

SLIDE 1 MY QUESTION TODAY IS, “SHOULD WE EXPAND THE CURRENT GLOBAL CLIMATE CHANGE PARADIGM?”

SLIDE 2 WHEN ALFRED WEGENER PROPOSED THE HYPOTHESIS OF CONTINENTAL DRIFT IT WAS DOGMATICALLY REJECTED. I TWICE DEBATED THE PRO SIDE OF CONTINENTAL DRIFT. I SIDED WITH WEGENER BASED ON EMPIRICAL EVIDENCE.

SLIDE 3 THIS SLIDE WAS USED WHEN I WAS IN CHARGE OF SHELL’S PLANNING, ECONOMICS AND FORECASTING FOR PRESENTATIONS ON THE COMING OIL CRISIS TO THE DEPARTMENTS OF INTERIOR, COMMERCE AND DEFENSE. WE ALSO GAVE TALKS FROM CALIFORNIA TO NEW YORK INCLUDING THE SENIOR MANAGEMENT OF GM, FORD, CHRYSLER AND AMERICAN MOTORS.

IN 1973 BEFORE, AND IN 1974, AFTER OUR FIRST OIL CRISIS, I DEBATED THE FRIENDS OF THE EARTH, THE SIERRA CLUB AND THE AUDUBON SOCIETY. OUR THEME AT THAT TIME WAS THAT THE U.S. MUST DEVELOP AN ENVIRONMENTALLY RESPONSIBLE NATIONAL ENERGY POLICY WHICH INCLUDED DEVELOPING OUR DOMESTIC ENERGY RESOURCES INCLUDING COAL, OIL, GAS, NUCLEAR AND ALTERNATIVE SOURCES LIKE SOLAR AND WIND. WE DEVELOPED A CONSERVATION SCENARIO. WE PUSHED VERY HARD TO GET THE RESEARCH STARTED TO EXPLOIT U.S. OIL SHALES. WE SHOWED HOW THE

COUNTRY WOULD EVENTUALLY GO BROKE IMPORTING OIL TO FILL THIS GAP. I AND MOST GEOLOGISTS ARE ENVIRONMENTALISTS. WE PRESENTED GOOD HISTORICAL DATA SUPPORTING OUR POINTS BUT OUR VOICES WERE OVERWHELMED BY THE VOICES OF IRRESPONSIBLE ENVIRONMENTALIST DOGMA.

SLIDE 4 AFTER THE 1986 CRASH THE MAJORS LEFT DENVER AND MOVED TO HOUSTON. THE DOGMA IN ALL THE MAJORS WAS TO GO OVERSEAS – AS THERE WERE NO BIG FIELDS LEFT IN THE ONSHORE USA. WE WERE CONVINCED THAT THE ROCKIES WERE UNDER EXPLORED AND UNDER EXPLOITED FOR GAS, AND THAT IS WHEN WE STARTED TPA.

I NATURALLY RESIST DOGMA. WHEN A HYPOTHESIS IS EITHER REJECTED OR SUPPORTED DOGMATICALLY WITHOUT PROOF IT TROUBLES ME.

SLIDE 5 THIS SLIDE SHOWS THE CLOSE RELATIONSHIP BETWEEN CO₂ AND TEMPERATURE OVER THE LAST FOUR GLACIAL TERMINATIONS. BUT IS THERE A CAUSAL RELATIONSHIP BETWEEN THE TWO?

SLIDE 6 THIS SLIDE SHOWS THE BEST ESTIMATES AND RANGES OF SIX MODELING SCENARIOS IN THE 2007 IPCC REPORT. TEMPERATURE INCREASES FOR THE NEXT 100 YEARS RANGE FROM 1.1° C TO 6.4° C. NOTE THE STRAIGHT LINE PROJECTIONS BY ALL MODELS BASED ON A DIRECT RELATIONSHIP WITH INCREASING CO₂.

SLIDE 7 THE UNITED STATES HAS A SOMEWHAT DIFFERENT TEMPERATURE HISTORY THEN THE GLOBAL HISTORY. NOTE 3 OF THE 10 HOTTEST YEARS IN THE LAST 100 YEARS ARE IN THE LAST 10 YEARS SHOWN IN PINK. SHOWN IN BLUE ARE 6 OF THE HOTTEST YEARS WHICH OCCURRED PRIOR TO 1955.

SLIDE 8 LET'S PUT THE LAST HUNDRED YEARS AND THE NEXT HUNDRED YEARS IN A LARGER CONTEXT. THIS IS DAVIS AND BOHLING'S CHART OF 20 YEAR AVERAGED TEMPERATURES FROM A GREENLAND ICE CORE PLOTTED FOR THE LAST 16,000 YEARS. IT SHOWS A SLIGHT COOLING TREND FOR THE LAST 10,000 YEARS – COLORED GREEN.

NOTE THAT THE DRAMATIC CYCLICITY STAYS WITHIN A WELL DEFINED BAND.

SLIDE 9 THIS SLIDE SHOWS THE SAME BAND AND I BELIEVE IT MAY REFLECT A SET OF NATURAL FORCES THAT ARE CONTROLLING TEMPERATURE IN THE CURRENT INTERGLACIAL PERIOD. COULD IT BE THAT INCREASED EVAPORATION OF WATER AS TEMPERATURES WARM CAUSES MORE GREENHOUSE GAS I.E. WATER VAPOR AND CLOUDS, WHICH IN TURN EVENTUALLY CAUSES AN ALBEIDO EFFECT THAT REFLECTS MORE HEAT CAUSING COOLING WHICH THEN RESULTS IN PRECIPITATION REDUCING

CLOUDS, AND INCREASING WARMING AND THE CYCLE REPEATS. OR COULD IT SIMPLY BE CYCLIC AMOUNTS OF EXTERNAL HEAT OR SOME COMBINATION.

SLIDE 10 THIS SLIDE SHOWS A COMPARISON OF THE DAVIS AND BOHLING DATA BACK TO 3,000 YEARS BEFORE 1980 AND A SIMILAR TIME PLOT FOR THE SARGASSO SEA. THERE ARE GROSS SIMILARITIES, IN PARTICULAR THE MEDIEVAL CLIMATE OPTIMUM AND THE LITTLE ICE AGE.

SLIDE 11 THIS COMPARISON OF THE SARGASSO SEA DATA WITH MANN ET AL.'S 1000 YEAR TEMPERATURE HISTORY IS STRIKINGLY DIFFERENT. THERE IS NO MEDIEVAL CLIMATE OPTIMUM AND ONLY A HINT OF THE LITTLE ICE AGE APPARENT ON MANN'S HOCKEY STICK GRAPH.

SLIDE 12 HERE IS SHOWN AN AVERAGE OF 18 SEPARATE STUDIES ASSEMBLED FROM ALL OVER THE WORLD, BOTH NORTHERN AND SOUTHERN HEMISPHERES, DEMONSTRATING A SIMILARLY PRONOUNCED MEDIEVAL CLIMATE OPTIMUM AND LITTLE ICE AGE.

SLIDE 13 ONE AUTHOR'S 2007 REVIEW OF THE LITERATURE IS SHOWN HERE. OF 23 QUANTITATIVE PAPERS, 3 FOUND THE MEDIEVAL WARMING PERIOD COOLER BY UP TO 1° C AND 20 FOUND IT WARMER THAN CURRENT TEMPERATURES BY UP TO 4.0° C. LISTING QUALITATIVE REPORTS, SUCH AS GRAIN GROWN IN GREENLAND, IT WAS 28 REPORTS OF A HIGHER TEMPERATURE

DURING THE MEDIEVAL WARM PERIOD VERSUS 2 REPORTS OF A LESS WARM
MEDIEVAL WARM PERIOD.

SLIDE 14 I HAVE IMPLIED THAT THE DIRECT RELATIONSHIP BETWEEN CO₂
AND TEMPERATURE MAY NOT BE CLEAR CUT. SINCE THE ABNORMALLY WARM
1998 EL NINO YEAR, GLOBAL TEMPERATURES HAVE PLATEAUED AND ARE
CURRENTLY DROPPING.

THIS SLIDE SHOWS GLOBAL TEMPERATURES FROM THE HADLEY
CLIMATE RESEARCH UNIT. SINCE 1976, THE MATHEMATICAL TREND LINE IS
0.01656 OR APPROXIMATELY 1.7°C IF PROJECTED OVER 100 YEARS.

SLIDE 15 FROM THE LOW POINT AT 1976 TO TODAY, INCLUDING THE HIGH
POINT OF 1998, THE ANNUAL TEMPERATURE LOOKS LIKE THIS. DATA FROM 2008
ARE AN AVERAGE OF ONLY THE FIRST 5 MONTHS AND WILL CHANGE SOME.

SLIDE 16 HERE IS THE GLOBAL MONTHLY CHART FOR THE HIGH POINT AT
1998 THROUGH MAY OF 2008. NOTE THE DRAMATIC FALL IN TEMPERATURES
FROM JANUARY 2007 TO JANUARY 2008.

SLIDE 17 THESE DATA ARE NOT UNIQUE. THE ANNUAL FALL IN GISS DATA IN
2007 WAS 0.75°C AS SHOWN HERE WITH THE HADLEY DATA.

SLIDE 18 THE FALL IN UNIVERSITY OF ALABAMA DATA WAS 0.588°C AND THE FALL IN RSS DATA WAS 0.629°C. AVERAGING THESE RESULTS GIVES A ONE-YEAR DROP OF 0.641°C – ABOUT THE SAME AS THE INCREASE IN THE LAST 100 YEARS.

SLIDE 19 BUT DOES THIS SLIGHT DOWNTURN REALLY PORTEND COOLER TEMPERATURES? POSSIBLY NOT. THIS IS THE HOYT AND SCHATTEN DATA MODIFIED BY BOB RAYNOLDS IN 2007. IT SHOWS A CLEAR SEPARATION BETWEEN SOLAR IRRADIANCE IN RED AND TEMPERATURE IN BLACK. BOTH IN THE LATE 1800'S – HERE, AND IN THE LATE 1900'S – HERE.

SLIDE 20 THIS SLIDE SHOWS THE MASSIVE CIRCULATION CURRENT OF HOT PLASMA BETWEEN THE CORE AND THE EXTREMITY. THE CONVEYOR BELTS TAKE APPROXIMATELY 40 YEARS TO COMPLETE A CIRCUIT AND MOVE DIAGONALLY. THEY MOVED AT ABOUT 1 METER PER SECOND FOR MUCH OF THE 20TH CENTURY. HOWEVER, THEY HAVE BEEN SLOWING IN RECENT YEARS – THERE QUARTERS TO ONE THIRD METER PER SECOND. THE SLOWER BELT MAY FORETELL LOWER SOLAR ACTIVITY.

SLIDE 21 TO GIVE YOU A FEELING FOR SCALE, THIS SLIDE SHOWS A SUNSPOT CLUSTER THAT IS WIDER THAN JUPITER WHICH HAS A DIAMETER OF ELEVEN TIMES THAT OF EARTH.

SLIDE 22 THIS SLIDE COMPARES A SOLAR MAXIMUM TO A SOLAR MINIMUM. MORE IMPORTANTLY, ALONG WITH INCREASED SUNSPOT ACTIVITY INCREASES OCCUR IN SOLAR FLARES, SOLAR FACULAE, MAGNETIC FLUX AND THE SOLAR WIND. SUNSPOT STRENGTH IS RELATED TO MAGNETIC FIELD STRENGTH SHOWN ON THIS GRAPH WHICH HAS BEEN DECREASING SINCE 1990.

SLIDE 23 THIS SLIDE SHOWS A COMPARISON OF TEMPERATURE (UPPER CURVE) AND SOLAR IRRADIANCE (LOWER CURVE). NOTE THE LOWER TEMPERATURE DURING THE MAUNDER MINIMUM OF THE LITTLE ICE AGE WHERE THERE WERE VIRTUALLY NO SUN SPOTS. THIS WAS WHEN THE THAMES FROZE OVER.

SLIDE 24

- SUN SPOT CYCLES AVERAGE 10.7 YEARS
- CYCLE 23 IS JUST ENDING AND PEAKED AT 120.9 WOLF NUMBER
- NEW CYCLE SUNSPOTS (SUCH AS 24) START BEFORE OLD CYCLE SUNSPOTS (SUCH AS 23) END.
- SOLAR CYCLE 23 APPEARS TO BE HEADED TOWARD A 13 YEAR LONG CYCLE WHICH HAS HISTORICALLY PRECEDED A LOWER TEMPERATURE CYCLE.

THIS SOLAR IMAGE WAS TAKEN JUST TWO WEEKS AGO WITH AN ABSENCE OF SUN SPOTS.

SLIDE 25 THIS SLIDE SHOWS THE SUNSPOT CYCLE INTENSITY AND A PREDICTION BASED IN PART ON THE VELOCITY OF SUNSPOT MOVEMENT DISCUSSED EARLIER. DAVID HATHAWAY AT NASA HAS PREDICTED THAT CYCLES 24 AND 25 WILL LOOK AS SHOWN. THEY PREDICT CYCLE 25 IS GOING TO BE CONSIDERABLY LOWER, AND THE PROJECTED TREND SINCE 1990 WILL BE DOWNWARD.

SLIDE 26 THIS SLIDE FROM ABDUSAMATOV PUBLISHED IN SOLAR PHYSICS IN 2007 DESCRIBES RECENT RUSSIAN RESEARCH SHOWING THAT THE DURATION OF SUNSPOT CYCLES DEPENDS ON THE SECULAR CYCLE PHASE. THEY ALSO FOUND THAT THE LONG-TERM CYCLIC VARIATIONS OF THE SOLAR ACTIVITY, RADIUS AND SOLAR CONSTANT ARE CAUSED BY SOME COMMON PROCESSES WHICH OCCUR DEEP IN THE SUN AND ARE CORRELATED IN BOTH PHASE AND AMPLITUDE. THEY HAVE BUILT THEIR DATA AND PROJECTIONS BASED ON CYCLES 10 THROUGH 23. ACCORDING TO ABDUSAMATOV THE SOLAR ACTIVITY, SOLAR RADIUS AND RADIATION FLUX CAN BE USED TO PREDICT MORE ACCURATELY THE HEIGHTS OF THE PEAKS OF SUCCESSIVE CYCLES. HIS PROJECTIONS INDICATE A DRAMATIC DECLINE IN SOLAR ACTIVITY THAT STARTED IN ABOUT 2000. HE ALSO PREDICTS AN EXTENDED GRAND MINIMUM STARTING ABOUT 2040, AND EXTENDING FOR 45 TO 60 YEARS.

SLIDE 27 BUT IT'S NOT JUST SUNSPOTS. THE INTERPLANETARY MAGNETIC FIELD STRENGTH IS SHOWN WITH CYCLES 20, 21, 22 AND 23. NOTE IT IS ALREADY BELOW CYCLE 20 FROM THE LATE '60'S AND EARLY '70'S WHEN CLIMATE SCIENTISTS PREDICTED ANOTHER ICE AGE WAS COMING.

SLIDE 28 MCCRACKEN HAS SHOWN THAT THE HELIO-MAGNETIC FIELD HAS STEADILY INCREASED SINCE 1400 AND THAT THE LONG-TERM MAGNETIC FLUX OF THE SUN HAS INCREASED. THIS CORRELATES WELL WITH THE GENERAL INCREASE IN TEMPERATURE SINCE THE 1400'S.

SLIDE 29 ANOTHER INDICATOR OF A POSSIBLE DECLINE IN TEMPERATURE IS CHANGES IN THE SUN'S ORBITAL ROTARY FORCE. LANDSCHEIDT SHOWS HERE A COMPARISON OVER A 1300-YEAR PERIOD. NEWTON SHOWED 300 YEARS AGO THAT THE SUN'S ORBITAL ROTARY FORCE COULD BE CALCULATED VERY ACCURATELY PAST, PRESENT AND FUTURE. NOTE THE STRENGTH OF CYCLES IN 2030 AND 2200 WHICH EACH HAVE THREE EXCURSIONS BELOW AN EMPIRICAL LINE, WHILE THE MAUNDER AND SPOERER MINIMUMS OF THE LITTLE ICE AGE ONLY HAVE TWO.

SLIDE 30 THIS SLIDE SHOWS A SUMMARY OF SOME RUSSIAN RESEARCH ON SALMON CATCHES WHICH ARE DIRECTLY RELATED TO THE TEMPERATURE OF THE NORTH PACIFIC SURFACE WATERS. THEY ARE USING THESE PREDICTIONS COMMERCIALY.

SLIDE 31 KEN SCHATTEN FROM STANFORD RECENTLY SAID, REFERRING TO SOME LONG RANGE PROJECTIONS: “THE SURPRISING RESULT OF THESE LONG-RANGE PREDICTIONS IS A RAPID DECLINE IN SOLAR ACTIVITY, STARTING WITH CYCLE #24. IF THIS TREND CONTINUES, WE MAY SEE THE SUN HEADING TOWARDS A “MAUNDER” TYPE OF SOLAR ACTIVITY MINIMUM – AN EXTENSIVE PERIOD OF REDUCED LEVELS OF SOLAR ACTIVITY.”

SLIDE 32 I SUBMIT THAT WE DON’T KNOW ENOUGH ABOUT THE INTERACTION OF THE SUN, COSMIC RAYS AND CLOUDS. MUCH MORE RESEARCH NEEDS TO BE DONE ON THESE RELATIONSHIPS BEFORE WE CAN FORECAST FUTURE CLIMATES WITH CONFIDENCE. THERE ARE STILL UNCERTAINTIES ABOUT WHETHER CLOUDS CAUSE INCREASING OR DECREASING TEMPERATURE. COSMIC RAYS MAY BE THE SMOKING GUN BECAUSE THEY INFLUENCE CLOUD FORMATION AND CLEARLY THE SUN IS VERY IMPORTANT, QUITE POSSIBLY IN WAYS WE ARE NOT YET ABLE TO MEASURE OR PREDICT.

SO MY APPEAL TODAY IS “LETS NOT RUSH TO JUDGMENT ON WHAT CAUSES TEMPERATURE TO GO UP OR TO GO DOWN. WE NEED TO START PLANNING FOR A VARIABLE CLIMATE IN THE COMING DECADES – ONE WHICH COULD BE HOTTER BUT ALSO ONE WHICH COULD VERY WELL BE MUCH COLDER.”

