Scientific Writing - Proposals

Dr. David Delene
Research Professor

Atmospheric Sciences Department
University of North Dakota

Objective

- Understand the Types of Scientific Writing
  - What is similar, What is different.
- **Write a fundable proposal.**

Images of the K-CPEC expansion type cloud chamber at NIMS that uses a double-structure de`sign with outer volume of 130 m^3 and inner volume of 22.4 m^3.

All Science Writing does the same Job!

Moves a claim from one mind into another.

With enough evidence that the reader believe it.

A Clear Claim

One thing you want the reader to accept — stated up front, not buried.

Honest Evidence

Data, reasoning, and citation that a skeptical expert can check.

A Real Audience

You write for who is reading — their knowledge, their needs, their stakes.

A Purpose

Inform, persuade, or request. The purpose shapes every choice you make.

A Ladder of Science Writing

Each Rung Adds Stakes, Audience Distance, and Persuasive Load.

Lab Report

The first and most disciplined form, record what you did and found.

- **What it Trains:**
  - Methods written so others can reproduce them.
  - Separating results from interpretation.
  - Clear figures, tables, and units.
  - Concise, neutral scientific voice.
- **What the Proposal Borrows:**
  - A precise, reproducible methods section.
  - Honesty about what data can and can't show.
  - Figures that carry the argument.
  - Discipline to report, not oversell.

Senior Project / Capstone

The first time the question is yours, you scope it, justify it, and defend it.

- **What it Trains:**
  - Choosing a question that fits your time and tools.
  - Justifying why the question matters.
  - Owning a project end to end.
  - Presenting to a non-specialist committee.
- **What the Proposal Borrows:**
  - Scoping work to a realistic budget & timeline.
  - A motivation that answers “so what?”.
  - Project ownership reviewers can trust.
  - Speaking to a mixed-expertise panel.

Master's Thesis

Sustaining a single argument across many pages and chapters.

- **What it Trains:**
  - Holding one thesis across a long document.
  - A literature review that finds the gap.
  - Structuring chapters so logic builds.
  - Anticipating a committee's objections.
- **What the Proposal Borrows:**
  - A through-line that survives 15 pages.
  - Positioning your gap against prior work.
  - Architecture: aims that build on each other.
  - Pre-empting the reviewer's doubts.

Peer-Review Publication

Your first writing judged by anonymous experts who can reject it.

- **What it Trains:**
  - Writing for a skeptical expert audience.
  - Claims sized exactly to the evidence.
  - Surviving and answering review.
  - Meeting a venue's format & norms.
- **What the Proposal Borrows:**
  - Reviewers, not a friendly advisor, decide.
  - Promising only what you can defend.
  - Responding to critique without defensiveness.
  - Following the call's rules to the letter.

Project White Paper

Persuading decision-makers that an approach is worth backing.

- **What it Trains:**
  - Leading with impact, not methodology.
  - Translating science for managers and sponsors.
  - Making a case under length limits.
  - Tying the work to a mission or need.
- **What the Proposal Borrows:**
  - Open with significance and payoff.
  - Plain-language framing for program officers.
  - Persuasion within strict page limits.
  - Aligning to the funder's priorities.

The Proposal

The synthesis: You ask for resources to do work that doesn't exist yet.

- **What it Trains:**
  - Reproducible methods (the lab report).
  - A scoped, feasible plan (the capstone).
  - A gap-driven argument (the thesis).
  - Reviewer-proof claims (the paper).
  - Impact-first persuasion (the white paper).
- **What the Proposal Borrows:**
  - You're funded on a promise, not results.
  - Feasibility and team are judged, not just ideas.
  - A budget must mirror the science.
  - It must answer a specific solicitation.

The Proposal Tells a Story

Reviewers read dozens in a sitting.
The fundable ones read as a narrative, not a checklist.

1	**The World**	Here is the important problem and what we don't yet understand about it.
2	**The Tension**	This gap blocks progress, and no one has resolved it because, **the hard part**.
3	**The Turn**	We have the idea, tools, and team to resolve it, here's the insight.
4	**The Resolution**	If funded, here's what will change, and why it's worth the investment.

Answer the Specific Call

A brilliant proposal for the wrong solicitation is an unfunded proposal. Read the call like a contract.

Match the Priorities

Mirror the solicitation's stated goals in your aims.

Hit every Requirement

Page limits, fonts, sections, broader impacts, data plans. Missing one means rejection.

Write for THIS Panel

A disciplinary panel and an interdisciplinary one need different framing.

Use the Review Criteria

Reviewers score against published criteria. Make each criterion easy to check off.

Conclusions

- You've been training for this all along.
  - Every lab report, capstone, thesis, paper, and white paper built one skill the proposal needs.
  - The proposal just asks you to use them all at once where you tell a story that is aimed at a specific call.

It is not easy, it takes time,
but go write the one that gets funded.

Thank You – Questions and Discussion

Related Material - http://www.opensciencesassociates.com/delene/

- Observations / Forecast
- Blogs / News Items / UND
- Vitae (pdf) / NSF-Bio (pdf)
- Peer Reviewed Publications
- Data, Software & Technical Papers
- Guides, White Papers and Slides
- Presentations / Workshops
- Videos & Audio Recordings
- Research Interests
- Projects/Proposals (Positions)
- ADPAA Software Gateway
- Teaching (Catalog)
- Dissertation Research
- Master Thesis (pdf)

Dr. David J. Delene, OSA President
UND Research Professor, and
UND Aerospace Research Fellow
(orcid 0000-0002-3733-6021)

University of North Dakota (Directory, Faculty Success)
John D. Odegard School of Aerospace Sciences
Atmospheric Sciences Department (Wiki, Gallery)
Clifford Hall 420, 4149 University Avenue (Map)
Grand Forks, North Dakota 58202-9006 (VCard)

Email david.delene.und@gmail (Public Key)

Voice 507-533-5363 Office 701-777-4847

Department 701-777-2184 Fax 701-777-5032

Whatsapp +1 701-317-1208, Discord (Invite)

Zoom (Invite, 365-040-0756 Meeting ID)

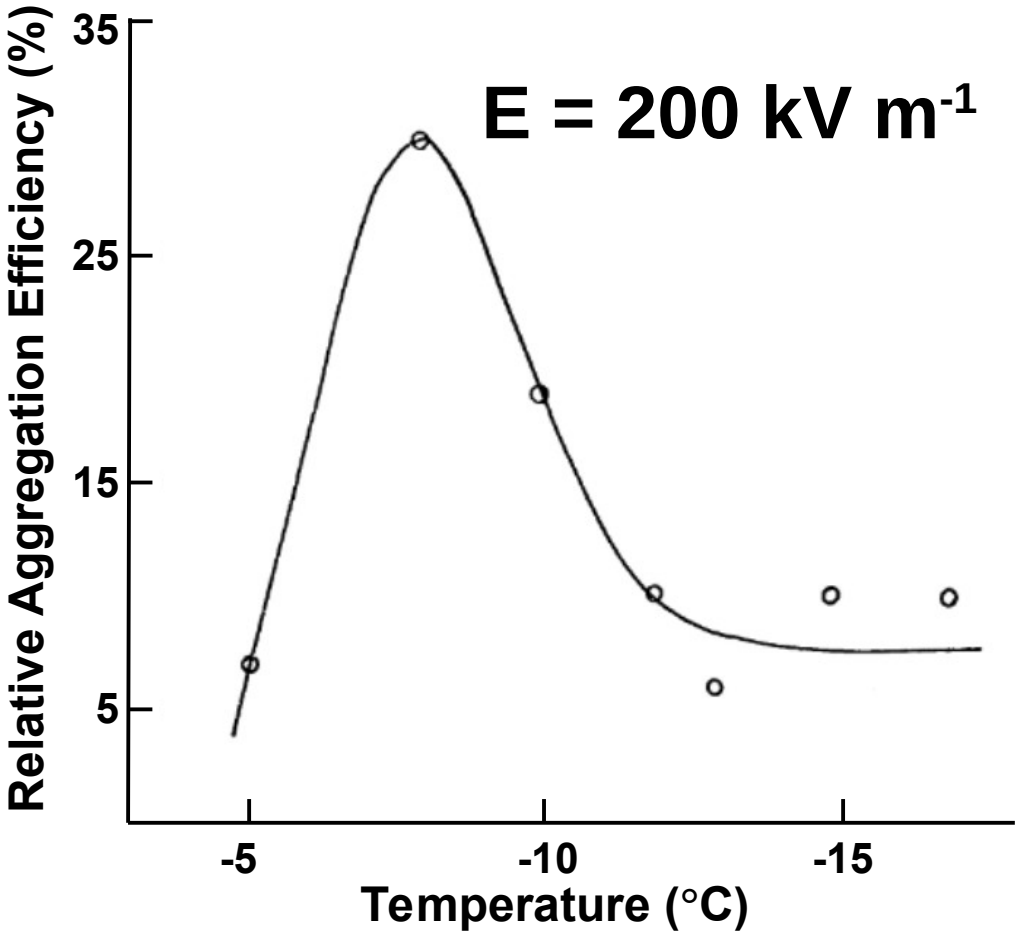
Zotero delene Frequent Logins

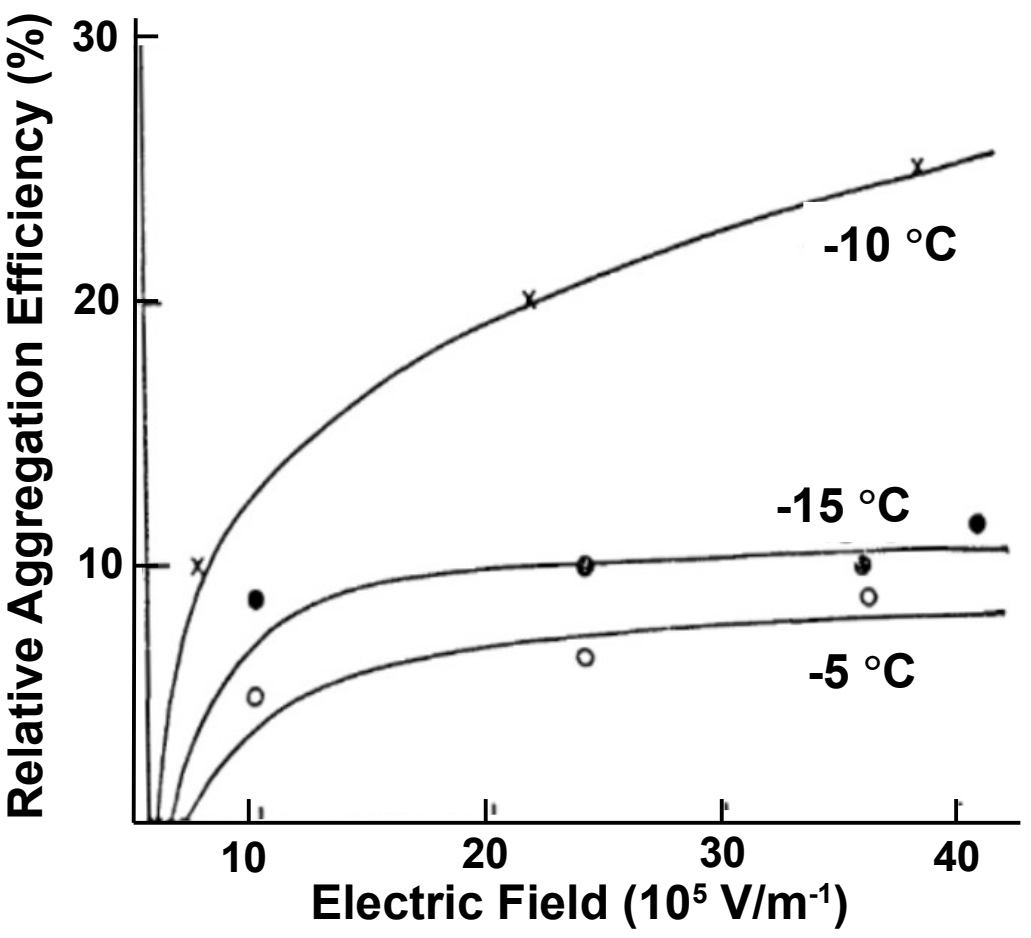
Google Scholar Profile

Linkedin Profile

Calendar: View My Schedule

Ice Crystal: N_{ice} = 3-4 x 10^6 m^{-3} and D_{ice} = ~50 µm





The experiment had an ice crystal concentration (N_{ice}) of 3-4 x 10^6 m^{-3} with a diameter (D_{ice}) of ~50 µm. Left panel had an electric field (E) of 200 kV m^{-1}. Adapted from Saunders and Wahab (1975).