

Zdenek and Flare Research

Hugh Hudson

UC Berkeley and University of Glasgow

Argentina (1974)



Front row: Gergely, Underwood, Rust, •, Svestka, Krieger, Kahler, Golub, Parkinson, Pye, •, Hudson, De Feiter, •, Doschek

The rest: •, •, Ghielmetti, Yousef, •, Simnett, Vorpahl?, Cheng, •, Machado, Brueckner, Ramaty, Goldberg, Gosling, Lin, Fan, Takakura, Datlowe, Jordan, Culhane, Sahade

Argentina (1974)



Argentina (1974)



Marcos Machado

Argentina (1974)



Bob Lin

Leen De Feiter

MIT (1976?)



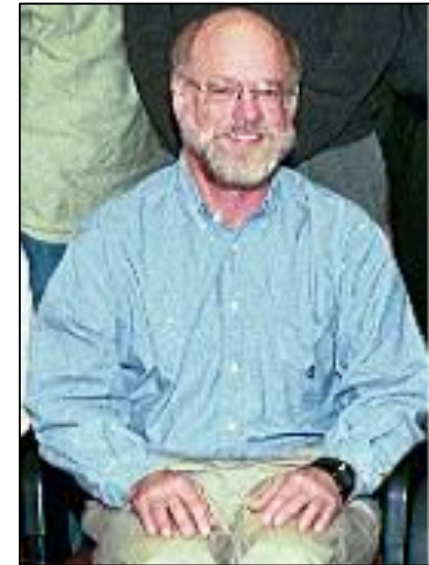


Paul Hick (center)

To UCSD (San Diego)



Larry Peterson



Bernie Jackson

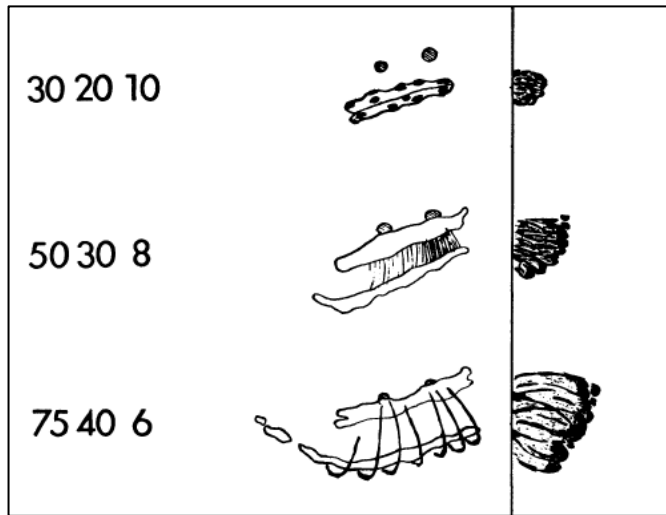
Zdenek's Research Trajectory

- Ondrejov: High-resolution spectroscopy; white-light flares; PCAs
- ESTEC: *Solar Physics*; eruptive flares; flare build-up
- Cambridge (USA): X-rays; eruptive flares
- UCSD: Eruptive flares, X-rays
- (Netherlands: jets, hard X-rays, interconnecting loops, eruptive flares...)

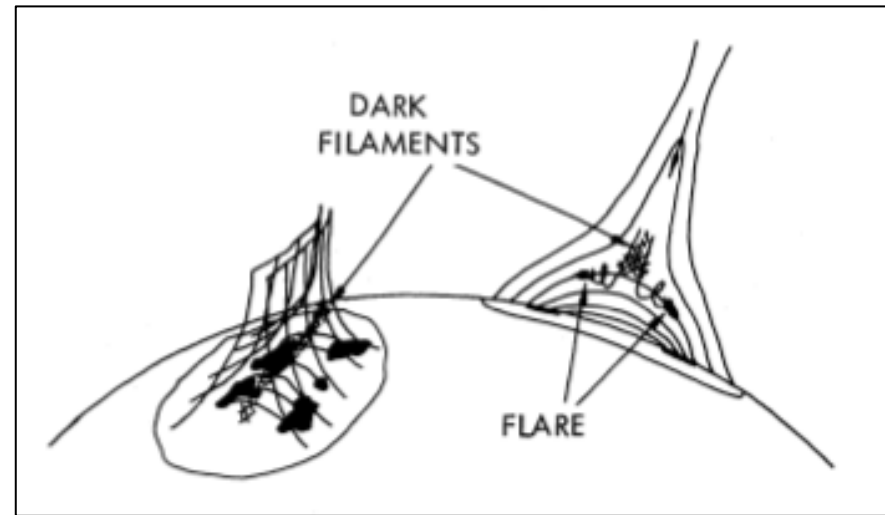
Specific Zdenek topics historically (then vs now)

- “Loop prominence systems”
- Giant Arches
- The Flare Build-Up Study
- White-light flares

Flare loops then

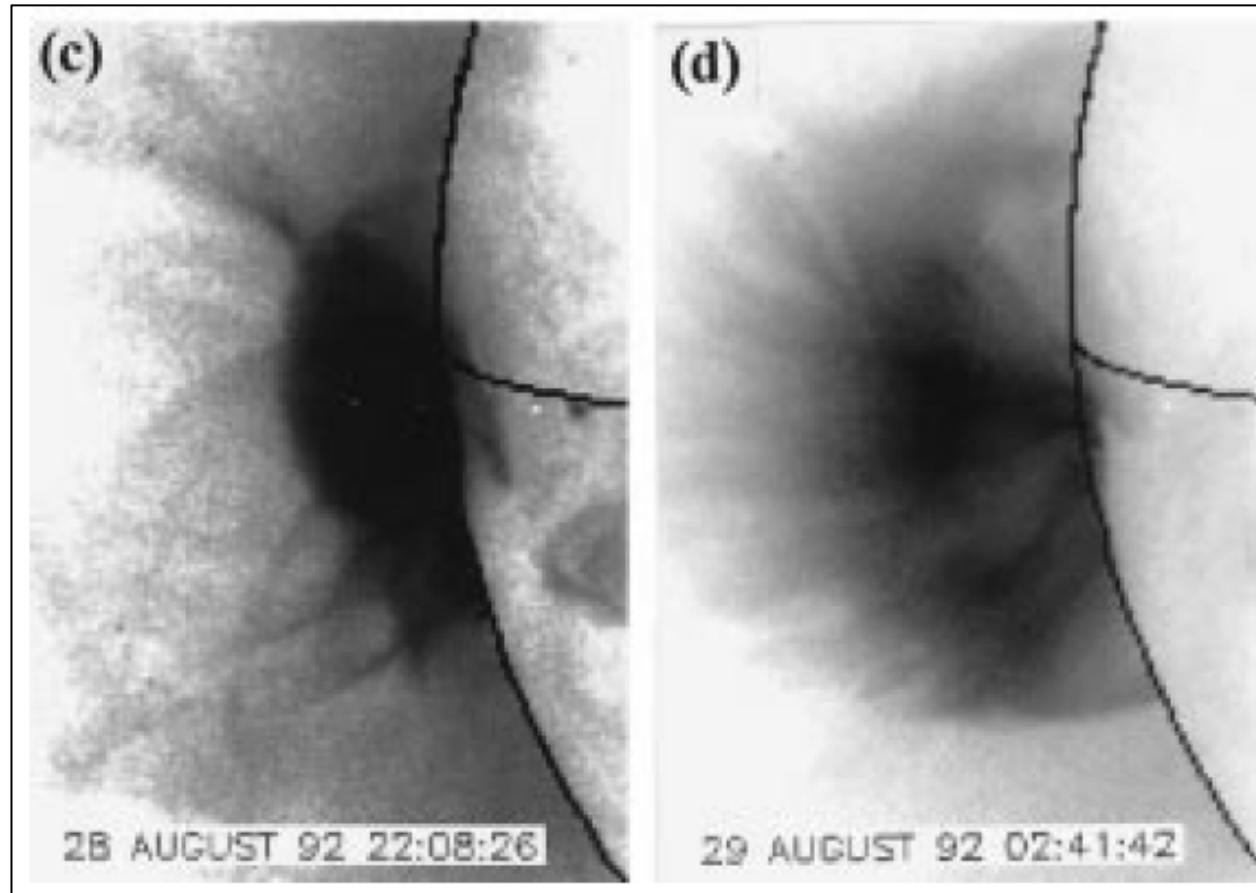


Bruzek 1964



Carmichael 1964

Flare loops now



Svestka et al. 1998

See David McKenzie's talk

Flare loops now

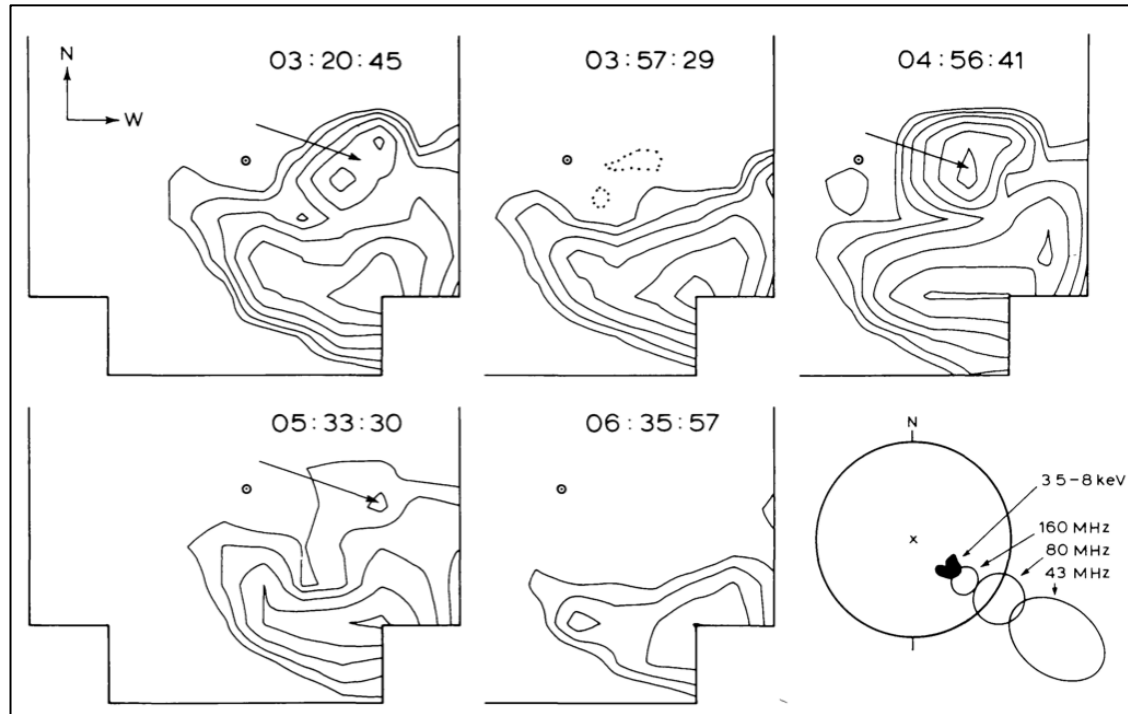
The Misnomer of “Post-Flare Loops”

Zdeněk Švestka

Received: 17 September 2007 / Accepted: 12 November 2007 / Published online: 27 November 2007
© Springer Science+Business Media B.V. 2007

Abstract Attention is drawn to the fact that the term “post-flare loops” is incorrect and should be avoided, because the loops are parts of the flare itself. Two other names for these loop systems are suggested.

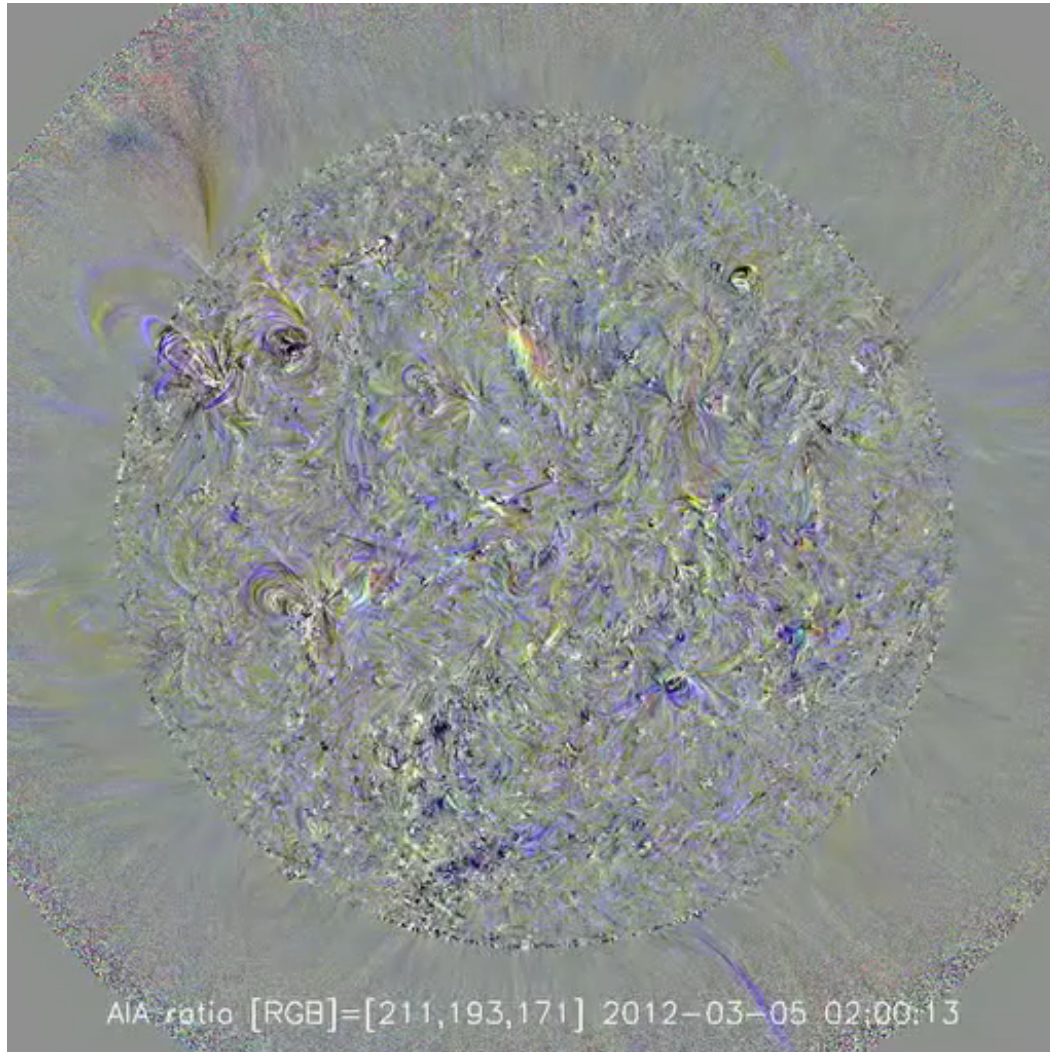
“Giant Arches” then



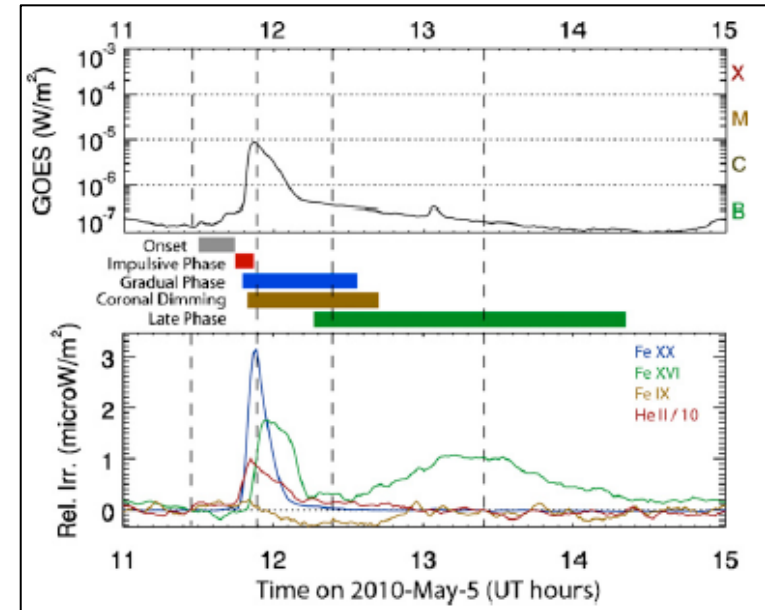
Svestka, 1983

- Zdenek noted large-scale structures not following the expected morphology
- The HXIS data here were generalized by Yohkoh/SXT in the 1990s

“Giant Arches” now



Karel Schrijver, 2014



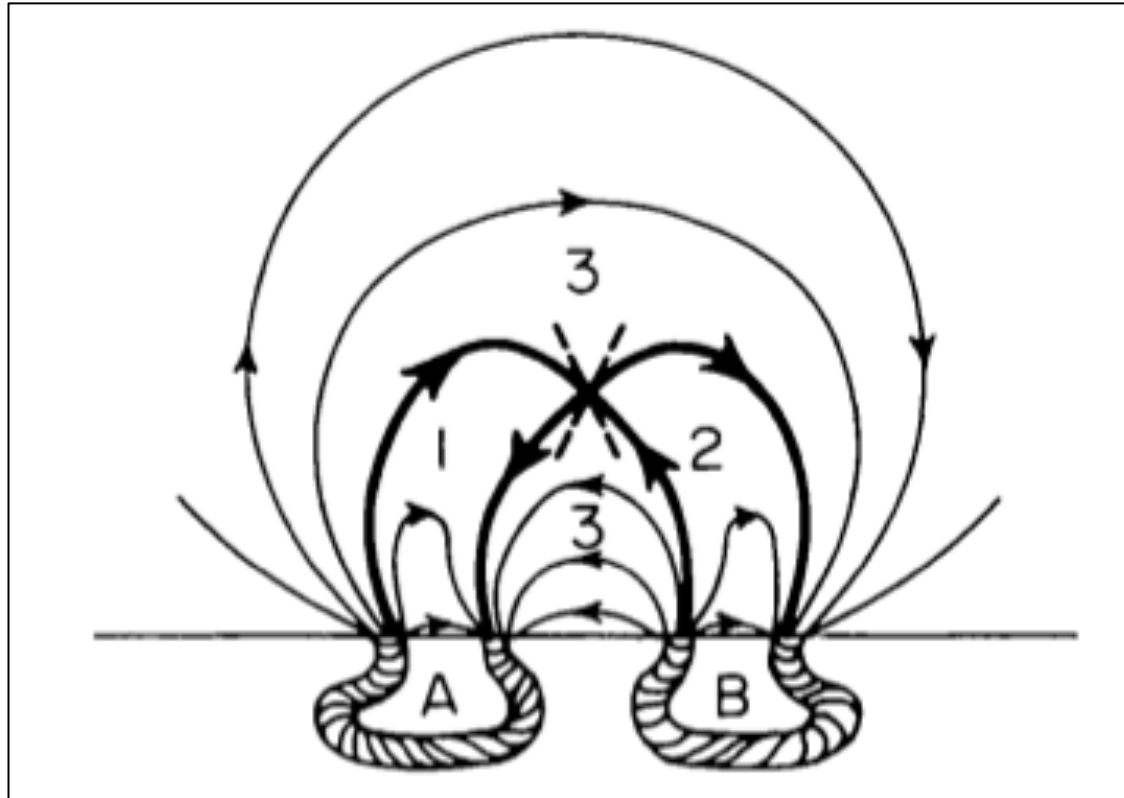
Woods et al. 2011

- The nature of the giant arches remains unclear.
 - “EVE late phase”?
 - the true post-CME reconnection, as opposed to the flare loops themselves?

Flare Build-up Study

- A SCOSTEP project led by De Jager, Svestka, Obayashi, and De Feiter
- Flare/Magnetosphere emphasis
- Publication in Solar Phys. V. 47, 1976
- Topical today, though not well-cited

Flare Build-up Study then

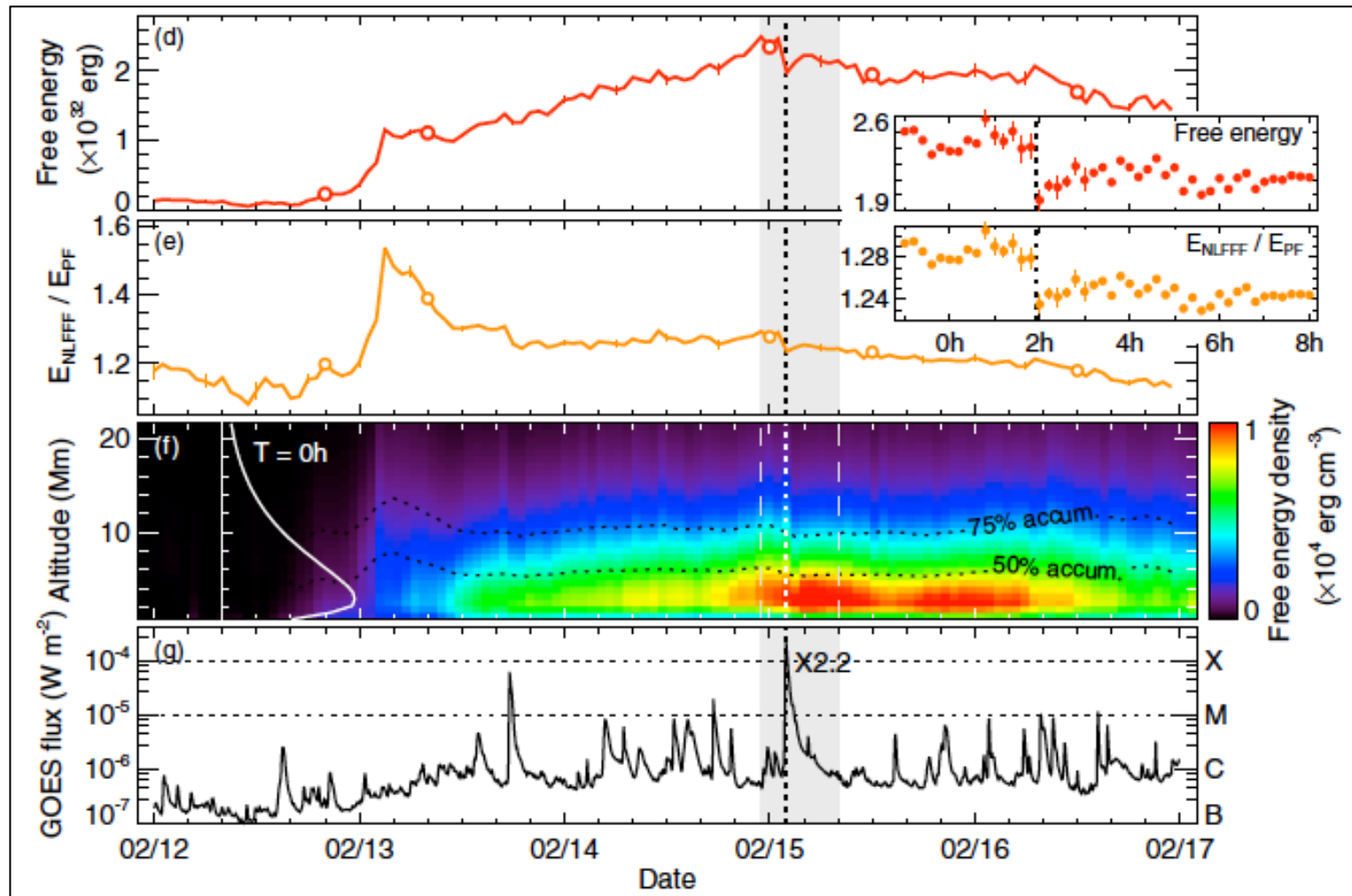


Cartoon from Bratenahl & Baum, 1976, showing the topology of an "Impulsive Flux Transfer Event"

Flare Build-up Study now

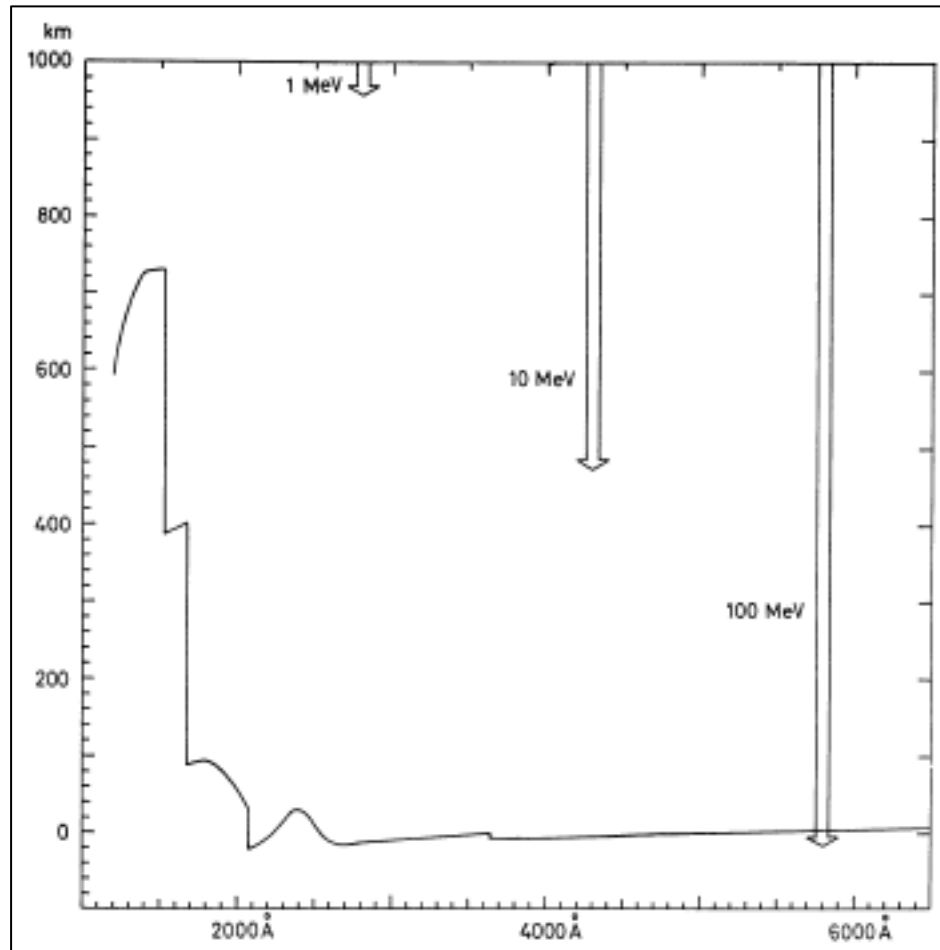
- There has been no confirmation yet of the “relaxation oscillation” behavior.
- Extrapolations for magnetic free energy are now possible, but must be considered marginal at present (apologies to T. Wiegmann; see next slide).

Flare Build-up Study now



Sun et al., 2012

White-light flares then



Svestka, 1970

- Zdenek worked with high-resolution spectroscopy at Ondrejov
- He had studied densities via the Balmer lines
- He became interested in “proton events”

These antecedent interests led him to an interesting proposition:

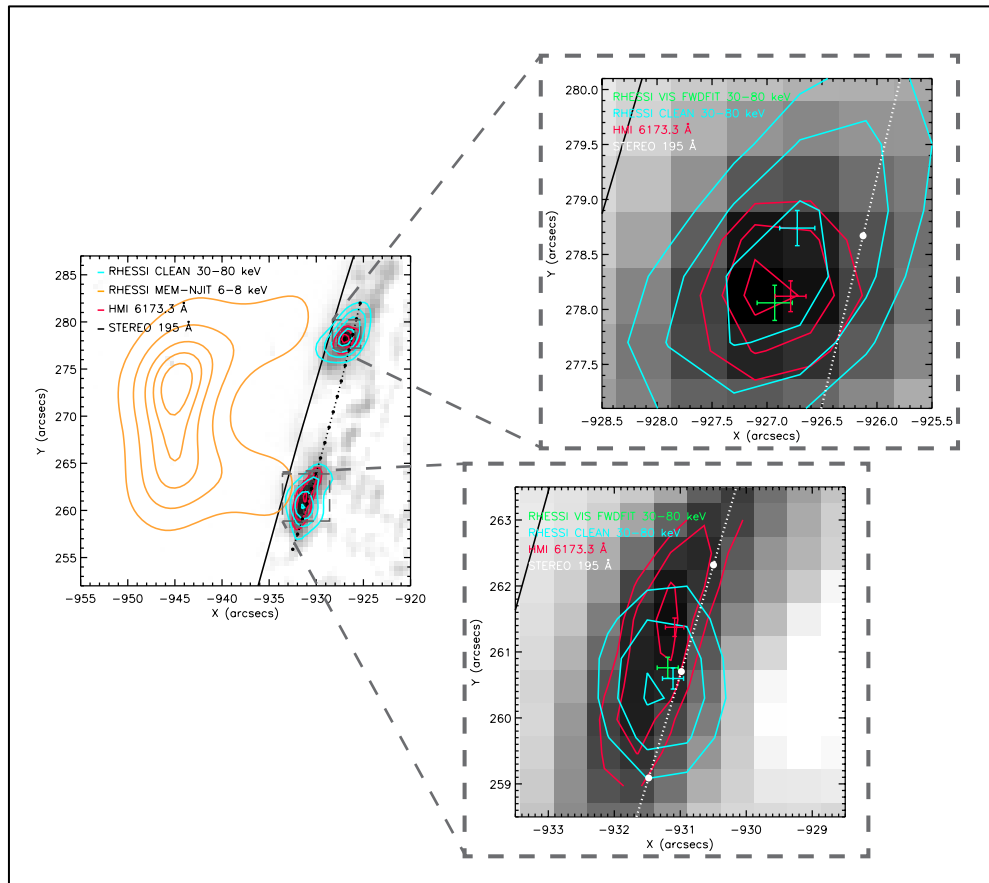
Could non-thermal particle acceleration explain flare energy release?

White-light flares now

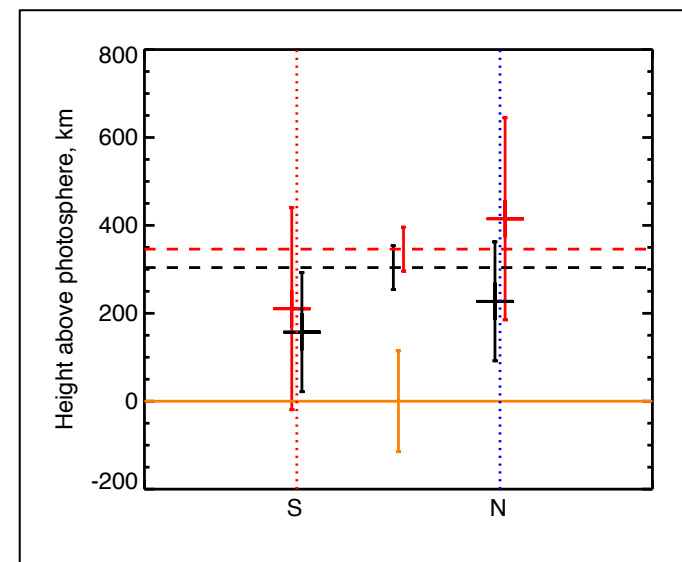
- Proton precipitation has been deprecated because of the energetics

- Electron precipitation seems to be going the same way

Non-thermal particle may explain flare energy release, but not transport



Martinez Oliveros et al. 2012



Summary

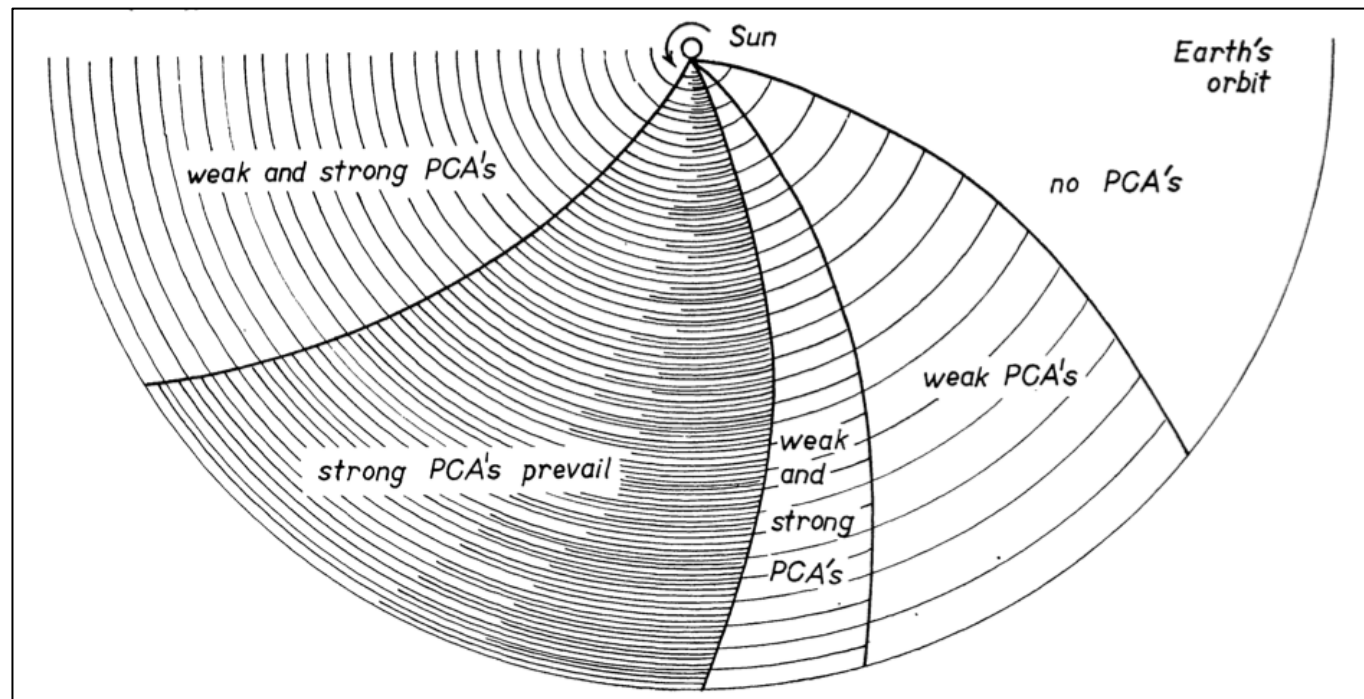
It is impossible to discuss Zdenek's legacy in 20 minutes, but it is clear that his ideas were at the forefront (or ahead of it) in many areas. I was privileged to work with him on some of his ideas, and to count him as a friend as well as a colleague.

Thanks!

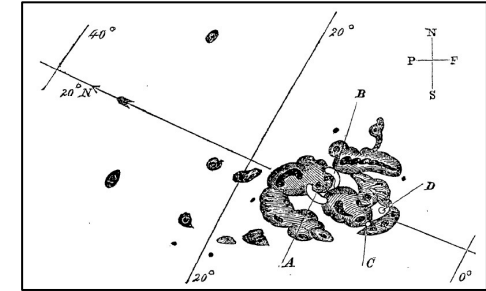
PROTON FLARES BEFORE 1956

Z. Švestka, Astronomical Institute of the Czechoslovak Academy of Sciences, Ondřejov

Протонные вспышки перед 1956 годом.



Carrington Flare energetics



- WL area ~ 200 MSH*
- Flare duration ~ 300 s
- Flare intensity 2x solar

Energy ~ 2×10^{32} erg

A reasonable modern interpretation of this simple result is that the radiant energy in the flare's impulsive phase dominates the flare energy – do modern data confirm this?