The Branding of INSTAAR

Name recognition: logos on papers, posters, presentations, letterhead, building signage

INSTAAR — an Earth and Environmental Systems Institute

36th International Arctic Workshop
The Branding of INSTAAR

Institutional Knowledge:
• History of the Institute/MRS
• Personnel: who we are
• Mission/Vision statements
• Strategic Plans
• Sources of revenue
• How we spend our revenue
• Where we conduct our research
• Breadth of our research portfolio
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Communicating our advances:
Published peer-reviewed papers,
Presentations (talks, addresses, posters) at conferences, symposia, workshops, meetings, seminars
Newspaper articles
Radio & TV interviews
Congressional hearings
Outreach: story books, middle school tours, high school science fares, webcam, etc.
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Peer-reviewed papers published in internationally recognized technical journals are the most advanced and permanent record of scientific achievements.

INSTAAR retains a permanent hard-copy record of these >2000 published papers in its IC.

Getting a paper published is like making a music record: 1) recording (writing the paper); 2) getting it played (i.e. published).
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Different radio stations (i.e. journals) reach different audiences; some (e.g. Science) reach a very diverse audience.

After hearing the recording (i.e. reading the publication), the public will or will not buy the record (i.e. choose to reference the paper in support of other scientific work).

The music industries’ comparative measure is record sales & radio station requests/plays.

The comparative measure in science is the no. of citations in other papers: the more citations the greater penetration of the findings into science.
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Besides the concept of payola, a major difference between the music business and science, is that it takes a few (5) years after a paper is published, discovered (read), discussed and appreciated by the scientific community before citations begin to appear.

Top INSTAAR papers are paradigm shifting advances — major contributions to the world’s scientific body of knowledge.

Web of Science a commercial tracking unit of Thomson Scientific count citations of a particular paper & author(s) for most major journals, along with book citations in these referred journals papers.

INSTAARs should recognize and celebrate how their collective research efforts have changed the field of environmental and earth system science.
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Findings:
• 35 Directorate members have written ≈1,600 peer reviewed pubs tracked by WOS, which have been cited ≈40,000 times.
• On average, INSTAARs are lead author on 4 of their top 10 cited papers;
• Of the 1,600 peer-reviewed pubs, 60 (4%) have gone “platinum”, defined as having been cited more 100 times; 2 papers that have been cited more 500 times; another 58 papers were cited between 100 and 500 times.
• INSTAAR had another 120 papers go “gold”: with between 50 and 100 citations.
• 80% of the Directorate has at least one of these 180 paradigm-shifting well-cited papers and others are subject to the five year time delay
• These G&P papers account for just 11% of the Institute's total peer-reviewed effort yet 50% of the Institute's citations.
• There are many papers just below the 50 citations per year that will reach “gold” or go “platinum” in the coming years.
The Top Platinum INSTAAR pubs (≥150 cites)

1. Grootes, PM; Stuiver, M; **White, JWC**; Johnsen, SJ, and Jouzel, J, 1993
Comparison of oxygen-isotope records from the GISP2 and GRIP Greenland ice cores: Nature, 366 (6455): 552-554; No. Citations (01/07): 656

• paper solidified the existence and importance of Dansgaard-Oeschger events, which mark the unstable climate of the last glacial period.

• reported on the disagreement between the nearby GISP2 and GRIP ice cores in the basal ice, raising the importance of ice dynamics in ice cores.

- North Atlantic cores contain layers rich in ice-rafted debris.
- The most recent 'Heinrich layers', (14Kyr - 70Kyr), record marked decreases in sea surface temperature and salinity, decreases in the flux of planktonic foraminifera to the sediments, and short-lived, massive discharges of icebergs originating in eastern Canada.
- The path of the icebergs, clearly marked by the presence of ice-rafted detrital carbonate, can be traced for more than 3,000 km; a remarkable distance.
- The layers may reflect repeated rapid advances of the Laurentide ice sheet and not Milankovitch orbital periodicities.
The Top Platinum INSTAAR pubs (≥150 cites)

3. Milliman JD, Syvitski JPM 1992 Geomorphic tectonic control of sediment discharge to the ocean - the importance of small mountainous rivers: Journal Of Geology 100 (5): 525-544; No. Citations (01/07): 538

- Until this paper, large rivers were thought to dominate the delivery of sediment to the global coastal ocean.
- Global database was published
- Algorithms define the role of basin area, relief and human impact.
- Paper reached a variety of disciplines: geomorphology, sedimentology, stratigraphy, oceanography, hydrology, biogeochemistry.
The Top Platinum INSTAAR pubs (≥150 cites)

4. Alley, RB; Meese, DA; Shuman, CA; et al. (White, JWC) 1993 Abrupt increase in Greenland snow accumulation at the end of the Younger Dryas event: Nature, 362 (6420): 527-529; No. Citations (01/07): 491

- The end of the last glaciation was characterized by abrupt returns to glacial climate, e.g. the Younger Dryas event ended within 20 to 50 yr.

- Paper put the nail in the coffin of abrupt climate change skeptics who debated the Dansgaard, White and Johnsen (1989) results.

- The two-fold increase in accumulation of snow in a few years points to a hair trigger in the climate system, in response to some kind of threshold or trigger in the North Atlantic climate system.
5. Ciais, P; Tans, PP; Trolier, M; **White, JWC** & Francey, RJ, 1995 A large Northern-hemisphere terrestrial CO2 sink indicated by the C-13/C-12 ratio of atmospheric CO2: Science, 269 (5227): 1098-1102; No. Citations (01/07): 381

- showcased the ability of $\delta^{13}CO_2$ to separate ocean and land carbon sources and sinks (when after 1990, INSTAAR isotope measurements began).

- land plants in the temperate Northern Hemisphere are a major sink of atmospheric CO$_2$.

- research was led author by post-doc at INSTAAR.
First direct ocean evidence for change in large scale meridional overturning circulation with timing and speed suggested by conceptual and numerical models- underscores concerns about stability of the circulation in the future……
Provided a metadata analysis of soil invertebrate effects on biogeochemical processes and made predictions about trophic cascade effects on carbon and nutrient fluxes.

No. Citations (01/07): 359

The Top Platinum INSTAAR pubs (≥150 cites)
The Top Platinum INSTAAR pubs (≥150 cites)


No. Citations (01/07): 355

- first comprehensive N balance of a large region: N. Atlantic watersheds
- showed for first time a consistent relationship between total human-derived N inputs to watersheds and the N export at the coast
- even in highly N-loaded regions, the majority of the N added to the landscape does not appear at the river mouth.

- analysis has been re-created multiple times at multiple scales around the world, and its basic conclusion of 20-30% of the added N appearing at the coasts remains robust.
The Top Platinum INSTAAR pubs (≥150 cites)


CENTURY was the first ‘mechanistic’ systems model to describe global patterns of grassland carbon, and predict how climate changes might influence carbon dynamics.
The Top Platinum INSTAAR pubs (≥150 cites)

10. Taylor KC; Lamorey GW; Doyle GA; Alley RB; Grootes PM; Mayewski PA; White JWC, & Barlow LK, 1993 The flickering switch of late Pleistocene climate change: Nature, 361: 432-436; No. Citations (01/07): 311

- Electroconductivity measurements in ice were used to show that the fast, 1-20 year “flickers” of significant dust changes seen in Greenland ice cores point to a rapidly changing atmospheric circulation during the glacial.
- Paper was written while the lead author was on sabbatical at INSTAAR.
The Top Platinum INSTAAR pubs (≥150 cites)


- paper truly broke new ground in pointing out that major climate shifts can occur in years, as opposed to centuries or millennia.
- first paper to show what we now call abrupt climate change
- it took several years and more papers to gain acceptance of the ideas laid out here.
The Top Platinum INSTAAR pubs (≥150 cites)


- first spatially explicit analyses of main factors that control C storage in world’s soils, including modeled soil C turnover.
- Influential for providing a framework for how to think about soil carbon dynamics,

Mean residence time of soil organic carbon (in years)
The Top Platinum INSTAAR pubs (≥150 cites)


\[ RSL(t,r) = \iint_{\text{ocean}} G^E(r-r')\rho_w RSL(t,r')d\Omega' \]
\[ + \iint_{\text{ice}} G^E(r-r')\rho_1 RSL(t,r')d\Omega' \]
\[ + \int_{18,000\text{BP}}^t dt \iint_{\text{ocean+ice}} G^v(t-r,r-r')[\rho_w s(t,r')] \]
\[ + \rho_1(t,r')d\Omega' - K_e(t) - K_c(t) \]

- Provided a means to model sea level fluctuations using the immediate sea-level change caused by changes in water load (1st term); the immediate elastic sea-level response due to changes in ice load (2nd term); & the slow deformation of the earth from changes in both ice and water loads from the last glaciation (3rd term).

- documented how substrate lithology and geomorphology exert fundamental controls on the chemistry of surface waters within the world’s largest river catchment.
- importantly, documented how secondary effects, such as the precipitation of salts within soils, and biological uptake and release, are more difficult to discern.
15. Francey, RJ; Tans, PP; Allison, CE; et al. (White, JWC) 1995

• broke new ground using records of carbon isotopes of CO$_2$ to help define land vs ocean sources and sinks.

• While we had few records, the growth of the land sink in the late 1980’s was a robust result that triggered many other studies.
The Top Platinum INSTAAR pubs (≥150 cites)


- Presents a general model for the geochemical mixing of river water and ocean water in a well mixed estuary

- established criteria for the identification of any non-conservative behavior of the dissolved constituents.

- iron & silica, highly non-conservative constituents, were used to demonstrate the application of the model.

- Discovered the cause of the largest abrupt-climate change in the Holocene when temperatures dropped 4 to 8°C in central Greenland and 1.5 to 3°C around the NE North Atlantic.

- Cooling was forced by a massive outflow of fresh water from Hudson Strait into the Labrador Sea, from a catastrophic drainage of glacial lakes previously dammed by the Laurentide ice sheet.

- This sudden flux of freshwater reduced sea surface salinity and altered ocean circulation, thereby initiating the most abrupt and widespread cold event.
The Top Platinum INSTAAR pubs (≥150 cites)

No. Citations (01/07): 226

Identified the mechanisms behind the observations that dead organic matter had strong effects on plant productivity and plant species.

- Alaskan glaciers are a major sources of runoff to the ocean causing sea-level rise.

- Glaciers in southern Alaska and adjacent Canada supply about as much glacial runoff as all the other glaciers in the world, exclusive of the two major ice sheets.

- Previous analyses underestimated this contribution because of the lack of quality meteorological and glaciological data from the area.
The Top Platinum INSTAAR pubs (≥150 cites)

Bedrock incision, rock uplift and threshold hillslopes in the northwestern Himalayas: Nature 379 (6565): 505-510; No. Citations (01/07): 211

- Dating of abandoned river-cut surfaces in the NW Himalayas reveals that the Indus river incises through the bedrock at extremely high rates (2-12 mm/yr).

- Mountainous hillslopes are steep and essentially independent of erosion rate, suggesting control by a common threshold process.

- In this rapidly deforming region, an equilibrium is maintained between bedrock uplift and river incision, with landsliding allowing hillslopes to adjust efficiently to rapid river down-cutting.

• functional leaf traits vary predictably with life span, regardless of ecosystem type
• relationship indicates convergent evolution for leaf traits across biomes from alpine to tropics regardless of differences in evolutionary history among plants
• useful in modeling of leaf function affects on biogeochemistry and C cycling

similar responses for respiration and stomatal conductance not shown
The 100x speedup in glacier motion in a surge is caused by the buildup of high water pressure in the basal passageway system, which is made possible by a fundamental and pervasive change in the geometry and water-transport characteristics of this system.

The behavior of the glacier in surge has many remarkable features, which can provide clues to a detailed theory of the surging process.

The surge mechanism is akin to a proposed mechanism of overthrust faulting.
The Top Platinum INSTAAR pubs (≥150 cites)

23. Ciais, P; Tans, PP; **White, JWC**; et al. 1995 Partitioning of ocean and land uptake of CO2 as inferred by delta-C-13 measurements from the NOAA climate monitoring and diagnostics laboratory global air sampling network: J. Geophysical Research-Atm., 100 (D3): 5051-5070; No. Citations (01/07): 196

- good, in-depth, technical study outlining the methodology of a double-deconvolution (isotopes and concentration of CO\textsubscript{2}) approach to reconstructing land and ocean sources and sinks of carbon.
- majority of δ\textsubscript{13}C measurements were made at INSTAAR
- with respect to global totals for 1992, 3.1 GT C of carbon dissolved into the ocean and 1.5 GT C were sequestered by land ecosystems.
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- El Nino flood events in Ecuador create light-colored sediment layers, when volcanic sediment erodes into lake.
- First continuous, direct evidence of El Nino flood events for the past 10Kyr.
- Frequency and intensity of El Nino has changed through time, with flood events less common before about 5,000 years BP

- INSTAAR data, from varved sediments of the southern Caribbean Sea, are used to construct an accurate and continuous radiocarbon calibration for the period 9 kyr to 14.5 kyr BP, nearly 3,000 years beyond the tree-ring based calibration.

- modeled the atmospheric radiocarbon concentration during this period

- Determined that the North Atlantic Deep Water formation shut down during the Younger Dryas period, but was gradually replaced by an alternative mode of convection, possibly via the formation of North Atlantic Intermediate Water.
The Top Platinum INSTAAR pubs (≥150 cites)


As sites of expanded environmental gradients, fjords are perfect field-scale laboratories to develop fundamental theories in oceanography (e.g. plume dynamics, internal waves); sediment dynamics (e.g. slope failures, gravity flows), biogeochemistry (e.g. anoxia, diagenesis), pelagic / benthic dynamics (e.g. community dynamics to physical-chemical stress); and glaciology (e.g. iceberg calving)

• Established the general agreement between bottom up and top down approaches for balancing atmospheric CO$_2$ across the conterminous US
• The US is a net carbon sink.
• These land-based estimates are larger than those from previous studies because of the inclusion of additional processes such as the flux of C exported by rivers and commerce.
• 50% of the total flux is outside the forest sector.
• Results indicate a relatively stable U.S. sink throughout the 1980-94 period.
28. Battle, M; Bender, ML; Tans, PP; et al. (White, JWC) 2000 Global carbon sinks and their variability inferred from atmospheric O$_2$ and $\delta^{13}$C: Science, 287 (5462): 2467-2470; No. Citations (01/07): 166

- A team of isotope geochemists using $\delta^{13}$CO$_2$ combined with a group using atmospheric O$_2$ records to compare these two approaches to isolating carbon sources and sinks.

- Results were very consistent, and that the sink of carbon in the terrestrial biosphere is indeed quite real, and varies in magnitude as well.

- Classic paper on rainfall thresholds (duration and intensity) and the triggering of slope failure of mountain debris
- Global analysis

• Pulses of detrital carbonate-rich sediments in cores from the NW Labrador Sea reflect episodes when an ice stream from the Hudson Strait extended to the shelf break and delivered sediment onto the slope and deep-sea plain.

• The carbonate intervals are coeval with Heinrich events in the eastern North Atlantic which have been linked with the massive production of icebergs associated with ice-sheet surges and glaciological instability.
The Top Platinum INSTAAR pubs (≥150 cites)

No. Citations (01/07): 157

• Ecologists back 25 years ago did not have a good recognition of the role of geomorphology on ecosystem processes
• Came out of one of the first LTER workshops held at the MRS

- Developed a method for the isolation of hydrophilic organic acids from aquatic environments, by first removing the hydrophobic organic acids (i.e. aquatic fulvic acid).

- Hydrophilic acids have lower carbon and hydrogen contents, higher oxygen and nitrogen contents, and are lower in molecular weight than the corresponding fulvic acids.

- Hydrophilic acids have a lower concentration of aromatic carbon and greater heteroaliphatic, ketone and carboxyl content than the fulvic acid.
The Top Platinum INSTAAR pubs (≥150 cites)


• North Atlantic deep Water (NADW) production was decreased or eliminated at ≈ 14,500, 13,500, 12,000 and 10,500 years BP

• Each interval is associated with abrupt events of meltwater discharge to the surface ocean

• intervals are associated with brief episodes of cooler climate in the North Atlantic region, e.g. Younger Dryas cooling of 10,500 years ago.

• results support models linking meltwater discharge, decreased NADW production, and decreased North Atlantic heat flux.
The Top Platinum INSTAAR pubs (≥150 cites)


Critical Concentrations, Cs*, for marine hyperpycnal flow conditions

Equatorial:  \( Cs^* > 36 - 36.4 \text{ kg/m}^3 \)
Sub-tropical:  \( Cs^* > 38.7 - 39 \text{ kg/m}^3 \)
Temperate:  \( Cs^* > 42 - 43.3 \text{ kg/m}^3 \)
Sub-polar:  \( Cs^* > 43 - 43.5 \text{ kg/m}^3 \)

• For the first time defined the conditions and frequency of when global rivers enter marine waters as a hyperpycnal flow.

• Petroleum industry interest reflected much of the new reservoirs being discovered were in deep-ocean sediment fans.

• Navy interest reflected the potential of new ocean dynamics off areas of active operation (e.g. Taiwan).

Skeidarasundar, Iceland, 1996
The Branding of INSTAAR

• The productivity and success of INSTAAR scientists is based on a variety of measures including 1) teaching & mentoring; 2) penetration of their science; and 3) service at a variety of local to international levels.

• Penetration of science is accomplished by presentations, papers, reports, models, adopted methods, public outreach and press.

• One of the many methods of measuring this penetration of science is through citations. In this regard we have much to celebrate.

• We celebrate the achievement of those whose success lifts all Institute members higher and provides insight for further success.

• The branding of INSTAAR gold and platinum hits begin with members getting to know the melodies and tunes of our hit parade.