National Aeronautics and Space Administration

SALINITY & THE WATER CYCL

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Data from Aquarius will allow scientists to see how freshwater moves between the ocean and the atmosphere as a result of processes like rainfall, evaporation, ice melt, and river runoft. These data will improve global "water cycle budget" estimates over the ocean, where the majority of global precipitation and evaporation occurs. Accurate data will also be used to improve computer models to better resolve how climate, ocean circulation, and the water cycle are connected, and thereby improve climate prediction.





OCEAN CIRCULATION

SALINITY &

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Surface salinity data from Aquariu will give scientists a key to bette understanding how ocean circulat is tied to global climate.

Ocean circulation is driven by surface winds as well as by changes in seawate density, which is determined by salinity temperature. Salinity variations of surfa waters in the far North Atlantic can influe the strength of the deep circulation.

AQUARIUS Sea Surface Salinity from Space

Aquarius is a new Earth orbiting mission sponsored by NASA's Earth System Science Pathlinder (ESSP) Program. After launch in 2011, Aquarius will employ advanced technologies to make NASA's first space-based measurements of ocean salinity across the globe—an important observation for ocean and climate studies. Aquarius will detect changes in ocean salinity as small as the equivalent of a "pinch" (about 1/8 teaspoon) of salt in a gallon of water, or about 0.2 grams salt per kilogram of water. This mission is a collaborative effort with the Argentina space agency CONAE. NASA supplies the primary instrument (Aquarius) and the launch vehicle. CONAE supplies the spacecraft (SAC-D) and the ground systems. This join a the segurated Aquarius/SAC-D.

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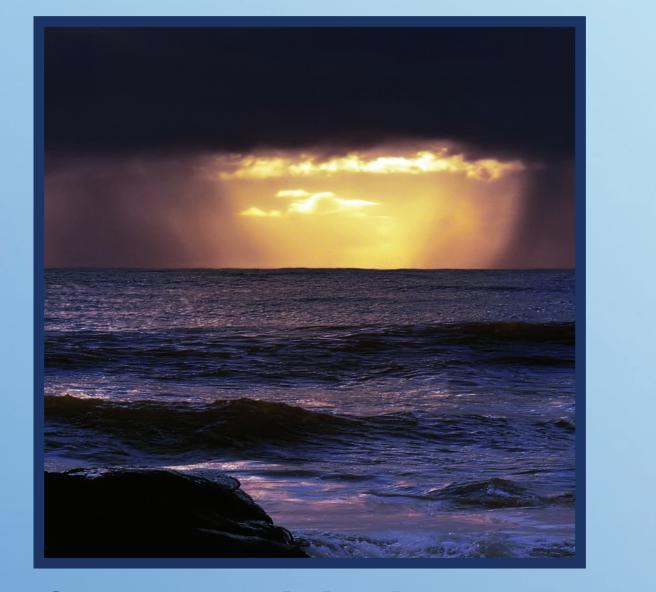




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Schematic visualizations of circulation in the North Atlantic, South Atlantic, and Indian Ocean basins. White arrows depict wind-driven surface currents. Blue arrows depict densitydriven deep currents.

SALINITY DECREASES WITH:



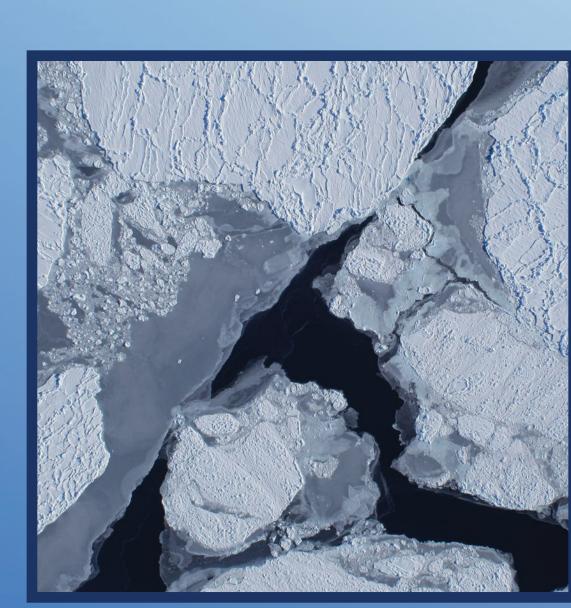


Ocean Precipitation

Melting Glaciers, Icebergs

SALINITY INCREASES WITH:



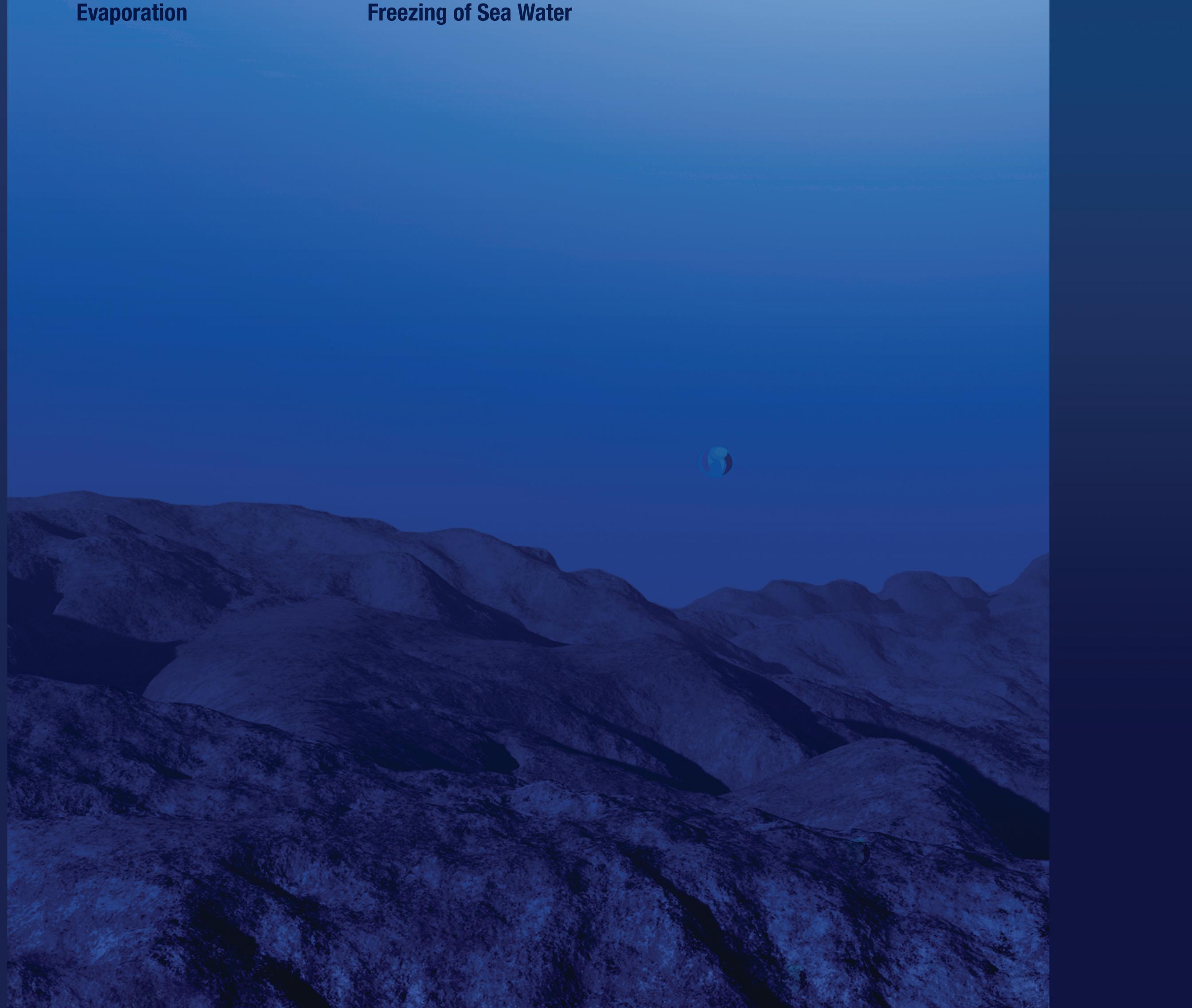


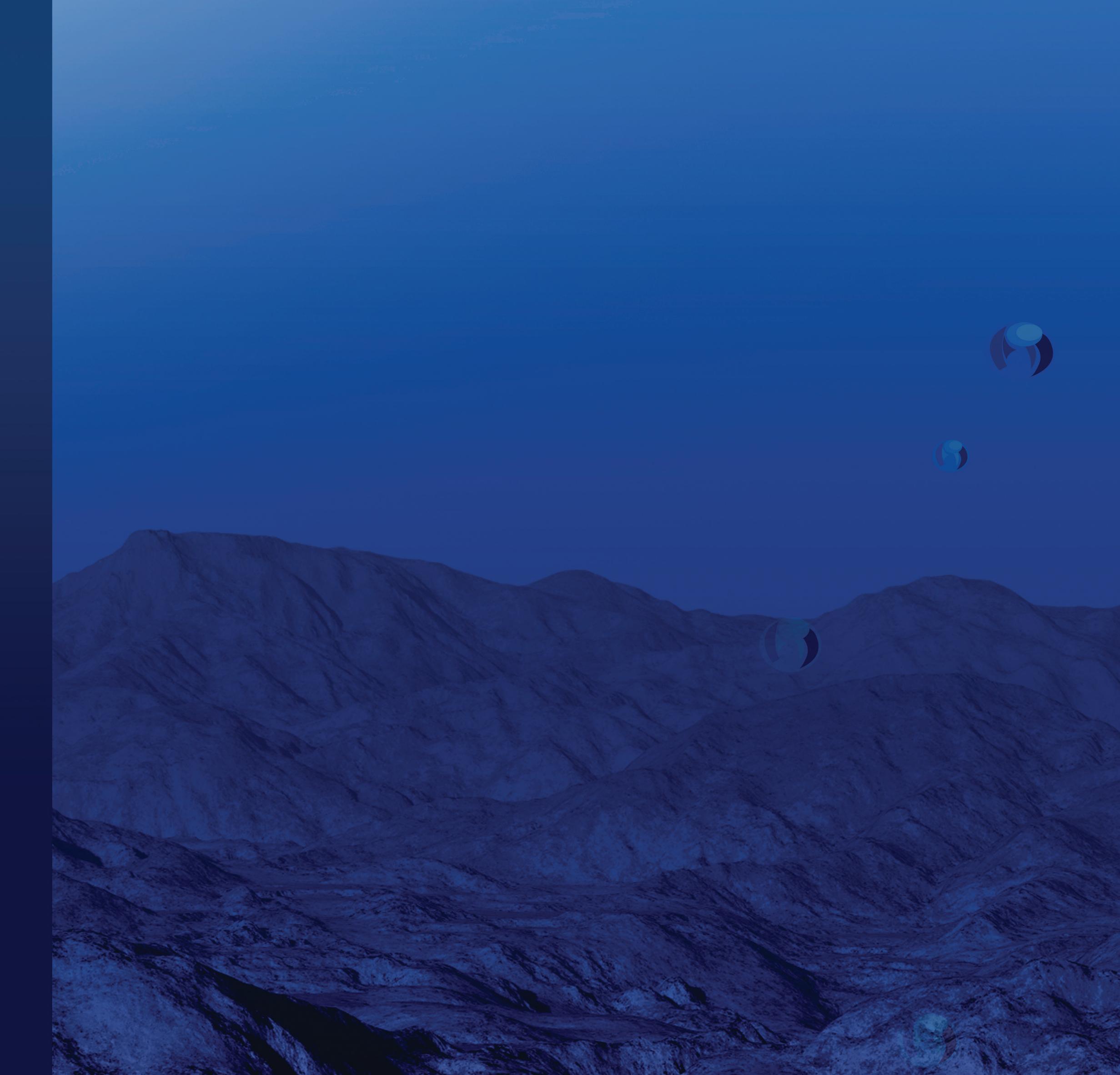


Freshwater Input

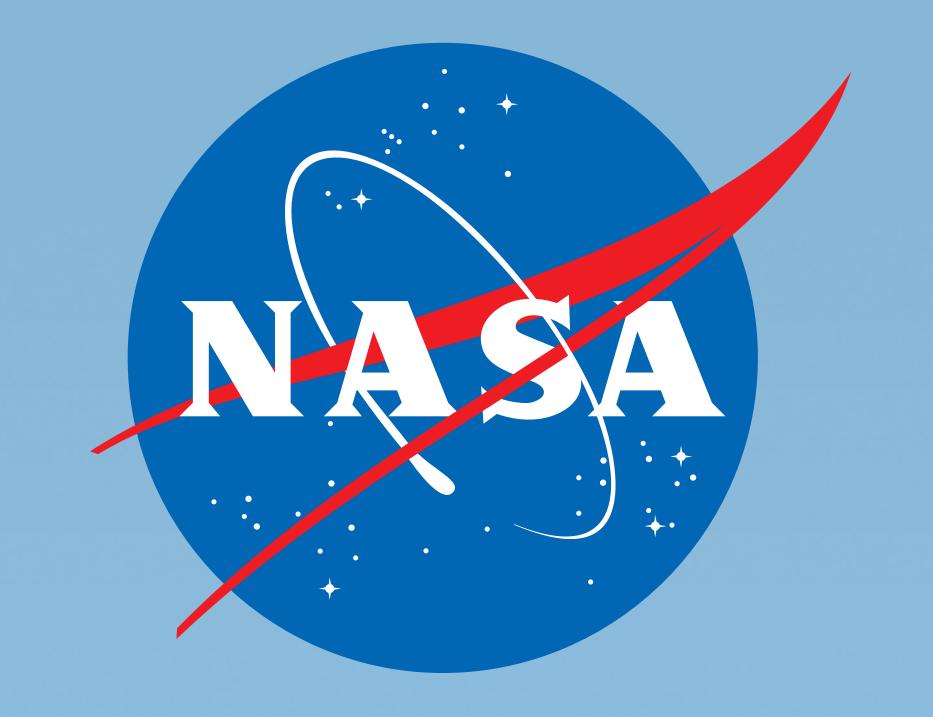
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MEASURENENTS

ROSA

TDP

CARMEN-1

Aquarius observation will contribute significantly to improving computer models that are used to forecast future climate conditions. With this new data stream, scientists can begin to understand the correlation of changes in salinity with changes in the water cycle, ocean circulation and climate.

Aquarius will measure sea surface salinity by observing the natural thermal emission from the ocean surface with an instrument called a "radio-meter." At frequencies near those used

Aquarius

Instrument

NIRST

HSC⁻

DCS

MWR

in microwave ovens, the level of emitted signal depends on the salinity of the ocean water, in addition to temperature. This emission, which is measured as an equivalent "brightness" temperature in degrees Kelvin, has a direct correlation to surface salinity. Other things being equal, salty water appears cooler than freshwater.

In addition to Aquarius, the observatory includes 7 SAC-D instruments. CONAE has developed the Microwave Radiometer (MWR), High Sensitivity Camera (HSC), Technology Demonstration Package (TDP) and Data Collection System (DCS). The Radio Occultation Sounder for Atmosphere (ROSA) was supplied by the Italian Space Agency, ASI. The French Space Agency, CNES, has provided CARMEN-1. The New Infrared Sensor Technology (NIRST) is a collaborative product between CONAE and the Canadian Space Agency, CSA.

