

[Submitted for an October 31, 2014 publication date, for Horizons, while we search for a new Horizons Editor. We intend to finish this one-or-two-page document by October 15, 2014.]  
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[While waiting for an AIAA Houston Section Editor to be found for the AIAA year starting July 1, 2014, we plan to prepare about one page of inputs every two months starting August 31, 2014, to be prepared as if a bimonthly deadline existed. We plan to prepare this first article by August 15, 2014. We will use this simple Word format and create a simple PDF document for ease of emailing and reading. Our purpose is to encourage new Editor candidates by letting them know that we are eager to submit our writing for Horizons. The two of us can also encourage others to submit French-American space articles to our new Horizons Editor, in the spirit of our French-American sister section relationship.]

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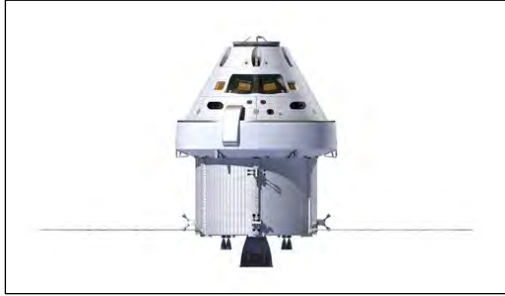
[European Space Agency (ESA) website [article](#), 23 May 2014]

### **European Orion Milestone Leads to Detailed Design**

ESA is a step closer to building the future of human spaceflight and exploration in Europe by completing the preliminary design review of Europe's Service Module for NASA's Orion vehicle to send astronauts beyond low orbit.

Europe is contributing the Service Module and expertise to the Orion multipurpose crew vehicle with flight-proven technology used on ESA's series of Automated Transfer Vehicle supply spacecraft.





### **Model service module**

Orion consists of a crew capsule with the European module providing power, thermal control, consumables and propulsion to the vehicle.

The cooperation highlights the major involvement of ESA, NASA and European industry on this important project, based on a long-standing partnership of the agencies across many areas of human and robotic spaceflight.

A Preliminary Design Review is one of a series of checkpoints in complex engineering projects. Having passed this review, the next step is to start the detailed design and procuring the subsystems.

As the review process continues, the spacecraft design will be assessed again to ensure the safety and reliability of the overall system and its compliance with Orion requirements.

The teams developing the Service Module reviewed the documentation in April and May before meeting for a week in Bremen, Germany. Reviewers from ESA, NASA and the US prime contractor Lockheed Martin evaluated documents delivered by Airbus Defence & Space and European contractors.

The Preliminary Design Review concluded with a formal board on 15 May that provided the go-ahead for the next phase.

The next major review milestone is the Critical Design Review at the end of 2015, aiming for Orion's uncrewed first flight with Europe's Service Module in 2017.

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### **Climate Change: Past the Tipping Point for West Antarctica Glaciers, a NASA/JPL Report Using European Space Agency (ESA) Data**

[Douglas Yazell, October 31, 2014]

Searching the internet for climate change and European Space Agency (ESA), I found public domain reports about this news from May of 2014. We all heard this news, of course, but we can reproduce it here thanks to public domain sources such as the Climate Change Network, NASA, and ESA. We respectfully keep copyrights and credits in mind.

I started with this [article](#) from the Climate Change Network (CCN). They use Creative Commons and they explain that, "You are free to copy, reproduce and build upon this work." The CCN article's title is, "No way back for West Antarctic Glaciers." This article by Tim Radford mentions the ESA data in the fifth paragraph. Here are the first five paragraphs from the CCN article:

#### **Satellite data analysis reveals the ominous news that the melting glaciers of West Antarctica have passed the 'point of no return' as the southern hemisphere gets warmer**

*LONDON, 22 May* – The glaciers of the West Antarctic may be in irreversible retreat, according to the evidence of satellite data analysed by scientists at the US space agency [Nasa](#).

The study of 19 years of data, due to be reported in the journal [Geophysical Research Letters](#), confirms the ominous news that the southern hemisphere is not just

warming – it is that it is warming in a way that speeds up the melting of the West Antarctic glaciers.

Long ago, glaciologists began to wonder whether the [West Antarctic ice sheet](#) was inherently unstable. The water locked in the ice sheet in the Amundsen Sea region – the area the Nasa researchers examined – is enough to raise global sea levels by more than a metre. If the whole West Antarctic ice sheet turned to water, sea levels would rise by at least five metres.

#### Steady change

What the latest research has revealed is a steady change in the glacial grounding line, which is the point in a glacier's progress towards the sea where its bottom no longer scrapes on rock but starts to float on water. It is in the nature of a glacier to flow towards the sea, and at intervals to calve an iceberg that will then float away and melt. The puzzle for scientists has been to work out whether this process has begun to accelerate.

Eric Rignot, a glaciologist at the [Nasa Jet Propulsion Laboratory](#) and the [University of California, Irvine](#), thinks it has. He and his research partners believe that [European Space Agency](#) satellite data has recorded the points at which the grounding lines can be identified in a series of West Antarctic glaciers monitored between 1992 and 2011, as the glaciers flexed in response to the movement of tides.

That ESA link leads to a nice ESA image (below) that shows the part of Antarctica we are talking about, along the western shore, describing data from ESA's Cryosat:



Above: **Title** Antarctica's ice loss, **Released** 19/05/2014 10:44 am, **Copyright** CPOM/Leeds/ESA, **Description** Three years of measurements from CryoSat show that the Antarctic Ice Sheet is now losing 159 billion tonnes of ice each year, enough to raise global sea levels by 0.45 mm per year. **Id** 311302.

That led me to conduct another internet search, leading to the related NASA/JPL [article](#) dated May 12, 2014, "West Antarctic Glacier Loss Appears Unstoppable."

I recall from the NASA climate website FAQ that NASA does not promote a particular climate policy. I rely on the IPCC (<http://ipcc.ch>, working with UNEP and WMO since 1988) to summarize the science well, but the IPCC uses diplomatic language accepted by all of more than 100 signatory nations.

For a summary from a group of experts that engages in both science and public policy, I turn to the American Geophysical Union (AGU, <http://agu.org>), keeping in mind that all of Earth is affected by climate change, not just the USA. I conclude that most of their members work in the fossil fuel industry (oil, coal, and natural gas), so I am wary of their climate change position statement.

But the AGU [position statement](#) is excellent. It was revised and reaffirmed for the third time in August of 2013. Its title is, "Human-induced climate change requires urgent action." It was first issued in December of 2003. Its length is only two pages. I conclude that urgent action is required of

all people, organizations, and governments. Planet Earth will survive easily, but life and civilization are in danger of tremendous upsets.

AIAA engages in atmospheric science, as shown in the names of its technical groups and technical committees, so I continue to suggest that AIAA publish a climate change position statement.

The NASA/JPL article starts with an image (below) of the Thwaites Glacier in West Antarctica (image credit: NASA). It is a good reminder of the natural beauty of the area:

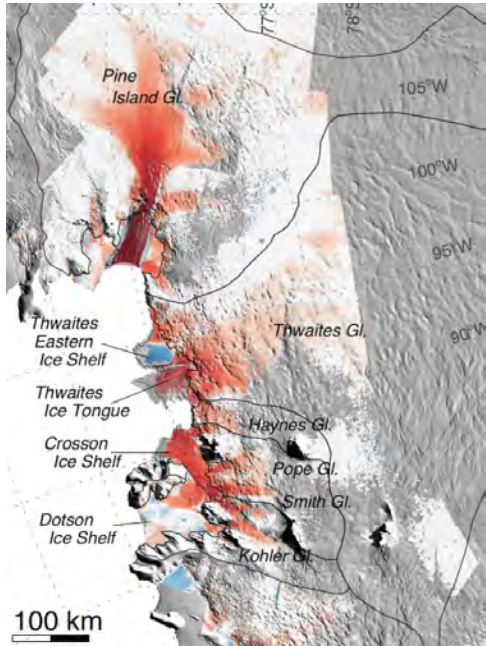


The NASA/JPL article contains this [link](#) to a page of multimedia. Below is a map showing the area under discussion, noted by the arrow next to the label, “Amundsen Sea sector:”



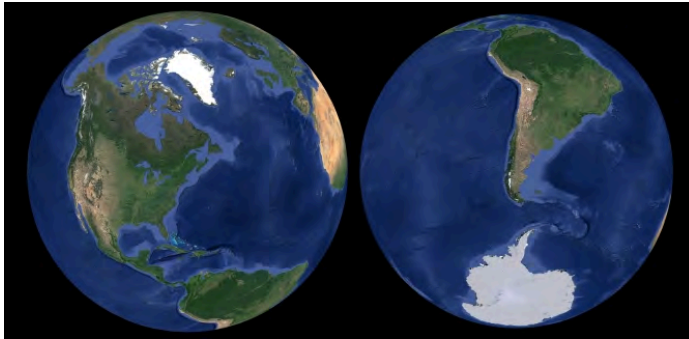
The NASA/JPL multimedia for this article contains an animation showing a glacier grounding line, a very helpful animation about that aspect of this tragic story of inevitable worldwide sea level rise. Another video there contains a link to that same video on YouTube (thanks to NASA/JPL), narrated by Eric Rignot of NASA/JPL. It is a very good video, with a duration of only 2 minutes and 21 seconds.

Below is a NASA image from that page showing more details about the glaciers under discussion:



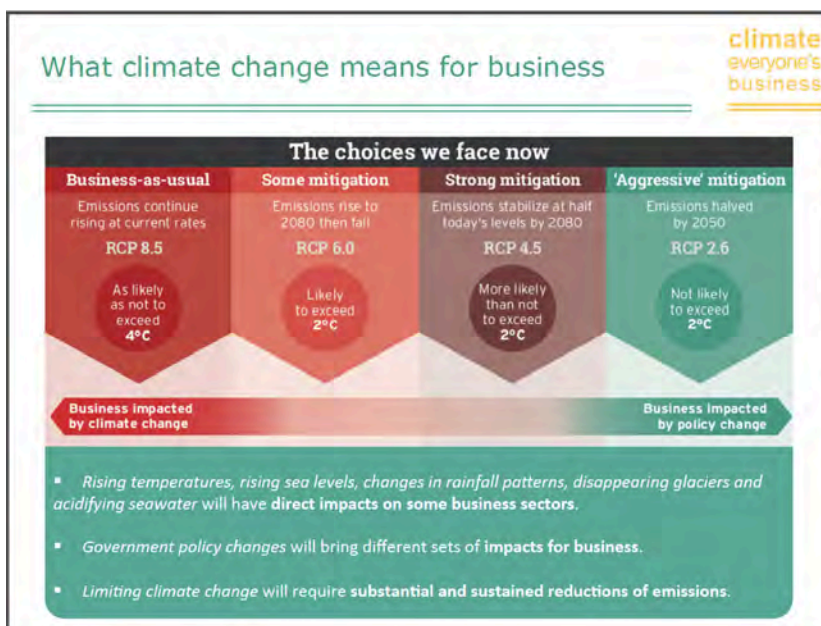
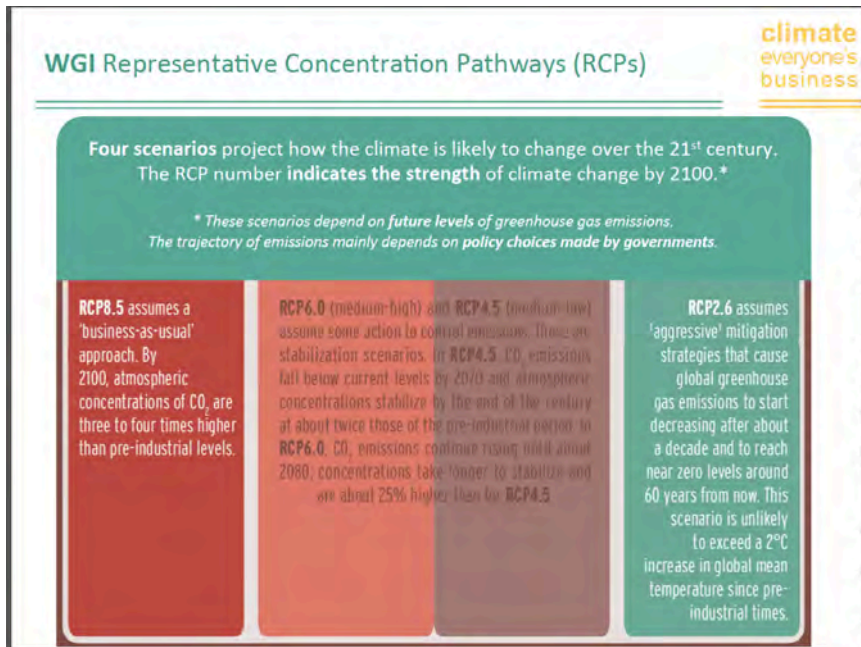
*Above: The glaciers studied by Rignot's research team. Red indicates areas where flow speeds have increased over the past 40 years. The darker the color, the greater the increase. The increases in flow speeds extend hundreds of miles inland. Image credit: Eric Rignot.*

One last image is included below from that NASA/JPL article, since it is a good reminder of these areas on our blue marble Earth:



*Above: Greenland and Antarctic ice sheets. Image credit: NASA.*

The following two images from the IPCC define RCP (Representative Concentration Pathway) and define four options for humanity; business as usual, weak mitigation, strong mitigation, or aggressive mitigation. The last choice on that list, aggressive mitigation, is the only reasonable choice, even though the USA has institutionalized delay for decades, since about 1989.



In the second image above, we note that we can choose to have business impacted by climate change or policy change. The only reasonable choice is policy change.

A democratic nation requires popular understanding of complex subjects. Climate change supercharges most other subjects, and a healthy world requires popular understanding.

Some groups can fool some of the people all of the time, and all of the people some of the time, but they cannot fool all of the people all of the time. Life and civilization cannot afford a world where we fool ourselves about climate change.

Movement Conservatives, employees and leaders of the fossil fuel corporations (oil, coal, and natural gas), and the religious right say (many of them say) Earth is not warming, or the warming is not human-induced, or humanity can just adapt to the warming. Since the Concorde wars (the SuperSonic Transport, the SST), SDI wars (Star Wars), the lead wars, the asbestos wars, the acid rain wars, the ozone hole wars, the tobacco wars, and now the climate change wars, Movement Conservatives fought the science and often won.

Human-induced climate change requires urgent action. That is settled knowledge, as settled as science ever can be. That is as settled as the age of the Earth and the role of evolution on life, including human life. The many lines of evidence in physics, chemistry and biology add up to this result that will not be overturned.

The right is correct. The Right is right. They are not right about the science, but about the effects of climate change solutions on the ideology of Movement Conservatives. Public policy requires government action as a big part of the solution to climate change. Movement Conservatives are wrong to equate government activism with socialism, and Movement Conservatives are wrong to equate government regulation with socialism. No one is happy about the urgent action required by human-induced climate change, not the left, nor the liberals, nor the progressives.

Do the Math is a new campaign from 350.org and their leader Bill McKibben. Their board of directors includes author Naomi Klein. Do the Math focuses on just three numbers.

The first number is 2 degrees Celsius. Nations agreed in Copenhagen in 2009 to 2 degrees Celsius (3.6 degrees Fahrenheit) above pre-industrial data as a limit to global average surface temperature.

The second number is 565 gigatons. We can now add no more than 565 gigatons (565 billion tons) of carbon dioxide to the atmosphere while respecting that limit of 2 degrees Celsius.

The third number is 2,795 gigatons. The fossil fuel corporations paid for their reserves already, but using those reserves would emit 2,795 gigatons of carbon dioxide. That is the result from a recent study from the United Kingdom. That is about 5 times the second number, about 5 times the amount of carbon dioxide we can emit into the atmosphere before we reach that limit of 2 degrees Celsius.

The greenhouse gas effect of carbon dioxide in our atmosphere means that we can tolerate using only one fifth of the reserves of the fossil fuel corporations, so four fifths (80%) of those reserves must never be extracted. The fossil fuel companies will not volunteer to follow that rule, so public policy is the only option.

This changes everything!

A few recommended books and resources are noted at the end of this article.

Mainstream news must stop giving equal time to the Flat Earth Society. American Movement Conservative news often passes for mainstream news, so boycotting their sponsors seems like a good tactic for informed citizens.

We cannot leave climate change action for the environmentalists. We can no longer look away. We need climate change on our radar. We must get off the fence about climate change. Our American institutionalized delay set us back by decades, but we can heal our heritage and provide a national example of aggressive greenhouse gas mitigation in our climate change public policy.

Climate change was not on my radar until late 2011, despite my viewing of Al Gore's Academy-Award-winning (Oscar-winning) 2006 documentary movie, *An Inconvenient Truth*, and despite the award of the 2007 Nobel Peace Prize to both Al Gore and the IPCC. I was on the fence about climate change until late 2012 when a televised episode of PBS *Frontline* ended my confusion. I quickly learned to trust the NASA climate website and the IPCC website. Now I know I can trust the AGU climate change position statement, too.

Actions have consequences. Our delaying and looking away from climate change can be overcome, but delay is costly.

We cannot see the age of the Earth when we step outside to start another beautiful day. We cannot see the role of evolution on life by stepping outside our home in the morning. Even Pope Francis trusts the settled knowledge about evolution and the Big Bang. We cannot see climate change by looking out our window.

Most science results are not visible at a glance. Scientists work only on the difficult subjects. They establish settled knowledge, then continue to investigate uncertainties. The uncertainties then become second-order effects, affecting numerical results in the second place after the decimal, not the first.

Sometimes the trouble with Americans is we did not read the summary of the previous meeting.

### Resources and References

- Join 350.org. <http://350.org>.
- Join the Climate Action Network. They work closely with the IPCC.
- Read the 2014 book by Naomi Klein, *This Changes Everything, Capitalism vs. the Climate*.
- Read the 2010 book *Merchants of Doubt* by Naomi Oreskes and Eric M. Conway (the NASA JPL historian). The SST (Concorde), SDI, nuclear winter, asbestos, acid rain, ozone, tobacco (including secondhand), climate change, etc.
- Read *To Make Men Free, a History of the Republican Party*, the 2014 book by Heather Cox Richardson. Movement Conservatives. William F. Buckley and his magazine the *National Review* (edited by his brother-in-law L. Brent Bozell). The magazine did not sell well enough to survive until 1957 when 9 students integrated a high school in Little Rock, Arkansas. The governor sent in state troops to keep them out. President Eisenhower sent in federal troops to oppose the governor. The magazine sold well enough to survive. For the grassroots movement, the John Birch Society started its work in late 1958 and remained mainstream, embraced by the Republican Party, until 1961.
- Read *Dog Whistle Politics*, the 2014 book by Ian Haney López. The book mentions climate change once and global warming once.
- Read *Wrapped in the Flag*, the 2014 book by Claire Conner. Her parents were leaders in the John Birch Society. She no longer embraces that movement.
- Read Salon.com. They cover climate change very well. They also serve as a Movement Conservative Watch blog so that we need not read or watch Movement Conservative news media.
- Listen to and watch Pacifica public radio's *Democracy Now!* NPR and PBS are good but sometimes not great in covering climate change, but this program, hosted by Amy Goodman and others, never gave equal time to the Flat Earth Society.
- Read Robert Brulle's December 2013 paper whose title includes the words, "Institutionalized Delay." (Search the internet for the press release titled, "Not Just the Koch Brothers.")

### Acronyms

AIAA: The American Institute of Aeronautics and Astronautics

IPCC: Intergovernmental Panel on Climate Change

JPL: Jet Propulsion Laboratory

NASA: National Aeronautics and Space Administration

NPR: National Public Radio

PBS: Public Broadcasting Service (in the USA)

SDI: Strategic Defense Initiative

UNEP: United Nations Environmental Program

USA: The United States of America (not United Space Alliance in this case)

WMO: World Meteorological Society