Recipes for cooking a successful paper

Preparing a manuscript
for a peer-reviewed international journal

Lecture 3: Presenting and illustrating the message

Tarmo Soomere
Estonian Academy of Sciences
Laboratory of Wave Engineering
Centre for Non-linear Studies
Institute of Cybernetics at Tallinn University of Technology

Bricks of writing: paragraphs

- A paragraph = step in your story
- Describes a clearly identified part of the content
  - Remember "roadmap" for writing
- Normally 5-10 lines, 3-7 sentences
- Organise each paragraph!
- Start with a topic sentence
  - that explains the main point or idea
- Subsequent sentences provide the detail
  - This formula: sometimes considered less polished
  - But direct and intelligible; thus, perfectly acceptable
  - Start with this style, adjust when you gather experience

Writing a good paragraph

- Each paragraph expresses/covers only one point
- Each sentences establishes or supports this point – the topic of the paragraph
  - The sentences should illustrate their overlapping effect
- Explain why actions were taken
  - "All of the patient data were kept in paper files. The absence of even one clerk caused delays in the monthly reporting. Finally, management decided to interview some systems analysts"
  - "All of the patient data were kept in paper files, which took too much staff time to maintain. The absence of even one clerk would delay the monthly patient reports. Management wanted computerised recordkeeping, which would take less time and be more reliable, and finally decided to interview some systems analysts to develop the new system"
    - From J.T.Yang, An outline of scientific writing.

Writing a good paragraph II

- Keep a consistent point of view
  - Maintain the same grammatical voice (act/pass):
    - "Topical applications of the drug did not improve the condition. The condition improved after small doses were delivered intravenously": passive + active
    - "Topical applications of the drug did not improve the condition. Intravenous delivery of small doses improved the condition"
      - From J.T.Yang, An outline of scientific writing.
- Maintain consistent structure
  - Sometimes attempts to avoid monotony hinder comprehension

From Lesson 2: Results

- Feature main results of the stated aims of the paper
- Present 'analysed' data, not raw data
- Present as:
  - tables
  - graphs, or
  - model figures where possible

Results: additional hints

- Results: general statements that interpret the raw data
- The "meat" of a paper
  - The most important part
  - All other sections are subordinate
  - Can be of any length
- Sometimes combined with Discussion

Writing the Results section

- Emphasize only important information or observations
  - that will answer The Question
- Be selective
  - Detailed data belong to Material or an Appendix
- Structure the text so that emphasis is on results
  - Place the results sentence at the beginning of a paragraph
  - Subsequent sentences provide supporting details
  - Put ancillary information in a subordinate clause
  - Use the active/passive voice to emphasize the right element

Steering emphasis

Figs. 2.13 and 2.14 illustrate geographical distributions of amplitudes .....

Emphasis is on the figures

An interesting feature of geographical distributions of amplitudes (Fig. 2.13, 2.14) is that ....

Emphasis is on the interesting feature

Writing the Results section II

- Explain only those illustrations and tables whose significance is not obvious to the reader
  - Do NOT repeat the data
  - Do NOT repeat the Fig. legends and Table titles in the text
- Be sure that the text, illustrations and tables are consistent with each other
  - Wave height in a Table is 0.82 m and in the text 0.92 m??
- Analyse your data with standard statistical methods
  - Draw confidence intervals
  - Analysis of variance, statistical significance, etc.
- Be honest
  - Do NOT omit data that do not support your hypothesis and conclusion
  - even if you might be attacked for showing bad data

Writing: general

- Use the past tense of verbs except for Figures and Table
  - "Table 1 contains data collected over a three-week period."
- Terms beginning a sentence: fully spelled out
  - Usually: "Substituting Eq. (1) into [....]"
  - BUT: "Equation (1) reveals that ..."
    - (unless custom abbreviations such as DNA, Dr., et.)
  - Do NOT start a sentence with a numerical or symbol
  - Numbers in a sentence should start with a decimal point
  - .476 is not good; use 0.476

Discussion

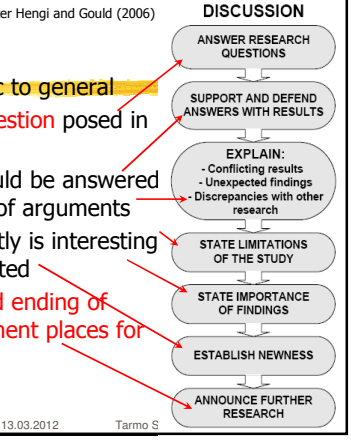
- Takes the data reported in the Results section
  - Interprets the findings
  - Evaluates their significance
  - Examines the implications
- Usually the most challenging section to write
- Demonstrates how well you understand the results
- No need to be lengthy
- Sometimes merged with Results or Conclusions

Discussion: hints by Terry Healy

- Elaborate upon the findings
- Emphasise what is new, different to earlier authors
- Refer extensively to other authors
- Place your contribution in relation to existing published work and programs
- This is an essential characteristic of a paper for international readership

After Hengi and Gould (2006)

- Move from specific to general
- Start with The Question posed in the Introduction
- This question should be answered now – by a chain of arguments
- Specify what exactly is interesting and what is expected
- The beginning and ending of Discussion: prominent places for important ideas



Writing a good Discussion

- Begin with a topical sentence that returns to The Question
- Mention shortly new findings, knowledge or concepts that resulted from your study
  - Do NOT introduce again data or methods that were already presented
  - Do NOT introduce data that were not presented in the text before
  - Do NOT copy sentences from Results
- State whether you have achieved your goal
  - Perhaps found exceptions? Unexplained effects?
- Compare your results and interpretations with previously published work
  - Even though it may disagree with yours
  - Give fair credit to others whose work has been confirmed. Cite!
  - Be fair with those whose results differ
  - Explain, if possible, the disagreement impartially
    - From J.T.Yang, An outline of scientific writing.

An example of internal separation of conclusions

8th Baltic Sea Science Congress 2011
22-26 August, 2011, St. Petersburg, Russia

Decadal variations of wave-driven sediment transport processes in the Gulf of Riga

Katri Kartau, Maija Viška, Tarmo Soomere
Institute of Cybernetics at Tallinn University of Technology
Wave Engineering Laboratory

Conclusions matching the existing knowledge

- The rate of the bulk transport and net transport is the largest to the north of Akmenrags Cape, along the NW coast of Latvia
  - and in a short section in the westernmost area on the Sambian Peninsula.
- The bulk transport in the Baltic Proper considerably exceeds that along the entire Gulf of Riga
- Longshore variations in the bulk transport mostly follow the changes in the orientation of the coastline
- There is an overall increase in the bulk transport rate
  - this increase matches the increase in wind speed over the northern Baltic Proper
- The net sediment transport along the entire coast is always to the (north)-east, or clockwise in the Gulf of Riga.

Interesting conclusions

- Biggest variability in the net transport occurs in the north-western coast of Latvia
- The net transport in the Gulf of Riga considerably exceeds that along the southern part of the study area (contrary to the bulk transport)
  - The coast of Kaliningrad District and Latvia may be in almost equilibrium state whereas the coast of Gulf of Riga are far from equilibrium
- Temporal course of both bulk and net transport show a clear presence of a signal with a typical scale of about 10 years
- Long-term course of net transport shows no clear trend
  - An increase up to ~1995
  - A decrease since then
- The course of both net and bulk transport in the Gulf of Riga decoupled from the similar course along the Baltic Proper coast

Writing a good Discussion II

- Take care to label speculations as such
  - Journals permit some reasonable speculations if based on solid evidence
  - You can refer to published speculations as a starting point of new research
- Discuss any theoretical implications and possible applications
- Present the conclusions concisely
- Suggest the future studies, if any
- End with a short summary or conclusion
- Do NOT repeat material from other sections
  - From J.T.Yang, An outline of scientific writing.

Summary and Conclusions

- Summarise major findings
- List in importance (bullet points or numbers)
- Remember: many read only the Abstract and Conclusions
- Refer to aims/purpose of the paper

Acknowledgements

- Used to give credit to those who have materially or intellectually contributed to the research
  - Technical assistance
  - Advice from colleagues
  - Other research-related contributions
- Do NOT include: Contributions that do not involve research
  - Clerical/administrative assistance
  - Word processing, Translation, Copy-editing
  - Encouragement from friends
- Refer to funding assistance
  - Mandatory for research supported by targeted financing in Estonia from 01.01.2010
  - Success of Estonian Science Foundation grants is counted based on papers with the relevant acknowledgement

Acknowledgements II

- Keep short
  - A standard formulation:
    - "This work was supported by the Estonian Science Foundation (grant No. 9125) and targeted financing by the Estonian Ministry of Education and Research (grant SF0140007s11). We thank Prof. A.X for his comments on the manuscript and Dr. X.Y.Z. or his technical assistance."
- Be aware of misinterpretations
  - Maybe Dr. X.Y.Z performed the experiments and Dr. A.X explained the data, and your contribution was limited to being the armchair general?
  - Make certain that Acknowledgements accurately reflect the situation
- Obtain prior permission from the person being acknowledged
  - Maybe he/she only read the draft and fully disagreed with your treatment?
  - Maybe he/she should be a coauthor?

Lesson 3

Illustrating the message

One picture is worth of a thousand words

Difference between text and picture

- Wake waves from fast ferries may create dangerous breaking waves in unexpected locations under otherwise calm conditions .....

Design principles

- Read the Instructions; follow journal format exactly!
  - Study the format carefully – each journal is different
  - Some journals allow only lines, symbols and numerals to identify various curves
  - A few require that all figures be boxed
- Color illustrations still sometimes costly and discouraged
- If you cannot present your point in BW, you have not understood it yourself

Design principles II

- Fit your illustration to the columns of the journal

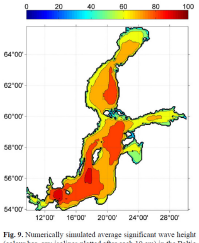


Fig. 9. Numerically simulated average significant wave height (colour bar, cm; isolines plotted after each 10 cm) in the Baltic Sea in 1970–2007.

Design principles

- Fit into the printed area
- Cover a whole column
- Some journals offer 2-3 preferred widths (Boreal Environmental Research)
- Combine panels if necessary

Soomere, Rannat 2003

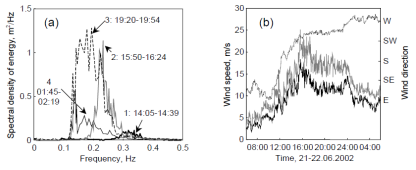


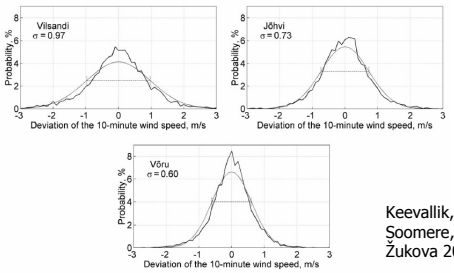
Fig. 3. (a) Spectral density of wave energy near the western coast of Aegna during different stages of a strong gale on 21–22.06: 1 – at the initial stage of the wave storm, young waves, H_s = 95 cm;

Design principles II

- Fit your illustration to the columns of the journal

below about the (standard) deviation of the quasi-traditional recordings, having in mind their deviation from the values, obtained from the continuous recordings.

Poor design



Keevallik, Soomere, Pärg, Žukova 2007

Fig. 1. Comparison of the distributions of differences of the quasi-traditional wind speed recordings from the 3-hour mean wind speed and the Gaussian distributions with the same standard deviations at three measurement sites for the resolution of 0.1 m/s.

Design principles

Size the aspect ratio of the illustration to optimal dimensions

Poor design – waste of space

Soomere 2003, J. Sea Res.

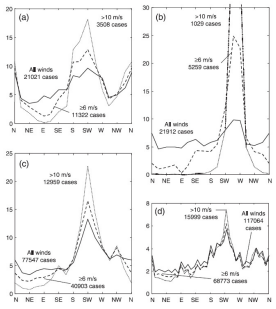
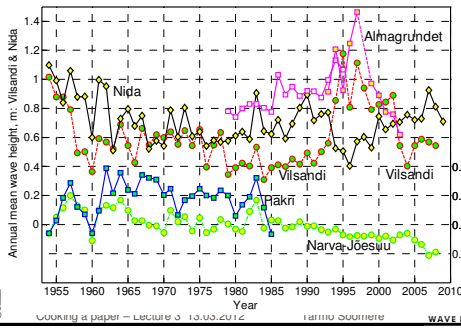


Fig. 2. Directional distribution of all winds (solid line), winds ≥ 6 m/s (dashed line) and strong winds (>10 m/s, dotted line): (a) at Vilsandi 1977–1991, (b) at Ristna 1977–1991, (c) at Nõmmküla 1980–1988, at 38 m level, (d) at Ust 1961–2001. Vertical axis represents relative frequency of occurrence (%) of wind events. Notice that angular resolution is 22.5° (a, b, c) or 10° (d).

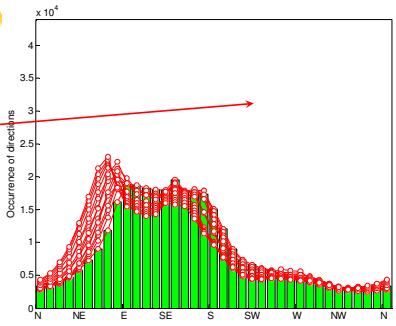
Design principles

- Label the axes AND indicate the units
- Use two sets of axes if necessary

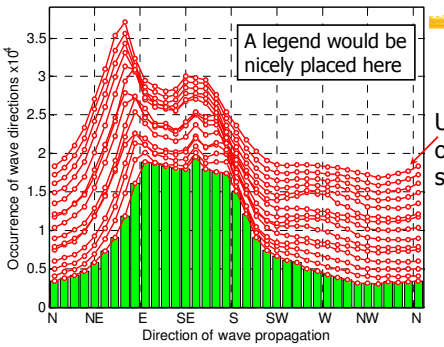


Design principles

- Scale units so that tick marks are labeled with one- of two-digit numbers
- Avoid wasted space within an illustration
- Use labels etc. large enough after the illustration is reduced
- Use gridlines



A better example

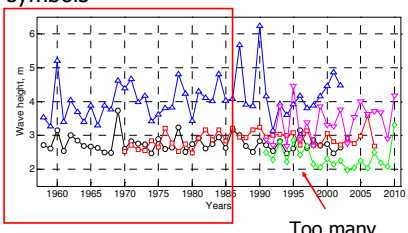


Design principles

- Use standard symbols to indicate data points
  - If "§" or "~" is used, nobody can read it
- [optional] Draw scales of all four sides of a boxed figure
- Solid plot lines are preferable
- Use a reasonable number of tick marks

Design principles

- Do NOT crowd a graph with overlapping curves and symbols



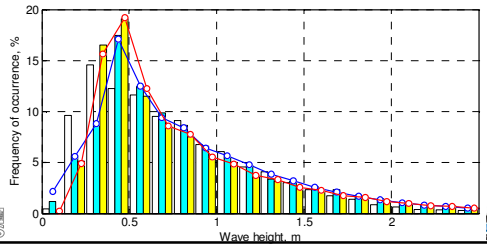
Fine

Too many overlapping curves

Soomere, Kurkina 2011

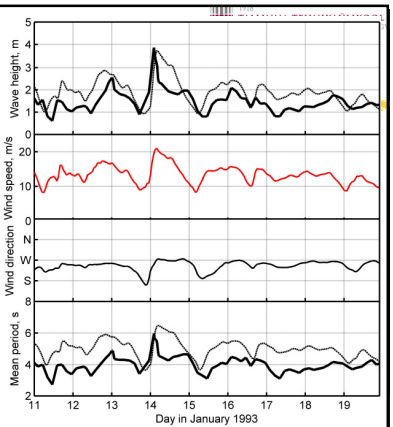
Design principles

- Keep the graph simple
- One image = one idea
  - Consider separating too "crowded" images into two
  - Use different ways of presentation



Design principles

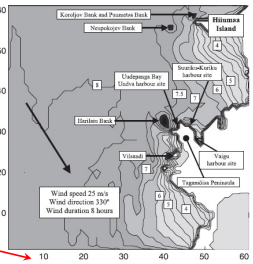
- Use multiple windows
- Avoid redundancy: e.g. show x-axis only once



Design principles

- Geographical maps: indicate coordinates

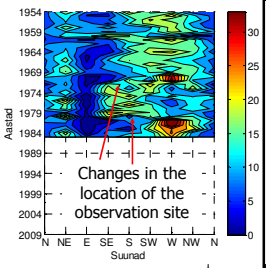
Very poor design: number of grid points indicated at the axes



Mandatory images

- Results of field work, metocean data, etc:
  - Map/location scheme of the area
- Experimental work
  - Scheme of the device, flow chart, etc.
- If the experimental plots scatter; or some data is bad
  - Do not hide this
  - The reader should see the actual plot of data

Olga Tribštok, MSc thesis 2011; Student Prize from the Estonian Academy of Sciences



Before submission:

- Ask yourself: Is the figure necessary?
  - Data points on straight lines = linear relationship
    - Normally not necessary
- Avoid 'postage stamp' figures
  - Make sure readers can read all parts of the figure
- Saves a lot of time:
  - Program your images
  - Use the same size, layout, font, style, etc., from the beginning

Tables and Illustrations: both need captions/titles

- Follow journal format exactly
- Captions must be "**fully explanatory**"
  - i.e. reader should be able to understand meaning of each figure without additional reference to the main body of text.
  - Explain ALL symbols, curves, other objects
- Captions may include method used, instrument, dates, no. of samples analysed, etc.
  - As captions use smaller font, this saves space and makes the presentation more transparent
  - For space-limited papers: captions are usually not counted
  - Do NOT repeat this information in the body text

Tables

- One of the basic forms of presentation:
  - Body text
  - Figure
  - Table
- Less effective than a figure for showing trends in the data

Table 1: Comparison of statistics of wave simulations (m) and corresponding wind forcing (m/s) in 1996 for the SMB model forced with Vilsandi wind data, WAM model forced with geostrophic wind, and visual wave observations at Vilsandi.

	Characteristic	SMB	WAM	Observed
Wind	Average	5.5	6.1	
	St.dev.	3.2	3.3	
	90%	10.0	10.6	
	99%	14.0	15.5	
	max	18.0	21.8	
Signifi-cant wave height	Average	0.47	0.50	0.84
	St.dev.	0.39	0.34	0.62
	90%	1.09	0.88	1.70
	99%	1.77	1.74	2.31
	max	2.55	3.30	2.60

Räämet et al., 2009

Unnecessary table

Keevallik, Soomere, Pärg, Žukova, 2003

time intervals coincide and the inertia of the cup systems does not differ substantially.

Table 2. Averaging schemes of wind data considered in the analysis

	Quasi-traditional recording	Continuous recording
Wind speed	10 minutes before the traditional observation time	3 hours between the traditional observation times
Wind direction	2 minutes before the traditional observation time	

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- Contains almost no information
  - 10 min & 2 min & 3 hours
- The text would be much shorter

Unnecessary table: can be still used for explanations

time intervals coincide … he … s not differ … sul …

Table number

Title: brief and intelligent

Column headings

Rules

Table 2. Averaging schemes of wind data considered in the analysis

	Quasi-traditional recording	Continuous recording
Wind speed	10 minutes before the traditional observation time	3 hours between the traditional observation times
Wind direction	2 minutes before the traditional observation time	

Body of the table

Stub – the leftmost column

- Indicate clearly missing items "—", N.A., etc.
- Use footnotes if necessary to explain in detail some elements

Design principles

- Design to fit the printed space/columns
  - Use landscape/rotation by 90deg if needed
- Keep simple and easy to follow
- Do not waste empty space
- Round the data!!! 3 significant digits is fine
- Use columns for comparisons, not rows
  - Human eye compares columns more easily
- Ask yourself: Is this table necessary?

An example (Räämet et al. 2009)

Table 1: Comparison of statistics of wave simulations (m) and corresponding wind forcing (m/s) in 1996 for the SMB model forced with Vilsandi wind data, WAM model forced with geostrophic wind, and visual wave observations at Vilsandi.

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No observations: leave the column blank

Not perfect: decimal points not aligned

Comparison in columns

2-3 significant digits

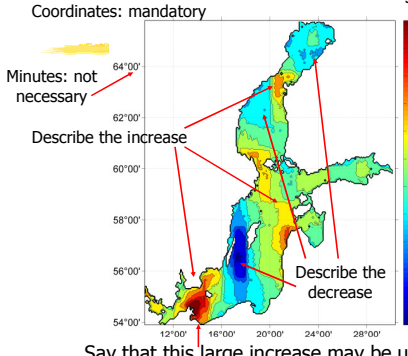
Images, tables and text

- Present each part of information only once
  - Especially the data in tables: do not repeat
- Refer to each table & image; number consecutively
- Describe important features of images
  - Just saying "Figure X shows everything" is not enough
  - Do it so that the reader can follow

Images and text (Soomere and Räämet, 2011)

Coordinates: mandatory

Scale: mandatory



Minutes: not necessary

Describe the increase

Describe the decrease

Long-term changes to the annual mean wave height in the Baltic 1970-2007

Say that this large increase may be unphysical

Images, tables and text confused

Results indicate that the number of hits overtopping the threshold occurred in nearshore points 45, 56, 83, 91, 93, 149, 150, 151, 153, 161, 178, 198, 243, 261, 264, 267, 271, 272, 278, 305 and 325 (Fig. 5)

Fig. 5

ns	r	c	x	y
45	31	34	216	178
56	29	43	225	180
83	21	62	244	188
91	19	68	250	190
93	18	70	252	191
149	17	109	291	192
151	18	110	292	191
152	18	111	293	191
153	18	112	294	191
161	21	116	298	188
178	26	109	291	183
198	29	101	283	180
243	34	64	246	175
261	37	47	229	172
264	37	46	228	172
267	39	44	226	170
271	41	42	224	168
272	40	42	224	169
278	43	37	219	166
305	39	20	202	160
325	53	12	194	156

- Repetition of information
- Fig. 5 is actually a table
- The reader wants to see where the points are

The meaning of references

- A study relies in part upon the work of others
- Authors are required to identify their sources of information == cite references
  - Not only to credit where it is due
  - But also to provide the reader the access to these
- Authors' ethics: External material MUST be identified wherever used
  - But to insert full documentation is disctracting and cumbersome
- A solution: references

Two basic components

- Text citation
  - A brief identification of the information source
  - Appears in the body text, caption, footnote, etc.
- Reference
  - A full bibliographic version of the citation
    - So that the reader can find it unambiguously
  - Appears with similar listings in a separate reference list
  - Usually following the text; some fields: in footnotes

Various systems

- Number system
  - Text citation: "As highlighted in [1], ..."
  - Reference list: [1] Johnson, D. 2001. ...
  - Various appearances: (1), [1], superscript, etc.
  - Preferable in letter-type journals; saves space
  - *Estonian Journal of Engineering, Physics of Fluids*...
- Author-date
  - Text citation: "... found in (Beckers, 2003)"
    - So that the reader can find it unambiguously
  - Reference list: alphabetical Beckers, J.-M. 2003. ...
  - Gives much more information about the source
  - Sources can be easily added or deleted
  - *Estonian Journal of Earth Sciences, Journal of Marine Systems..*

Referencing

- **Do not 'cite' unless you have 'sighted' a reference**
  - Check carefully the publication data
- Demonstrate knowledge of the authoritative international literature
- Avoid long lists of 10-20 authors in the text
  - => laziness
  - => you haven't really read them all
  - Integrate references into the text

Integration of references: more an art than science

There are an increasing number of studies into [...] such as suspended matter (Graewe and Wolff, 2010, fish eggs and larvae (Mariani et al., 2010) or turtle hatchlings (Monzon-Argullo et al., 2010) or different adverse impacts such as oil (Korotenko et al., 2004), microorganisms (Korajkic et al., 2009) or marine litter (Yoon et al., 2010). The majority of the relevant research addresses the direct problem of current-induced propagation of passive tracers (e.g. Korotenko et al., 2010). The studies cover a wide range of applications, from a verification of the classical circulation models beyond that offered in a Eulerian assessment (Ohlmann and Mitarai, 2010) up to intricate statistical models of oil spill propagation based on a large number of propagation scenarios (Abascal et al., 2010) and coastal risk evaluation systems based on simulating the transport of underlying contaminant or toxic algae (Chrastansky and Callies, 2009; Havens et al., 2010).

The largest concentration of citations

1. Introduction
   - Description of the scope, content, etc.,
2. Material and methods
   - All used techniques and solutions
3. Discussion
   - Showing the results in the proper context

Bibliography: List of References

- Follow journal format exactly!
- Study the format carefully – each journal is different
  - Alenius, P., K. Myrberg, and A. Nekrasov A., "Physical oceanography of the Gulf of Finland: a review", *Boreal Environment Research*, 3:97-125, 1998.
  - Alenius P., Myrberg K., Nekrasov A., 1998, *Physical oceanography of the Gulf of Finland: a review*, Boreal Env. Res., 3, 97–125.
  - Alenius P, Myrberg K, Nekrasov A, Physical oceanography of the Gulf of Finland: a review. *Boreal Env Res* 3, 97, 1998.
- EndNote may help – but frequently does not