Moons of Jupiter
Grades 4-5-6-7-8-9

National Science Education Standards

SCIENCE AS INQUIRY STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Abilities necessary to do scientific inquiry	Abilities necessary to do scientific inquiry	Abilities necessary to do scientific inquiry
Understanding about scientific inquiry	Understanding about scientific inquiry	Understanding about scientific inquiry

PHYSICAL SCIENCE STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Properties of objects and materials	Properties and changes of properties in matter	Structure and properties of matter
Position and motion of objects	Motion and forces	Motions and forces
		Interactions of energy and matter

LIFE SCIENCE STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Organisms and environments	Populations and ecosystems	Interdependence of organisms

EARTH AND SPACE SCIENCE STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Objects in the sky	Earth in the solar system	Origin and evolution of the earth system
Changes in earth and sky		

SCIENCE AND TECHNOLOGY STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Abilities to distinguish between natural objects ad objects made by humans	Abilities of technological design	Abilities of technological design
Abilities of technological design	Understanding about science and technology	Understanding about science and technology
Understanding about science and technology		

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Science and technology in local challenges	Science and technology in society	Science and technology in local, national, and global challenges

HISTORY AND NATURE OF SCIENCE STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Science as a human endeavor	Science as a human endeavor	Science as a human endeavor
	Nature of science	Nature of scientific knowledge
	History of science	Historical perspectives

Texas Essential Knowledge and Skills

Grade 4 Science

(a) Introduction.

(1) In Grade 4, the study of science includes planning and implementing laboratory investigations and fieldwork using scientific methods, analyzing information, making informed decisions, and using tools such as compasses and computers to collect and organize information.

(2) As students learn science skills, they identify components and processes of the natural world including properties of soil, effects of the oceans on land, and the role of the sun as our major source of energy. In addition, Grade 4 students identify the physical properties of matter and observe the addition or reduction of heat as an example of what can cause changes in states of matter.

(4) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(6) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct simple graphs, tables, and charts to organize, examine and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; (E) connect Grade 4 science concepts with careers; and (F) connect Grade 4 science concepts with the history of science and contributions of scientists.
(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect and analyze information using tools including calculators, safety goggles, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, meter sticks, timing devices, balances, and compasses; and (B) demonstrate that repeated investigations may increase the reliability of results.

(5) Science concepts. The student knows that systems exist in the world.	The student is expected to: (B) identify and describe the role of the components in nonliving systems, such as a light bulb in a circuit and stream in a watershed.
(6) Science concepts. The student knows that change can create recognizable patterns.	The student is expected to: (A) identify patterns of change such as weather, metamorphosis, and objects in the sky; and (B) illustrate that certain characteristics of an object can remain constant even when the object is rotated like a spinning top translated like a skater on ice, or reflected like a reflection on a smooth surface.
(7) Science concepts. The student knows that matter has physical properties.	The student is expected to: (B) conduct tests, compare data, and draw conclusions about physical properties of matter including states of matter, conduction, and buoyancy.
(10) Science concepts. The student knows that certain past events affect present and future events.	The student is expected to: (A) identify and observe effects of events that require time for changes to be noticeable including growth, erosion, dissolving, weathering, and flow; and (B) draw conclusions about "what happened before" using fossils or charts and tables.

Grade 5 Science

(a) Introduction.

(1) In Grade 5, the study of science includes planning and implementing laboratory investigations and fieldwork using scientific methods, analyzing information, making informed decisions, and using tools such as nets, cameras, and computers to collect and organize information.

(4) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(6) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct simple graphs, tables, and charts to organize, examine, and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; (E) connect Grade 5 science concepts with careers; and (F) connect Grade 5 science concepts with the history of science and contributions of scientists.
(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect and analyze information using tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, compasses, balances, meter sticks, timing devices, magnets, collecting nets, and safety goggles; and (B) demonstrate that repeated investigations may increase the reliability of results.
(5) Science concepts. The student knows that systems may not work if some of their components are removed.	The student is expected to: (B) predict and draw conclusions about what happens to a system when it is modified.

(6) Science concepts. The student knows that some change occurs in cycles.	The student is expected to: (A) identify events and describe changes that occur on a regular basis such as in daily, weekly, an seasonal cycles.
(11) Science concepts. The student knows that certain past events affect present and future events.	The student is expected to: (A) identify and observe actions that require time for changes to be measurable, including growth, erosion, dissolving, weathering, an flow; (B) draw conclusions about "what happened before" using data such as from tree-growth rings and sedimentary rock sequences; and (C) identify past events that led to the formation of the Earth' renewable, non-renewable, and inexhaustible resources.

Grade 6 Science

(a) Introduction.

(1) In Grade 6, the study of science includes conducting laboratory investigations and fieldwork using scientific methods, analyzing information, making informed decisions, and using tools such as beakers, test tubes and spring scales to collect, analyze, and record information.

(2) As students learn science skills, they identify components of the solar system including the sun, planets, moon, an asteroids and learn how seasons and the length of the day are caused by the tilt an rotation of the Earth as it orbits the sun. Students investigate the rock cycle and identify sources of water in a watershed.

(3) In addition, Grade 6 students identify changes in objects including position, direction, and speed when acted upon by a force. Students classify substances by their chemical properties and identify the water cycle ad decay of biomass as examples of the interactions between matter and energy.

(4) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(6) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct graphs, tables, and charts to organize, examine, and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; (E) connect Grade 6 science concepts with careers; and (F) connect Grade 6 science concepts with the history of science and contributions of scientists.
(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect, analyze, and record information using tools including beakers, petri dishes, metric-meter sticks, graduated cylinders, weather instruments, timing devices, heating apparatuses, test tubes, safety goggles, spring scales, magnets, balances, microscopes, telescopes, thermometers, calculators, field equipment, compasses, computers, and computer probes; and (B) identify patterns in collected information using percent, average, range, and frequency.

(5) Science concepts. The student knows that there is a relationship between force and motion.	The student is expected to: (A) identify and describe the changes in position, direction of motion, and speed of an object when acted upon by force; and (B) demonstrate that changes in motion can be measured and graphically represented.
(12) Science concepts. The student knows components of our solar system.	The student is expected to: (A) identify characteristics of objects in our solar system including the sun,, planets, asteroids, and moons.

Grade 7 Science

(a) Introduction.

(1) In Grade 7, the study of science includes conducting laboratory investigations and fieldwork using scientific methods, critical-thinking, problem-solving, and using tools such as weather instruments and graphing calculators to collect and analyze information to explain a phenomena.

(2) As students learn science skills, they identify gravity and phases of the moon as components of the solar system and explore the effects of events such as hurricanes on the Earth. Students use pulleys and levers to understand the relationship between force and motion. Students then relate the concept to processes in the human organism such as the movement of blood. In addition, Grade 7 students study chemical and physical properties of substances, examine the tarnishing of metal or burning of wood as example of chemical processes, and identify physical properties used to place elements on the periodic table.

(4) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(6) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct graphs, tables, and charts to organize, examine, and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; (E) connect Grade 7 science concepts with careers; and (F) connect Grade 7 science concepts with the history of science and contributions of scientists.
(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect, analyze, and record information using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, heating apparatuses, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, graphing calculators, field equipment, compasses, computers, computer probes, timing devices, magnets, and compasses; and (B) analyze collected information to recognize patterns such as rates of change.

(12) Science concepts. The student knows components of our solar system.	The student is expected to: (A) identify gravity as the force that keeps planets in orbit around the sun; and (B) relate the Earth's movement and the moon's orbit to the observed cyclical phases of the moon.

Grade 8 Science

(a) Introduction.

(1) In Grade 8, the study of science includes conducting laboratory investigations using scientific methods, analyzing data, critical-thinking, scientific problem-solving, and using tools such as telescopes to collect, analyze, and record information.

(5) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(6) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(7) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.

(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct graphs, tables, and charts to organize, examine, and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; (E) connect Grade 8 science concepts with careers; and (F) connect Grade 8 science concepts with the history of science and contributions of scientists.
(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect, analyze, and record information using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, heating apparatuses, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, graphing calculators, field equipment, compasses, computers, computer probes, water test kits,, timing devices; and (B) extrapolate from collected information to make predictions.
(10) Science concepts. The students knows that cycles exist in Earth systems.	The student is expected to: (A) analyze and predict the sequence of events in the lunar and rock cycles.
(11) Science concepts. The students knows characteristics of the universe.	The student is expected to: (A) describe characteristics of the universe such as stars and galaxies; and (C) research and describe historical scientific theories of the origin of the universe.

Integrated Physics and Chemistry

(b) Introduction.

(1) In Integrated Physics and Chemistry, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical-thinking and scientific problem-solving. This course integrates the disciplines of physics and chemistry in the following topics: motion, waves, energy transformations, properties of matter, changes in matter, and solution chemistry.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; and (D) communicate valid conclusions.

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (C) represent the physical world using models and identify their limitations; (D) describe connections between physics and chemistry, and future careers; and (E) research and describe the history of physics, chemistry, and contributions of scientists.
(4) Scientific processes. The student knows concepts of force and motion evident in everyday life.	The student is expected to: (B) investigate and describe applications of Newton's laws such as in vehicle restraints, sports activities, geological processes, and satellite orbits.

Astronomy

(b) Introduction.

(1) In Astronomy, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical thinking and scientific problem-solving. Students in Astronomy study the following topics: information about the universe; scientific theories of the evolution of the universe; characteristics and the life cycle of stars; exploration of the universe; role of the sun in our solar system; planets; and the orientation and placement of the Earth.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from data; and (D) communicate valid conclusions.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) make responsible choices in selecting everyday products and services using scientific information; (C) evaluate the impact of research on scientific thought, society, and the environment; (D) describe connections between astronomy and future careers; and (E) research and describe the history of astronomy and contributions of scientists.
(4) Science concepts. The student knows scientific information about the universe.	The student is expected to: (A) observe and record data about lunar phases and uses that information to model the Earth, moon, and sun system.

(7) Science concepts. The student knows how mathematical models, computer simulations, and exploration can be used to study the universe.	The student is expected to: (A)demonstrate the use of units of measurement in astronomy such as light year ad Astronomical Units; (B) research and describe the historical development of the laws of universal gravitation and planetary motion and the theory of special relativity; (C) analyze a model that simulates planetary motion and universal gravitation; (E) analyze the impact of the space program on the collection of data about the Earth and the universe.
(9) Science concepts. The student knows that planets of different size, composition, an surface features orbit around the sun.	The student is expected to: (A) observe the night-time sky to determine movement of the planets relate to stars; (B) compare the planets in terms of orbit, size, composition, rotation, atmosphere, moons, and geologic activity; (C) identify objects, other than planets, that orbit the sun; and (D) relate the role of gravitation to the motion of the planets around the sun and to the motion of moons and satellites around the planets.
(10) Science concepts. The student knows how life on Earth is affected by its unique placement and orientation in our solar system.	The student is expected to: (A) compare the factors essential to life on Earth such as temperature, water, mass, and gases to conditions on other planets.