

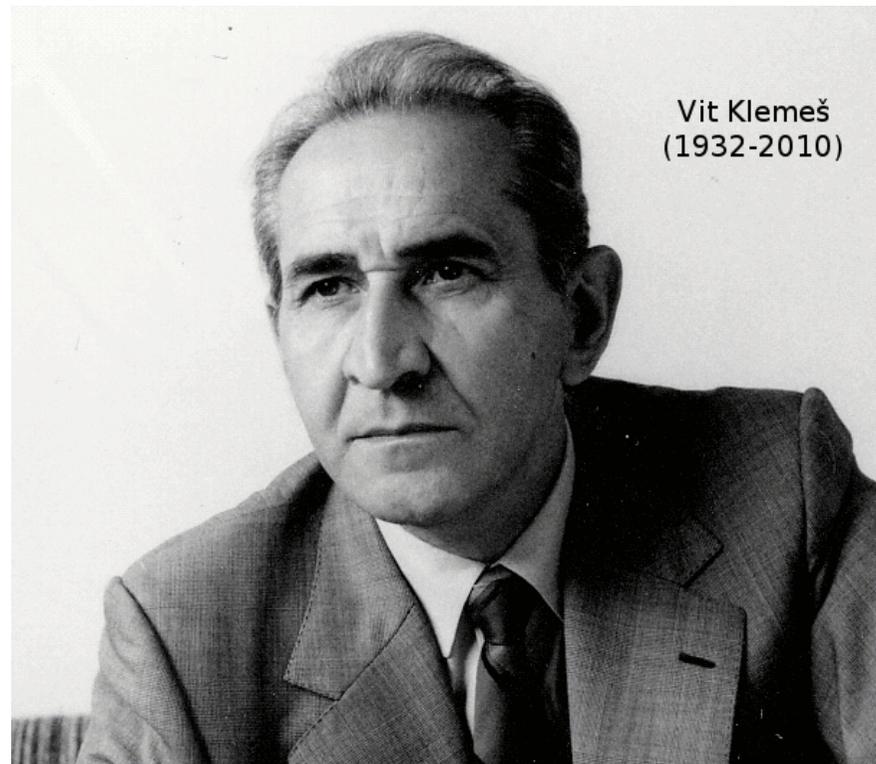


3<sup>RD</sup> STAHY INTERNATIONAL WORKSHOP ON STATISTICAL METHODS FOR  
HYDROLOGY AND WATER RESOURCES MANAGEMENT

OCTOBER 1 & 2- 2012



## A personal tribute to Vit Klemeš



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# Vit Klemeš at Perugia 2007

*"I still consider that the talk given by Vit at the General Assembly of IAHS in Perugia in July 2007 was one of his best - simple, witty and yet profound in its challenge to the practicing engineer and scientist. I suggest that it be linked from the announcement of his passing that you have put on the home page of our web site."*

Arthur Askew, IAHS Past President

(from the IAHS Web Tribute to Vit Klemeš, <http://iahs.info/history/klemes.htm>)

**IAHS General Assembly, Perugia, 8-14 July 2007**  
**Association lecture by Vit Klemeš**

1st IAHS Plenary : Monday 9, 18:00 - 19:30, Department of Mathematics Room I1

**"20 years later: What has changed and what hasn't"**

**Abstract** : While changes in hydrological regimes caused by rising CO2 levels have been a hot topic in recent years, changes in hydrological science, and in the thinking about water in general, have crept in without attracting much attention. Some examples will be presented to illustrate the point and to argue that the latter changes may be as important as the former.

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# Vit Klemeš on model validation

*Hydrological Sciences – Journal – des Sciences Hydrologiques*, 31, 1, 3/1986

## Operational testing of hydrological simulation models

V. KLEMEŠ

National Hydrology Research Institute,  
Environment Canada, Ottawa, Ontario, Canada  
K1A 0E7

**ABSTRACT** A hierarchical scheme for the systematic testing of hydrological simulation models is proposed which ties the nature of the test to the difficulty of the modelling task. The testing is referred to as operational since its aim is merely to assess the

In 1986, Vit Klemeš published in Hydrological Sciences Journal a masterpiece paper on model validation that still inspires young people today.

From the abstract:

*“The scheme contains no new and original ideas: it is merely an attempt to present an organized methodology based on standard techniques [...]”.*

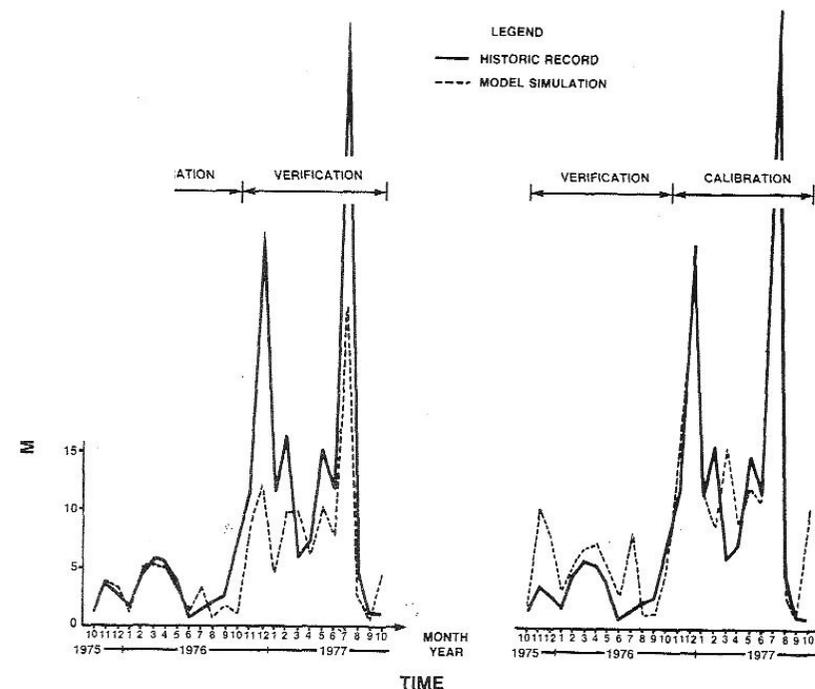


Fig. 1 Example of differential split-sample test for a simulation model for monthly flows using satellite-based information on cloud cover as input; for the Gers River at Layrac, France (Strübing, 1984).



# Vit Klemeš on model validation

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## **Operational testing of hydrological simulation models**

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Several years later Vazken Andréassian and Charles Perrin (Cemagref, France) reported a comment by Vit on the subject:

*“He was sceptical about the capacity of hydrologists to test rigorously their models, considering that the tests he had suggested “will be avoided under whatever excuses available because modellers, especially those who want to ‘market’ their products, know only too well that they would not pass it. [...] I had no illusions in this regard when I wrote my paper, but the logic of modelling led me to develop the ‘testing principle’ to its, let’s say, ‘theoretical limit’.*

(From the IAHS Web Tribute to Vit Klemeš,  
<http://iahs.info/history/klemes.htm>)

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# Vit Klemeš on reservoir management

Vit Klemeš was a brilliant engineer. One of his main focuses was reservoir management.

He translated selected masterpiece contributions from the Russian literature published in the 30ies and 40ies. He noticed that they anticipated scientific developments presented by the English literature some 10-30 years later.

One may be amazed by Klemeš' linguistic skills. In the paper shown aside he describe his profound inspiration to learn several languages:

*“And so, having acquired (after 1945) an ability to read Russian and the privilege (after 1968) to write in English (for the former I am obliged, so to speak, to Josef Stalin and for the latter to Leonid Brezhnev), [...]”.*



[4]

Journal of Hydrology 172 (1995) 351–354

Journal  
of  
**Hydrology**

## Two early Russian contributions to the theory of the stochastic reservoir

V. Klemeš

3460 Fulton Road, Victoria, B.C. V9C 3N2, Canada

Received 29 March 1994; accepted 6 December 1994

### 1. Historical background

The papers of A.D. Savarenskiy (1940) and S.N. Kritskiy and M.F. Menkel (1940) have waited 55 years for their English translations, which appear in this issue. These two papers, printed side by side in the same issue of the Russian journal *Gidrotekhnicheskoe stroitelstvo*, constitute (together with A. Hazen's paper of 1914) the foundation of the theory of the stochastic reservoir.

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# Vit Klemeš on reservoir management

It is interesting to note that he proved that the results on reservoir management obtained by linear programming and dynamic programming could be also obtained (and more efficiently) by using storage mass-curve analysis.

He criticised the modern (in the seventies!!!) scientific attitude according to which:

*“[...] previously simple concepts are now blurred by the use of pretentious language and largely ornamental mathematics [...]”.*

And:

*“In particular, it will be shown that after more than a decade of concentrated effort by an army of high-caliber researchers and after volumes of dissertations piled high and deep, swollen with jargons of Hegelian obscurity and bursting with a frightening overkill of equations that have exhausted several times over the notational capacity of two alphabets and caused breakdown of many a computer, [...]”.*

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## Storage Mass-Curve Analysis in a Systems-Analytic Perspective

V. KLEMEŠ

*Hydrology Research Division, Inland Waters Directorate, Environment Canada, Ottawa, Ontario, Canada*

During the past decade, the systems approach to storage reservoir problems has been heralded as something of a jump from the stone age of mass-curve analysis into the modern era of science. In reality, however, no such jump ever occurred. There were a number of small ones but, contrary to the common belief, many of them were confined to the staircase of mass-curve analysis and not all of them were in the upward direction. This paper attempts to put the mass-curve technique into a proper perspective by clearing out some undesirable semantic underbrush accumulated over the past decades and by showing an intrinsic identity of some mass-curve and systems-analytic formulations. It demonstrates that, for the important special case of convex loss functions, both the dynamic and the linear programming formulations of optimum reservoir operation policies as developed over the past decade still have a long way to go to match a 55-year old mass-curve technique in terms of exactness, accuracy, as well as computational efficiency. Last but not least, it shows that the mass-curve technique provides insights into the problems of storage reservoir operation which are entirely out of reach of the systems-analytic methods and can significantly enhance the art of reservoir design and operation.

### INTRODUCTION

The plot of a function  $X(t)$  defined as an integral

$$X(t) = \int_{t_0}^t x(\tau) d\tau \quad (1)$$

and called the mass diagram or the mass curve has been used as a convenient tool for graphical integration in many engi-

dark background. However, the reason why in storage reservoir analysis mass-curve techniques were chosen as the most desirable background of this sort was not merely the term's lack of systems-analytic appeal. Much more significant was the fact that, by the time the systems-analytic bandwagon arrived on the American scene in the early 1960's, the term 'mass-curve technique' had already been considerably discredited by

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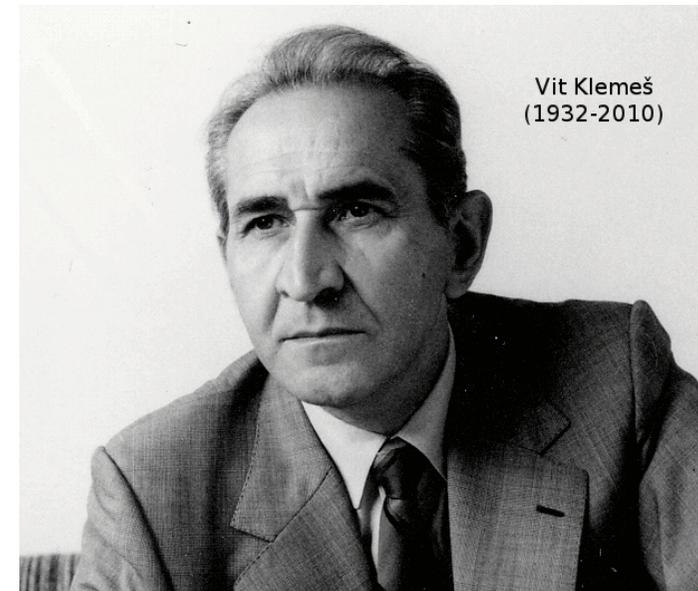
# Vit Klemeš' sense of humor

From Vazken Andréassian and Charles Perrin tribute,  
<http://iahs.info/history/klemes.htm>:

*His 1988 paper entitled "A hydrological perspective" is truly a masterpiece: there, he adapted to hydrology the radio Yerevan riddles, used in the former Soviet Union as a way to criticize the inner contradictions of the Soviet system. He used their stereotypic format – which always starts with an inquiry to radio Yerevan and continue with an answer starting with "In principle yes, but..." to end up by deconstructing the meaning of the affirmative answer. Here is how Klemeš summarized the contradictions of hydrological science:*

*Question to radio Yerevan: "Is it true that hydrologists are the scientists who study the relationships within the water cycle?"  
Answer by radio Yerevan: "In principle yes, but they are not scientists - they are technologists; and they don't study them - they fudge them."*

Vit Klemeš liked the provocative tone, which he always accompanied with a unique sense of humour, therefore resulting in very effective provocations.



Vit Klemeš  
(1932-2010)



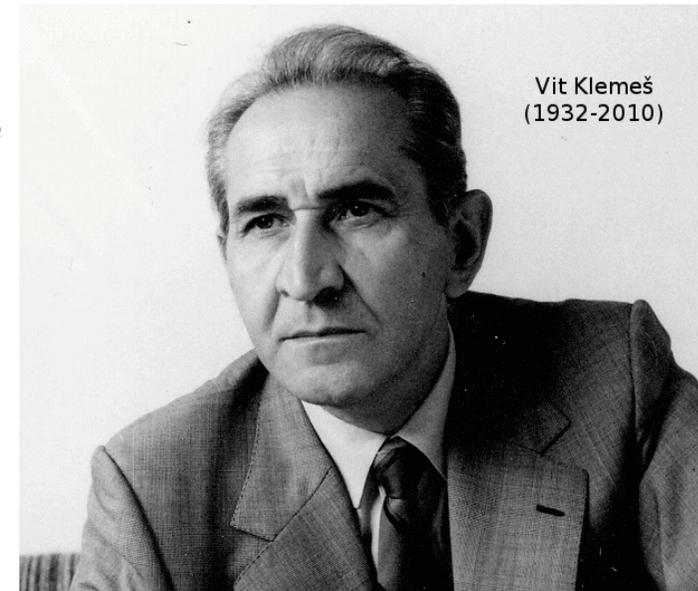
# Vit Klemeš

## A Hydrologist, an Engineer

Vit Klemeš' contributions to hydrology will remain in the history of science, but we should not forget that he was a brilliant engineer (he was awarded the "Ven Te Chow Award" from the American Society of Civil Engineering in 1998).

I believe he was one of the best interpreters of Hydrology as a Science on its own but he never forgot the role of Hydrology in engineering applications.

Vit Klemeš' papers are a very relevant reading for young researchers today.



Vit Klemeš  
(1932-2010)