

DR. FIELD: THANKS, RAY, AND THANKS TO ALL

0315

1 OF YOU FOR THE OPPORTUNITY TO PARTICIPATE IN THIS  
2 EXTENDED BIRTHDAY PARTY. IT'S NOT VERY OFTEN YOU GET  
3 TO COME TO A SCIENTIFIC MEETING THAT IS REALLY AT ITS  
4 HEART A PARTY AND A CELEBRATION.

5 IT'S THE TASK OF OUR GROUP THIS MORNING TO  
6 TALK ABOUT WHAT WE KNOW IN VERY BRIEF SUMMARY FORM OF  
7 IMPACTS OF CLIMATE CHANGE ON TERRESTRIAL ECOSYSTEMS,  
8 AND THERE'S A SENSE IN WHICH THAT'S REALLY THE REASON  
9 WE CARE ABOUT CLIMATE, ARE WHAT ARE THE IMPACTS GOING  
10 TO BE.

11 AND WHAT I WOULD LIKE TO DO IS SET UP A  
12 COUPLE OF BOOKENDS, FIRST, TO CHARACTERIZE WHERE  
13 WE'RE ACTUALLY HEADED IN TERMS OF THE RECENT  
14 TRAJECTORY OF CHANGES IN CLIMATE, AND THEN I'LL JUST  
15 SUMMARIZE FROM A SORT OF A 30,000-FOOT PERSPECTIVE  
16 SOME OF THE CHANGES THAT WE KNOW THAT HAVE OCCURRED,  
17 BECAUSE WHAT I REALLY WANT TO DO IS CREATE A CONTEXT  
18 IN WHICH PEOPLE BEGIN TO THINK ABOUT INTERACTING  
19 EFFECTS.

20 OUR SESSION IS ORGANIZED, LIKE ALMOST  
21 EVERYTHING ON CLIMATE CHANGE IMPACTS, TO LOOK AT  
22 IMPACT BY IMPACT BY IMPACT. BUT I THINK WE'RE  
23 GETTING AN INCREASING APPRECIATION OF, AS WE LEARN  
24 MORE ABOUT THE WAY NOT ONLY THE CLIMATE SYSTEM WORKS  
25 BUT THE WAY ECOSYSTEMS AND HUMANS WORK, IS THAT WHEN

0316

1 A BUNCH OF IMPACTS ARE OCCURRING TOGETHER, THE  
2 SITUATION BECOMES A LOT MORE COMPLICATED, AND THE  
3 OPPORTUNITIES FOR DEALING WITH IT ARE ADJUSTED  
4 SUBSTANTIALLY.

5 I'LL SUMMARIZE IN A LIST FORM THE CHANGES  
6 THAT WE EXPECT IN THE FUTURE; AND THEN IN THE SESSION  
7 THAT FOLLOWS, WE'LL GO IN DETAIL INTO SOME OF THOSE.  
8 AND THEN, FINALLY, WE'RE GOING TO CONCLUDE WITH A  
9 PRESENTATION FROM TED SCHUUR ON FEEDBACKS FROM THE  
10 UNMANAGED PART OF THE CARBON CYCLE TO THE TRAJECTORY  
11 OF CLIMATE CHANGE; AND IT'S REALLY ONE OF THE REALLY  
12 CRITICAL ISSUES FOR THE FUTURE, NOT ONLY FOR THE  
13 LAND, BUT FOR THE OCEANS AS WELL, THAT A PROBLEM THAT  
14 SO FAR HAS BEEN MAINLY AN ISSUE OF DRIVING THE SYSTEM  
15 FROM ANTHROPOGENIC EMISSIONS HAS A POTENTIAL TO DRIFT  
16 INTO A REGIME WHERE INCREASINGLY IT'S BEING DRIVEN BY  
17 FEEDBACKS FROM THE NATURAL SYSTEM OR THE UNMANAGED  
18 SYSTEM.

19 WE'RE FORTUNATE TO HAVE THREE PRESENTATIONS  
20 FROM PEOPLE REALLY WHO HAVE MADE A BIG DIFFERENCE IN  
21 OUR UNDERSTANDING OF WHAT'S HAPPENING WITH CLIMATE  
22 CHANGE. I FEEL REALLY PRIVILEGED TO HAVE PAUL  
23 KIRSHEN TALK ABOUT SEA LEVEL RISE, THE PERSON WHO I  
24 THINK ALMOST SINGLE-HANDEDLY HAS BEEN RESPONSIBLE FOR  
25 PUSHING CLIMATE CHANGE FROM AN ISSUE THAT WAS MAINLY

0317

1 DISCUSSED BY SCIENTISTS INTO AN ISSUE THAT WAS  
2 PROMINENT IN THE LEGAL SYSTEM. HIS STUDIES ON  
3 IMPACTS OF INCREASING SEA LEVEL IN THE BOSTON HARBOR

4 REGION HAVE BEEN CRITICAL FOR THE ESTABLISHMENT OF  
5 LEGAL STANDING IN THE DEMONSTRATION OF A PARTICULAR  
6 IDENTIFIABLE HARM THAT ALLOWED A LEGAL CASE, IN  
7 PARTICULAR, THE MASSACHUSETTS VERSUS EPA, TO MOVE  
8 AHEAD; AND OF COURSE, THAT WAS DECIDED RECENTLY BY  
9 THE SUPREME COURT.

10 DAVID LOBELL IS GOING TO SPEAK ABOUT AN  
11 ISSUE THAT EVERYONE IN THE WORLD HAS TO CARE DEEPLY  
12 ABOUT, THE WORLD FOOD SYSTEM. DAVID HAS BEEN A  
13 DETECTIVE, KIND OF UNRAVELING THE IMPACTS OF CLIMATE  
14 CHANGE ON AGRICULTURE THAT'S BEEN VERY DIFFICULT TO  
15 ASSESS BECAUSE AGRICULTURE IS AT A COMPLICATED  
16 INTERFACE WHERE IT'S HARD TO KNOW WHAT'S HAPPENING AS  
17 A RESULT OF CLIMATE AND WHAT'S HAPPENING AS A RESULT  
18 OF CHANGES IN MANAGEMENT AND CHANGES IN MARKET  
19 FORCES.

20 AND FINALLY, TED SCHUUR, FROM THE  
21 UNIVERSITY OF FLORIDA, IS GOING TO CONCLUDE WITH A  
22 REALLY IMPORTANT DISCUSSION OF TERRESTRIAL FEEDBACKS.  
23 THERE ARE PEOPLE WHO HAVE A UNIQUE CONTRIBUTION TO  
24 SCIENCE BY SORT OF DISCOVERING A BIG PROBLEM, AND  
25 WHAT TED HAS REALLY DONE IS LED US TO UNDERSTAND THAT

0318

1 THERE IS A VAST AMOUNT OF CARBON, SOMETHING LIKE A  
2 THOUSAND BILLION TONS OF CARBON LOCKED AWAY IN FROZEN  
3 NORTHERN SOILS; AND TED HAS BEEN THE PERSON WHO HAS,  
4 UNFORTUNATELY FOR THE FUTURE OF THE WORLD,  
5 DEMONSTRATED THAT THAT CARBON IS POTENTIALLY VERY  
6 EASILY DECOMPOSABLE. SO WE WILL MOVE THROUGH WHAT WE  
7 UNDERSTAND ABOUT IMPACTS TO THIS REALLY IMPORTANT  
8 AREA OF FEEDBACKS.

9 I WAS FORTUNATE TO SERVE AS A COORDINATING  
10 LEAD AUTHOR OF THE NORTH AMERICA CHAPTER FOR THE AR4  
11 OF THE IPCC; AND I WANT TO PULL TOGETHER FOUR KEY  
12 MESSAGES THAT ARE PRESENTED IN A SLIGHTLY DIFFERENT  
13 WAY THAN MOSTLY WHAT WE'VE THOUGHT ABOUT AS IPCC-TYPE  
14 MESSAGES.

15 THE FIRST MESSAGE THAT I THINK EVERYBODY IS  
16 AWARE OF BUT REALLY NEEDS TO BE AWARE OF AND NEEDS TO  
17 COMMUNICATE EFFECTIVELY IS THAT CLIMATE CHANGE  
18 IMPACTS ARE NOT SOMETHING WE TALK ABOUT FOR THE  
19 FUTURE; THEY ARE THINGS THAT HAVE ALREADY OCCURRED,  
20 AND THEY ALREADY HAVE SUBSTANTIAL ECONOMIC AND SOCIAL  
21 AND ECOSYSTEM IMPACT IN A REGION LIKE NORTH AMERICA.

22 MOST OF THESE, AND MOST LIKELY THE  
23 IMPORTANT ONES IN THE FUTURE, ARE NOT THE IMPACTS  
24 THAT COME FROM THE GRADUAL CHANGES, BUT THAT ARE THE  
25 CONSEQUENCES OF EXTREME EVENTS, EXTREME EVENTS THAT

0319

1 LEAD TO GREATER FREQUENCY AND SEVERITY OF WILDFIRES,  
2 INCREASING FREQUENCY OF SEVERE HURRICANES, INCREASING  
3 FREQUENCY OF HEAT WAVES. THE EXTREME EVENTS, THE  
4 ONES THAT ARE MOST DIFFICULT TO ASSIGN WITH HIGH  
5 CONFIDENCE TO CLIMATE CHANGE, ARE THE ONES THAT  
6 CURRENTLY, AND ALMOST CERTAINLY IN THE FUTURE, WILL  
7 CARRY THE BULK OF THE IMPACTS; A DIFFICULT  
8 COMMUNICATION CHALLENGE, BUT AN EXTREMELY IMPORTANT

9 ONE.

10 THE THIRD IMPORTANT CONCLUSION THAT I WANT  
11 TO MENTION IS THAT WHEN WE TALK ABOUT IMPACTS, WE'RE  
12 NOT REALLY TALKING ABOUT THINGS THAT ARE OCCURRING IN  
13 DISTANT REGIONS AND FOCUSED ON SECTORS THAT WE DON'T  
14 CARE ABOUT. WHEN YOU LOOK AT NORTH AMERICA OR  
15 ANYPLACE IN THE WORLD, THERE ARE VULNERABLE SECTORS,  
16 VULNERABLE PEOPLE, VULNERABLE SYSTEMS EVERYWHERE. IN  
17 NORTH AMERICA, THE PEOPLE WHO ARE VULNERABLE TO  
18 IMPACTS OF CLIMATE CHANGE ARE, IN MOST CASES, THE  
19 SAME PEOPLE WHO ARE VULNERABLE TO A NUMBER OF OTHER  
20 KINDS OF SOCIAL AND ECONOMIC ISSUES. IT TENDS TO BE  
21 THE ELDERLY, IT TENDS TO BE THE VERY YOUNG, AND IT  
22 TENDS TO BE THE POOR.

23 A FINAL POINT I WANT TO BRING FORWARD IS  
24 THAT WE TEND TO THINK ABOUT RESPONSES TO CLIMATE  
25 CHANGE IN TERMS OF MITIGATING, IN TERMS OF REDUCING

0320

1 THE AMOUNT OF CHANGE THAT OCCURS; BUT IT IS  
2 INCREASINGLY CLEAR THAT OUR ABILITY TO MANAGE CLIMATE  
3 CHANGE IS GOING TO BE NONCOMPLETE IN THE SENSE THAT  
4 CERTAIN IMPACTFUL CHANGES HAVE ALREADY OCCURRED AND  
5 WILL CONTINUE, AND THERE'S LOTS OF OPPORTUNITIES FOR  
6 DOING A BETTER JOB OF ADAPTING TO THE KIND OF CHANGES  
7 THAT WE CAN'T AVOID. AND IN PARTICULAR THE WAY IN  
8 NORTH AMERICA, A REGION WITH SUBSTANTIAL ADAPTIVE  
9 CAPACITY, WE HAVE ADAPTED TO PAST RISKS IS BASICALLY  
10 BY LOOKING IN THE REARVIEW MIRROR. WE'VE RESPONDED  
11 TO EVENTS THAT HAVE ALREADY OCCURRED. THE REALLY KEY  
12 MESSAGE FOR ADAPTING TO CLIMATE CHANGE IMPACTS IS  
13 THAT WE NEED TO INCREASINGLY FIGURE OUT A WAY TO  
14 ADAPT PROACTIVELY, IN A MAINSTREAM ADAPTATION SO  
15 THAT, IN CONTRAST TO DRIVING BY LOOKING IN THE  
16 REARVIEW MIRROR, WE'RE DRIVING BY LOOKING AHEAD.

17 IF WE LOOK AT FUTURE RISK AREAS FOR NORTH  
18 AMERICA, IT IS A LONG LIST. I'M NOT GOING TO SAY  
19 VERY MUCH ABOUT EACH OF THESE EXCEPT TO SAY THAT THE  
20 THING I ENCOURAGE PEOPLE TO THINK ABOUT IS NEW  
21 DIMENSIONS OF THE RISK AREAS THAT COME UP AS THE  
22 PROBLEMS INTERACT. THERE IS SOLID EVIDENCE FOR  
23 INCREASING FREQUENCY OF SEVERE HURRICANES, AS RICHARD  
24 SOMERVILLE TALKED ABOUT YESTERDAY. ONE OF THE EVENTS  
25 WHERE WE'VE SEEN THE MOST IMPACT TO DATE IS THIS

0321

1 ISSUE OF MORE FREQUENT AND SEVERE HEAT WAVES. IT  
2 DOESN'T TAKE A VERY LARGE INCREASE IN MEAN  
3 TEMPERATURE IN ORDER TO HAVE SIGNIFICANT INCREASES IN  
4 BOTH THE FREQUENCY AND THE LENGTH OF HEAT WAVES.  
5 MANY CITIES IN NORTH AMERICA ARE PRIME FOR HIGH  
6 IMPACTS FROM THIS.

7 PAUL WILL TALK ABOUT RISING SEA LEVEL.  
8 THERE ARE A WIDE RANGE OF PUBLIC HEALTH CHALLENGES  
9 THAT COME UP FROM CLIMATE CHANGE. WE'RE NOT GOING TO  
10 HAVE A CHANCE TO FOCUS ON THOSE. HEAT WAVES ARE ONLY  
11 ONE; VECTOR-BORNE DISEASES; INTERACTIONS BETWEEN  
12 THINGS LIKE URBAN INFRASTRUCTURE; AND PUBLIC HEALTH  
13 IS ANOTHER.

14                   ONE OF THE IMPACTS THAT HAS HAD THE MOST  
15 PERVASIVE EFFECT SO FAR IS DECREASES IN THE  
16 AVAILABILITY OF WATER. WE HAVE ALREADY SEEN A  
17 30-PERCENT DECREASE OVER THE LAST 50 YEARS IN SNOW  
18 WATER EQUIVALENT IN THE SPRING IN THE WESTERN  
19 MOUNTAINS, AND IT IS VERY DIFFICULT TO THINK OF ANY  
20 FUTURE SCENARIO THAT DOESN'T HAVE DECREASES IN WATER  
21 AVAILABILITY AND POTENTIALLY IN WATER QUALITY IN  
22 WESTERN NORTH AMERICA.

23                   IT IS ALSO REALLY INCREASINGLY CLEAR THAT  
24 WILDFIRES IN THE MOUNTAINOUS AREAS OF THE WEST, NOT  
25 SO MUCH IN CALIFORNIA, BUT THROUGH THE ROCKY

0322

1 MOUNTAINS, ARE VERY SENSITIVE TO THE LENGTH OF THE  
2 PERIOD BETWEEN THE SNOWMELT IN THE SPRING AND THE  
3 FIRST SNOW IN THE FALL; AND IT IS VERY DIFFICULT TO  
4 IMAGINE A FUTURE IN WHICH WE DON'T SEE INCREASING  
5 IMPACTS OF MORE FREQUENT AND LARGER WILDFIRES.

6                   DAVID WILL TALK ABOUT CHALLENGES TO  
7 AGRICULTURE AND FORESTRY, CHALLENGES THAT ARE  
8 AMPLIFIED BY CHANGES IN THE AVAILABILITY OF WATER,  
9 CHANGES IN THE DEVELOPMENT OF INFRASTRUCTURE, AND  
10 CHANGES IN DEMAND FOR PRODUCTS LIKE BIOFUELS.

11                   AND THEN THE FINAL AREA THAT IT IS  
12 IMPORTANT TO THINK ABOUT IS THE ONE THAT WE HEARD  
13 YESTERDAY, AND I THINK IT'S THE MAIN MOTIVATION FOR  
14 THE NOBEL PRIZE COMMITTEE DECIDING THAT THE IPCC  
15 EFFORT WAS WORTHY OF SHARING THE NOBEL PEACE PRIZE  
16 WITH AL GORE, IS ISSUES OF INTERNATIONAL TRADE AND  
17 SECURITY. WHEN WE THINK ABOUT IMPACTS OF CLIMATE  
18 CHANGE ON NORTH AMERICA, IT IS INCREASINGLY CLEAR  
19 THAT AGRICULTURE IN NORTH AMERICA IS LIKELY TO BE AS  
20 SENSITIVE TO CHANGES IN YIELDS IN ARGENTINA AND INDIA  
21 AS IT IS TO CHANGES IN YIELDS IN ILLINOIS; AND IT IS  
22 VERY LIKELY THAT CHANGES IN SOCIAL UNREST IN  
23 SUB-SAHARAN AFRICA MAY BE PERVASIVE IN THEIR IMPACTS  
24 ON THE WAY WE THINK ABOUT FUTURE SECURITY IN NORTH  
25 AMERICA.

0323

1                   I WANT TO CONCLUDE WITH SOME THOUGHTS NOW  
2 ON WHERE WE'RE HEADED AND PROVIDE A WAY TO THINK  
3 ABOUT RECENT TRENDS KIND OF AS A BOOKEND. IN 2006  
4 FOSSIL EMISSIONS WERE 8.4 BILLION TONS OF CARBON.  
5 WHEN YOU COMBINE THAT WITH THE EMISSIONS FROM LAND  
6 USE CHANGE, THE TOTAL HUMAN-DRIVEN EMISSIONS IN THE  
7 ATMOSPHERE WERE JUST A SMIDGIN UNDER 10 BILLION TONS  
8 OF CARBON. AN IMPORTANT PSYCHOLOGICAL BOUNDARY THAT  
9 WE'RE GOING TO BURST THROUGH IN 2007, 8.4 BILLION  
10 TONS FROM INDUSTRIAL ACTIVITY IS 35 PERCENT ABOVE  
11 GLOBAL EMISSIONS IN 1990.

12                   THE GROWTH RATE OF INDUSTRIAL EMISSIONS IS  
13 REALLY STAGGERING IF YOU LOOK AT THE ANNUAL GROWTH  
14 RATE FROM 1990 TO 1999. IT WAS 1.3 PERCENT PER YEAR;  
15 2000 TO 2006 WAS 3.3 PERCENT PER YEAR. IN THE  
16 CONTEXT OF THE WONDERFUL PRESENTATION THAT ROB  
17 SOCOLOW GAVE YESTERDAY, A WORLD WITH EMISSIONS,  
18 BASELINE EMISSIONS, GROWING AT 1.3 PERCENT PER YEAR

19 REQUIRES EIGHT WEDGES OF ACTION IN TERMS OF EMISSIONS  
20 REDUCTIONS OVER THE NEXT 50 YEARS.

21 WE'RE NOW IN A WORLD WHERE EMISSIONS ARE  
22 GROWING 3.3 PERCENT PER YEAR, RESULTING IN BASELINE  
23 EMISSIONS THAT ARE FIVEFOLD IN 2057 WHAT THEY ARE  
24 NOW; AND OFFSETTING THOSE EMISSIONS REQUIRES, NOT THE  
25 EIGHT WEDGES THAT ROB TALKED ABOUT, BUT 30 NEW

0324

1 WEDGES. ROB GAVE A BRILLIANT PRESENTATION ON HOW  
2 DIFFICULT IT IS TO CREATE A SINGLE WEDGE, AND HE  
3 OUTLINED SIX AREAS IN WHICH WE MIGHT CONCEIVABLY  
4 DEVELOP EIGHT WEDGES. BUT IF THIS WORLD THAT WE HAVE  
5 SEEN FOR THIS DECADE THAT WE'RE IN NOW, THE  
6 3.3-PERCENT-PER-YEAR GROWTH-IN-EMISSIONS WORLD IS THE  
7 LEGITIMATE BASELINE, AND WE DON'T KNOW FOR SURE BUT  
8 IT'S THE HISTORY, THEN WE NEED TO BE LOOKING AT A  
9 SUBSTANTIALLY GREATER INVESTMENT IN DEVELOPING NEW  
10 TECHNOLOGIES THAT HAS BEEN THE DOMINANT PARADIGM ON  
11 THE DRAWING BOARD.

12 LET ME JUST CHARACTERIZE THAT IN TERMS OF  
13 THE TRAJECTORIES THAT WE HAVE BEEN DISCUSSING. HERE  
14 IS THE TRAJECTORY OF FOSSIL FUEL EMISSIONS FROM THE  
15 MIDDLE OF THE 19TH CENTURY, AND IT IS A STAGGERING  
16 NEW RAPID RATE OF INCREASE CONNECTED WITH IMPRESSIVE  
17 ECONOMIC DEVELOPMENT; BUT WHEN WE SCALE THESE NUMBERS  
18 RELATIVE TO THE FUTURE, IT REALLY PUTS THINGS IN  
19 PERSPECTIVE. SO WHAT I WANT TO DO IS CONNECT THIS  
20 TRAJECTORY WITH THE SCENARIOS THAT HAVE BEEN  
21 CONSIDERED BY THE IPCC. SO THE HISTORICAL TREND  
22 DROPS DOWN TO JUST A LITTLE START-UP FOR A REALLY  
23 DRAMATIC SERIES OF TRAJECTORIES. AND A POINT THAT IS  
24 IMPORTANT TO RECOGNIZE IS THAT THE MOST RAPID GROWTH  
25 TRAJECTORY THAT WAS CONSIDERED BY THE IPCC IS THE ONE

0325

1 THAT IS SHOWN IN YELLOW ON THESE FIGURES, THE A2  
2 SCENARIO, WHICH IS KIND OF A NASTY WORLD, IT'S A  
3 WORLD OF RELATIVELY SLOW ECONOMIC GROWTH, NOT MUCH  
4 GLOBALIZATION, AND OF HEAVY EMPHASIS ON FOSSIL FUELS,  
5 BUT IT IS NOT THE MOST RAPID INCREASE THAT'S BEEN  
6 CONSIDERED.

7 WHAT I WOULD LIKE TO DO IS JUST POSITION  
8 THESE SCENARIOS WITH THE ACTUAL TRAJECTORY THAT WE  
9 HAVE SEEN SINCE ABOUT 1990, AND WE WILL FOCUS IN ON  
10 THAT. SO THIS IS THE HISTORICAL TREND SHOWN WITH TWO  
11 DIFFERENT DATA SETS MAINTAINED BY THE U.S. DEPARTMENT  
12 OF ENERGY AND CDIAC AND THE EIA; AND THEN THE  
13 TRAJECTORIES TAKING OFF FROM 2000 MOVING FORWARD, AND  
14 THE SCENARIOS WE'LL BE USING NOW WERE PUBLISHED IN  
15 2000, SO IT'S REASONABLE TO SAY THAT OVER A PERIOD OF  
16 A FEW YEARS, WHEN WE LOOK AT A WIDE RANGE OF  
17 POSSIBILITIES, WE WOULD AT LEAST HOPE THAT THE ACTUAL  
18 TRAJECTORY, THE WAY THAT WE'RE THINKING ABOUT FACING  
19 THE FUTURE STAYS WITHIN THOSE, AND HERE'S THE  
20 PATTERN.

21 ACTUAL EMISSIONS SINCE 2000 HAVE BEEN  
22 EITHER AT THE VERY TOP OF THE SCENARIO TRAJECTORY, OR  
23 IF THE EIA NUMBERS ARE RIGHT, EVEN HIGHER.

24                   LET ME EMPHASIZE AGAIN THAT THE MOST  
25 HIGH-IMPACT SCENARIO CONSIDERED BY THE IPCC IS THE  
0326

1   YELLOW ONE, THE ONE THAT IS IN THE MIDDLE OF THE  
2   PACK, SO THAT THE A1FI, THE FOSSIL INTENSIVE VERSION  
3   OF THE RAPID ECONOMIC GROWTH SCENARIO AT THE VERY TOP  
4   THERE, WASN'T EVEN CONSIDERED IN THE AR4. I'M GOING  
5   TO ADD THE 2006 DATA TO THIS FIGURE, AND YOU CAN SEE  
6   THAT IT'S CLEAR THAT WE BASICALLY ARE OPERATING IN  
7   UNKNOWN REAL ESTATE WITH RESPECT TO THE DIRECTIONS  
8   THAT CLIMATE CHANGE IS GOING.

9                   I WANT TO PULL THESE TWO THINGS TOGETHER AS  
10 I PASS THE CONVERSATION OFF TO PAUL. WHAT WE SEE IS  
11 THAT THERE ARE A WIDE RANGE OF IMPACTS THAT HAVE  
12 ALREADY OCCURRED; AND THAT BASICALLY WE'RE OPERATING  
13 NOW AT A LEVEL OF EMISSIONS AND A LEVEL OF EMISSIONS  
14 GROWTH THAT IS WELL OUTSIDE THE RANGE THAT HAS BEEN  
15 CONSIDERED BY THE IPCC. I THINK THESE TWO THINGS SET  
16 UP A SCENARIO THAT ISN'T JUST DISCOMFORTING, IT NEEDS  
17 TO BE A RALLYING CALL FOR ACTION.

18                   AND I'LL PASS IT TO MY COLLEAGUES HERE TO  
19 CHARACTERIZE HOW THE IMPACTS ARE SHAPING OUT, BUT I  
20 WANT PEOPLE TO THINK ABOUT THIS RAPID GROWTH AND THE  
21 PRESSURE WE'RE PUTTING ON THE CLIMATE SYSTEM IN THE  
22 CONTEXT OF THE IMPACTS THAT WE'RE GOING TO CONSIDER  
23 NOW.

24                   THANKS VERY MUCH.