK IS NEEDED  
10 WITH RESPECT TO THE FUTURE MEASUREMENT AND RESEARCH  
11 SYSTEMS? AND I KNOW THAT VICE ADMIRAL GAFFNEY HAD  
12 MENTIONED THAT REGIONAL MEASUREMENTS ARE NEEDED, BUT  
13 I'M WONDERING WHAT'S THE SCALE THAT'S IMPORTANT FROM  
14 A MILITARY PERSPECTIVE? AND WHAT BESIDES HAVING  
15 REGIONAL MEASUREMENTS ARE IMPORTANT FROM A MILITARY  
16 PERSPECTIVE?

17 DR. SOMERVILLE: WELL, I'LL HANDLE THE  
18 MILITARY PART, AND THEN PAUL WILL TALK ABOUT THE  
19 SCIENCE.

20 (LAUGHTER)

21 FOR THOSE OF YOU WHO DON'T KNOW, THAT WAS  
22 MELINDA MARQUIS, THE LOGISTICAL EMPRESS OF THIS  
23 MEETING, SHE HAS DONE A WONDERFUL JOB, WHOM I GOT TO  
24 KNOW BECAUSE SHE WAS PART OF THE GROUP GIVING  
25 EXEMPLARY STAFF SUPPORT TO THE IPCC WORKING GROUP I.

0198

1 SO ONE OF THE CONSEQUENCES OF IPCC WORK BEING  
2 FINISHED WAS THAT MELINDA MARQUIS WAS AVAILABLE TO DO  
3 THIS JOB.

4 BUT I DON'T HAVE A SINGLE SILVER BULLET  
5 KIND OF RESEARCH THAT IF YOU COULD DO IT WOULD SOLVE  
6 THIS PROBLEM. THE RESEARCH BUDGET IN THIS COUNTRY ON  
7 MOST CLIMATE-RELATED RESEARCH HAS BEEN FLAT FOR A  
8 LONG TIME, OR DECLINING BY THE INFLATION RATE,  
9 APPROXIMATELY. IN THE AREAS THAT I'M MOST FAMILIAR  
10 WITH, THE RATE-LIMITING FACTOR IN PRAGUE IS IN  
11 MANPOWER. I THINK THAT WE ARE CHURNING OUT MORE  
12 PROMISING GRADUATE STUDENTS WHO WANT TO HAVE RESEARCH  
13 CAREERS THAN THERE ARE APPROPRIATE OPENINGS FOR THEM.  
14 WHEN I LOOK AT HOW THE CLIMATE MODELING GROUPS ARE  
15 IMPACTED BY THE NEED TO RUN THESE SCENARIOS FOR IPCC,  
16 FOR EXAMPLE, THEY ARE STRAINING TO DO IT AND STILL TO  
17 DO THE KIND OF MODEL DEVELOPMENT AND DIAGNOSTIC WORK  
18 THAT THEY NEED TO DO. WHEN I LOOK AT SATELLITE  
19 REMOTE SENSING IN THE U.S. AND IN EUROPE, THE  
20 BOTTLENECK IS THE LACK OF PEOPLE TO ANALYZE THE DATA  
21 WHEN THEY'RE UP THERE. THE BALANCE BETWEEN ORBITING  
22 HARDWARE AND HAVING SCIENTISTS LOOK AT THE NUMBERS  
23 HAS ALWAYS BEEN A LITTLE BIT OUT OF OPTIMAL, IN MY  
24 PERSONAL VIEW.

25 I THINK THAT ONE CAN FOCUS MORE THAN HAS

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1 BEEN DONE ON KEY AREAS OF SCIENTIFIC UNCERTAINTY. WE  
2 WANT TO REDUCE THE UNCERTAINTY BARS ON THE KIND OF  
3 ESTIMATES THAT THE IPCC REPORTS ASSESS. THEN, I  
4 THINK ONE CAN LOOK MORE CAREFULLY AT SPECIFIC  
5 SCIENTIFIC AREAS: OCEAN ATMOSPHERE INTERACTIONS,  
6 CLOUD RADIATION INTERACTIONS, AEROSOL PHYSICS, AND SO  
7 ON, AND CHEMISTRY. THE LIST IS WELL-KNOWN. BUT WE  
8 HAVE, IN THIS COUNTRY ESPECIALLY, AN INTER-AGENCY  
9 ILLOGICAL KIND OF TURF SET UP, AND I THINK ANYBODY  
10 WOULD AGREE, AND SO THERE ARE AREAS THAT ARE  
11 SCIENTIFICALLY IMPORTANT THAT FALL BETWEEN THE CRACKS  
12 OF WHAT GIVEN AGENCIES ARE AVAILABLE TO USE.

13 SO THAT'S MY BEST ANSWER WITHOUT REVEALING  
14 CLASSIFIED INFORMATION, WHICH PAUL WILL NOW DO.

15 VICE ADMIRAL GAFFNEY: THANKS, MELINDA, AND  
16 THANKS FOR YOUR HELP.

17 MY INITIAL ADVERTISEMENT WOULD BE I SUPPORT  
18 AN INTEGRATED OCEAN OBSERVING SYSTEM, STARTING ON THE  
19 U.S. COAST AND MOVING OUTWARD; AND I WOULD LIKE TO BE  
20 ABLE TO HAVE SOME REPLICAS OF OCEAN WEATHER LIKE WE  
21 HAVE OF ATMOSPHERIC WEATHER.

22 IF I WAS IN THE UNITED STATES NAVY TODAY,  
23 I'D REALLY WANT TO KNOW ABOUT WHETHER ABRUPT CLIMATE  
24 CHANGE, NORTH ATLANTIC OSCILLATION DISRUPTION IS  
25 GOING TO HAPPEN OR NOT. SO THAT'S WHERE I WOULD BE

0200

1 FOCUSING IF I WERE IN THE U.S. NAVY TODAY. IF I WERE  
2 IN THE GROUND FORCES, MAYBE THE AIR FORCES, I WOULD  
3 BE THINKING OF SOME -- THE TERM I WROTE DOWN HERE IS  
4 "MESOSCALE." I'M JUST THINKING OF A MAP AND WHAT  
5 KIND OF A DECISION A PLANNER MIGHT MAKE. I WOULD SAY  
6 MAYBE SOMETHING A HALF OR A THIRD OF THE SIZE OF  
7 CHINA, HALF THE SIZE OF THE MIDDLE EAST, SOMETHING  
8 LIKE THAT; BUT THAT HAS NOTHING TO DO WITH THE  
9 GEOPHYSICAL DATA RECORD; THAT HAS A LOT TO DO WITH  
10 THE INTERPRETATION OF THE DATA THAT YOU CAN HAND OFF  
11 TO A DECISION MAKER WHO MAY NOT BE A SCIENTIST.

12 WE, IN FACT, GET DATA AT EVERY SCALE; AND  
13 IF YOU GO TO THE CLASSIFIED SIDE, WHERE RICHARD SITS,  
14 HE HAS SCALES OF INCHES, AND THERE'S SCALES OF  
15 KILOMETERS, SO IT'S ALL AVAILABLE. IT'S JUST PUTTING  
16 IT ALL TOGETHER AND GETTING SOMEBODY TO PAY FOR IT.  
17 SOMETIMES THE -- RICHARD MENTIONED MANPOWER -- BUT I  
18 REMEMBER DURING MEDEA, ONE OF THE ISSUES WAS, GEE,  
19 THERE'S SO MUCH DATA, WHO'S GOING TO JUST PAY US TO,  
20 EVEN IF WE DON'T GET ANY MORE PEOPLE, TO KEEP LOOKING  
21 AT IT FOR TEN YEARS. SO YOU NEED THAT KIND OF  
22 FEDERAL INVESTMENT, WHICH GOES TO MY LAST POINT; THAT  
23 IS, I'M HOPING THAT PRESIDENT CICERONE TAKES ON THE  
24 COMMISSION; BUT, MY GOD, \$50 MILLION IS NOT GOING TO  
25 HELP OUR SITUATION. WE NEED A LOT MORE THAN THAT, IN

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1 MY OPINION.

2 DR. MACDONALD: OKAY. WE'RE GOING TO HAVE  
3 DR. SPINRAD CLOSE THE SESSION.

4 DR. SPINRAD: I WILL SIMPLY ASK THE  
5 AUDIENCE TO THANK DR. SOMERVILLE AND ADMIRAL GAFFNEY

6 ONE MORE TIME FOR A WONDERFUL PRESENTATION.  
7