

	Mon 1/10	Tue 1/11	Wed 1/12	Thu 1/13	Fri 1/14
9:00	Mid Ocean Ridges [Mottl]	Hydrothermal Bio Systems [Cowen]	Ridge Flanks 2 [Cowen]	Interstellar Ices I [Boogert]	Origins of Life 1 [Baross]
	1 Geology & Geochemistry	5 General introduction subseafloor to water column	9 Microbial geochemistry	13 H <sub>2</sub> O/CO ices in protostellar environ New Keck Telescope results	18
9:45	Break	Break	Break	Break	Break
10:00	Ridge Flanks 1 [Mottl]	Molecular Biology Primer [Rappe]	Mud volcanos [Mottl]	Interstellar Ices II [Boogert]	Origins of Life 2 [Baross]
	2 Geology & Geochemistry	6	10 Biogeochemistry subduction zones	14 Ice inventory / Complexity Laboratory simulations New Spitzer satellite results	19
10:45	Break	Break	Break	Break	Break
11:15	Star Formation [Ceccarelli]	Pre Collapse phase [Ceccarelli]	ISO, SWAS and ODIN [Ceccarelli]	Mid Ocean Ridge Microbe sys 1 [Baross]	The Hot Corinos [Ceccarelli]
	3 Solar type star formation Molecular clouds --> protostar Protoplanetary disk	7 Depletion of molecules Grain mantle formation Molecular deuteration Observations & Theories	11 Interpretation of observations outflows	15	20 Complex organic molecules in the inner 100 AU envelope
12:00	Break	Break	Break	Break	Break
12:15	Water formation in ISM [Ceccarelli]	Collapsing Protostar Phase [Ceccarelli]	Solar type Protostars [Ceccarelli]	MOR Microbe sys 2 [Baross]	Protostellar Disk Phase [Ceccarelli]
	4 Gas phase and grain surface form. The present models	8 Predicted enhancement of water Outflows and Envelopes	12 Structure Water and deuterated water HDO underbalance puzzle Gas phase & solid state obs.	16	21 Molecular deuteration Water abundance Dust coagulation & Mixing process
13:00	Lunch	Lunch	Lunch	Lunch	Lunch
14:30	Discussion 1 & 2	Discussion 5 & 6	Discussion 9 & 10	Discussion 13 & 14	Discussion 18 & 19
16:00	Break	Break	Break	Break	Break
16:15	Discussion 3 & 4	Discussion 7 & 8	Discussion 11 & 12	Discussion 15 & 16	Discussion 20 & 21
17:45	Dinner	Dinner	Dinner	Dinner (18:00) - Catered IfA	
19:00				17 - Why Snowball Earth: Susceptibility of Earth-like planets to Global Refrigeration [Williams]	



	Mon 1/17	Tue 1/18	Wed 1/19	Thu 1/20	Fri 1/21
9:00	<b>Comets - Intro (Meech)</b> 22 Historical Development of comet sci General properties - parents molecules & chemistry Comet Formation scenarios	<b>Ice Drilling &amp; Core (Thorsteinsson)</b> 26 Drilling Techniques & Programs Grain growth and crystallization Lab deformation tests Ice core dating	<b>NASA Deep Impact Mission (Meech)</b> 30 Science Goals & Mission Plan Ground-observing results Encounter Observing Plan	<b>Intro Jovian Sats (Meech, Pappalardo)</b> 35 Comet Aging, ice irradiation Intro Jovian Satellites Jovian Magnetosphere	<b>Mars Ice: Intermed &amp; Dist. Past (Head)</b> 39 Outflow channels, transport, Cicumpolar ice, oceans or ice sheet Crater lakes & Gusev, Early Mars & Valley networks - fossil/extant life?
9:45	Break	Break	Break	Break	Break
10:00	<b>Glaciers - Intro (Thorsteinsson)</b> 23 Distribution of glaciers, ice caps, Polar ice distribution Pleistocene & Milanovitch cycles cosmic dust, meteorites	<b>Comet Measurement Techn (Meech)</b> 27 Observing & Imaging Techniques, dust models Spectroscopy, Infrared Observations Mass Spectra & In-situ	<b>Temperate Ice in Iceland (Thorsteinsson)</b> 31 History of Icelandic Glaciation Transport of water in glaciers Glacial Surges Radar sounding, Climate Records.	<b>Life in Icy Environments (Thorsteinsson)</b> 36 Subglacial Environments Lake Vostok, Grimsvotn The GRIP Ice Cores	<b>Europa Geology (Pappalardo)</b> 40 Surface Geology Surface composition & radiation Tidal heating
10:45	Break	Break	Break	Break	Break
11:15	<b>Ice Physics I (Meech &amp; Thorsteinsson)</b> 24 Phase diagrams, amorphous & crystalline ice, clathrates annealing, phase transitions, heat transport, radioactive heating	<b>Climate History &amp; Atm (Thorsteinsson)</b> 28 Isotopes: D/H, 18O/16O Isotope Fractionation processes Global Distribution	<b>The Kuiper Belt (Jewitt)</b> 32	<b>Follow the Water on Mars (Head)</b> 37 Pres. Environ., stability, reservoirs Spacecraft obs of ice & distn Ice & climate history; polar caps Lobate debris, Amazonian glaciation	<b>Europa Interior (Pappalardo)</b> 41 Europa Convection Future exploration of Europa Europa Astrobiology
12:00					
12:15	<b>Ice Physics II (Thorsteinsson &amp; Meech)</b> 25 Snow --> ice transformation, ice deformation, flow, rheology & viscosity, mass balance, thermal regimes. Water in temperate ice	<b>Origin of Earth's Oceans (Meech)</b> 29 Big bang & D/H, ISM Fractionation processes Impacts and Delivery Earth Fractionation Processes	<b>Water in Asteroids (Jewitt)</b> 33	<b>Antarctic Dry Valleys (Head/Thorsteinsso)</b> 38 Mars-like Earth Environ, comp. land Microclimate zones & implications cold-based glaciers vs wet-based Biology in cold polar deserts	<b>Discussion 39 &amp; 40</b> 42
13:00	Lunch	Lunch	Lunch	Lunch	Lunch
14:30	Discussion 22 & 23	Discussion 26 & 27	Discussion 30 & 31	Discussion 35 & 36	Discussion 41
16:00	Break	Break	Break	Break	Break
16:15	Discussion 24 & 25	Discussion 28 & 29	Discussion 32 & 33	Discussion 37 & 38	Final Write ups.
17:45	Dinner	Dinner	Dinner	Dinner	Dinner
19:00	Remote Observing (Pittichova)		34 - (7:00pm) - Deep Impact Movie & Discussion; 21:45 Bus to Hotel		