Using CIMIS ETo and satellite NDVI as the foundation of your irrigation management program

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DWR CIMIS network

- California Irrigation Management Information System

- 150 weather stations throughout the state to provide accurate reference evapotranspiration (ETo)

- Two new stations in 2022:
  - Paso Robles Airport (J. Lohr Winery)
  - Shandon (Sunview)

Accurate ETo requires a "reference surface"
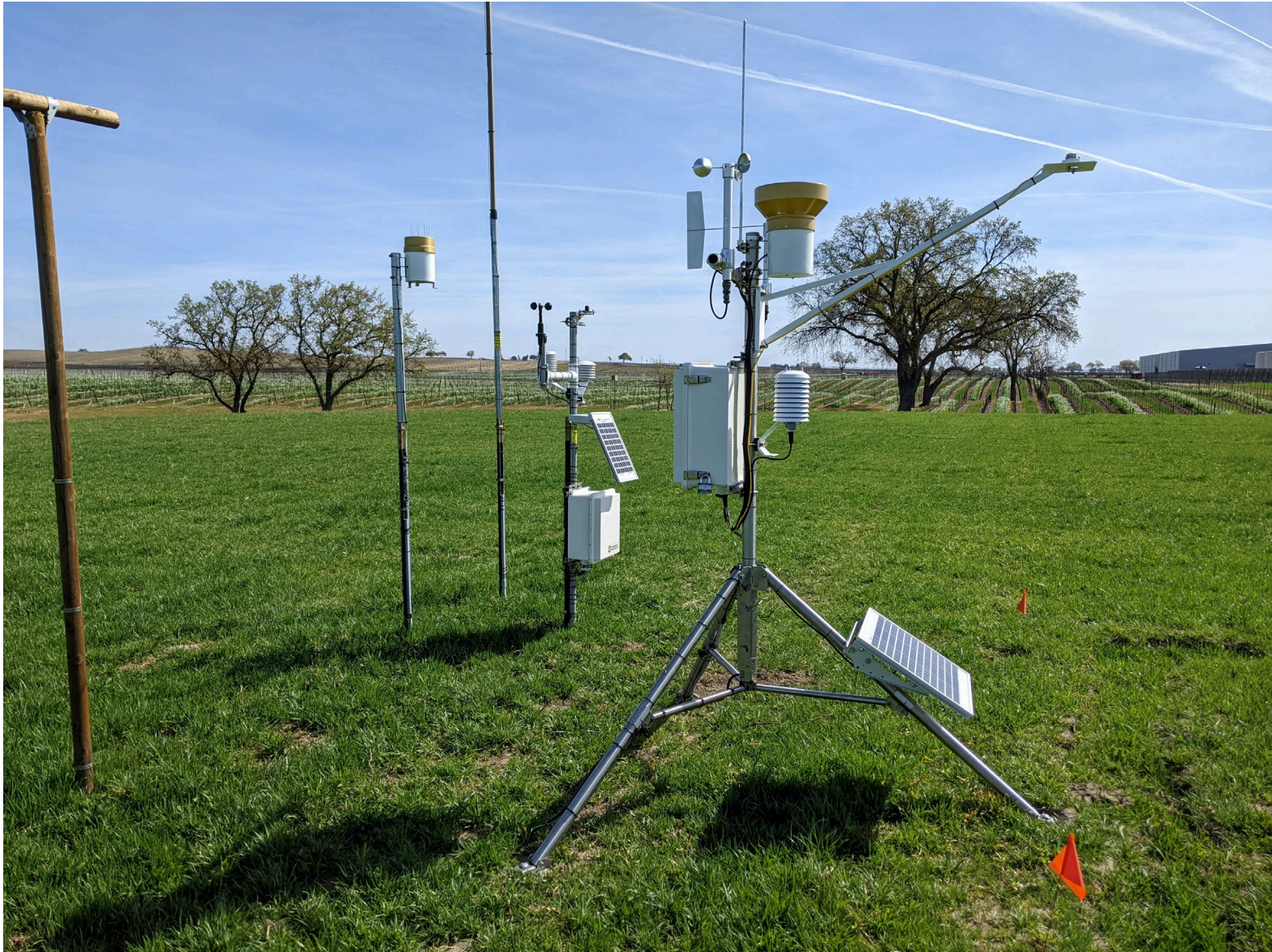
Accessing ETo data

- Standard CIMIS webpage
  - View and download data

- Through the Spatial CIMIS webpage
  - Have data emailed to you automatically

	A	B	C	D	E	F	G	H
1	Address	Latitude	Longitude	Date	ETo (in/day)	qc	Sol Rad Av	qc
2	Paso Robles, CA	35.67463	-120.634	3/14/2022	0.15		485	
3	Paso Robles, CA	35.67463	-120.634	3/15/2022	0.13		419	
4	Paso Robles, CA	35.67463	-120.634	3/16/2022	0.16		490	
5	Paso Robles, CA	35.67463	-120.634	3/17/2022	0.14		428	
6	Paso Robles, CA	35.67463	-120.634	3/18/2022	0.16		493	
7	Paso Robles, CA	35.67463	-120.634	3/19/2022	0.1		334	
8	Paso Robles, CA	35.67463	-120.634	3/20/2022	0.14		516	

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Two approaches to using ETo

1) To determine how much irrigation to apply now, to make up for what was lost in past X number of days

2) To quantify how irrigation is being managed relative to potential vine requirements, in real time or after-the-fact

Crop coefficient: Traditional Kc

- Fully well-watered crop:
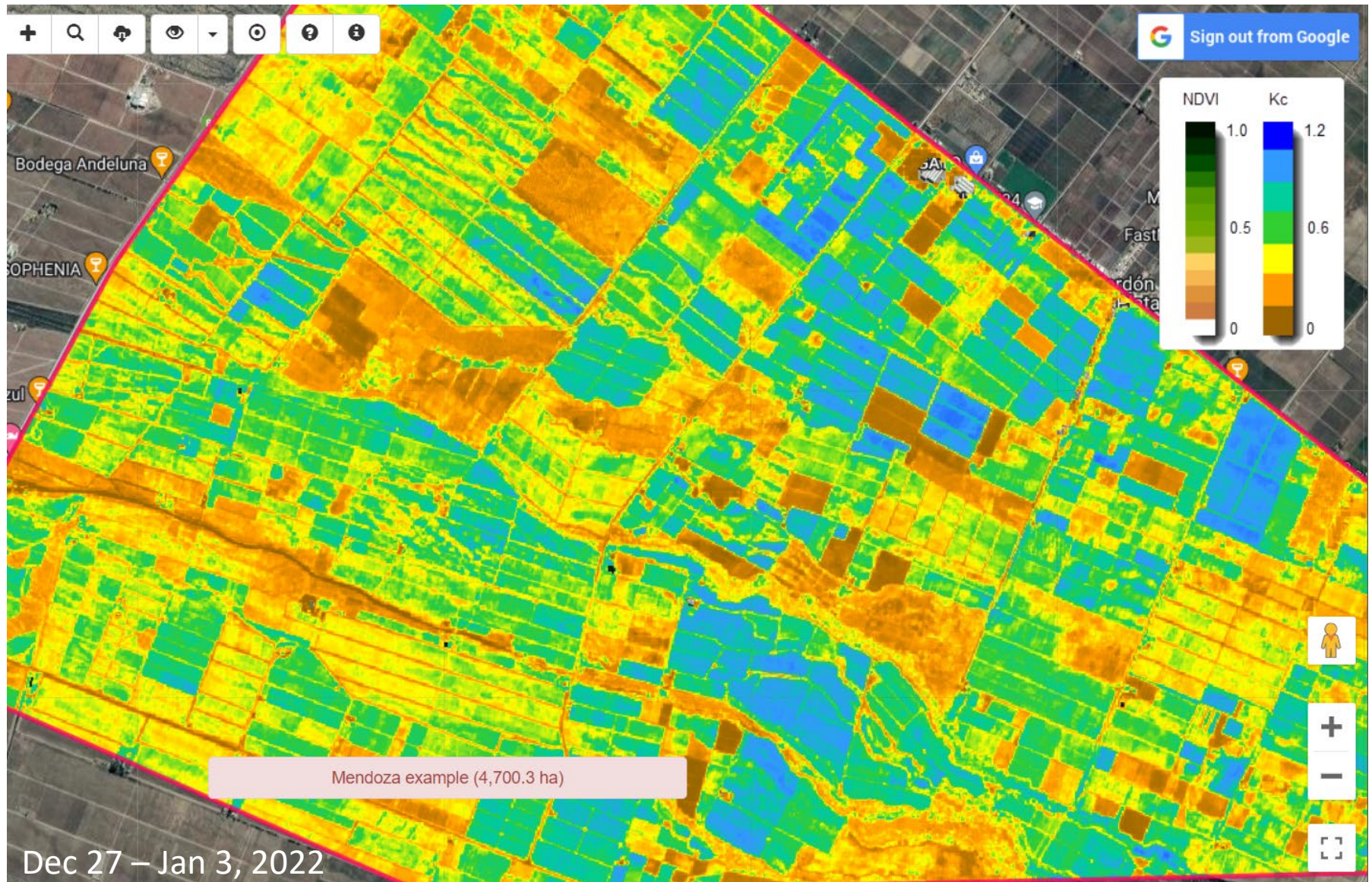
  Kc * ETo = ETc

- Accounting for deficit:

  Kc * ETo * deficit factor = Irrigation to apply

- Implement this approach gradually, and review past data to refine over time

Satellite Kc-NDVI

- A satellite passes over every ~3 days

- Kc-NDVI available for free over entire globe

- Past measurements archived

- IrriSAT website:

  https://irrisat-cloud.appspot.com/

IrriSAT website

Dec 27 – Jan 3, 2022

Mendoza example (4,700.3 ha)

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Taking advantage of historical data

- Irrigation = Kc * ETo * Deficit factor

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Taking advantage of historical data

- Irrigation = Kc * ETo * Deficit factor

- Deficit factor = Irrigation / (Kc_{NDVI} * ETo)

- If you do this for a past year when the block performed well, then you have created a "Deficit factor" target to aim for

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Example calculation

- Week of July 1-7, 2021

    ETo: 1.5 inches

    Kc_{NDVI}: 0.45

    Irrigation applied: 0.4 inches

- Equation:

    Deficit factor = 0.4 inches/(0.45 * 1.5 inches) = **0.61**

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Hypothetical targets

Current weather (ETo) + Current canopy size (Kc_NDVI) → Deficit factor from previous great year → Irrigation to apply

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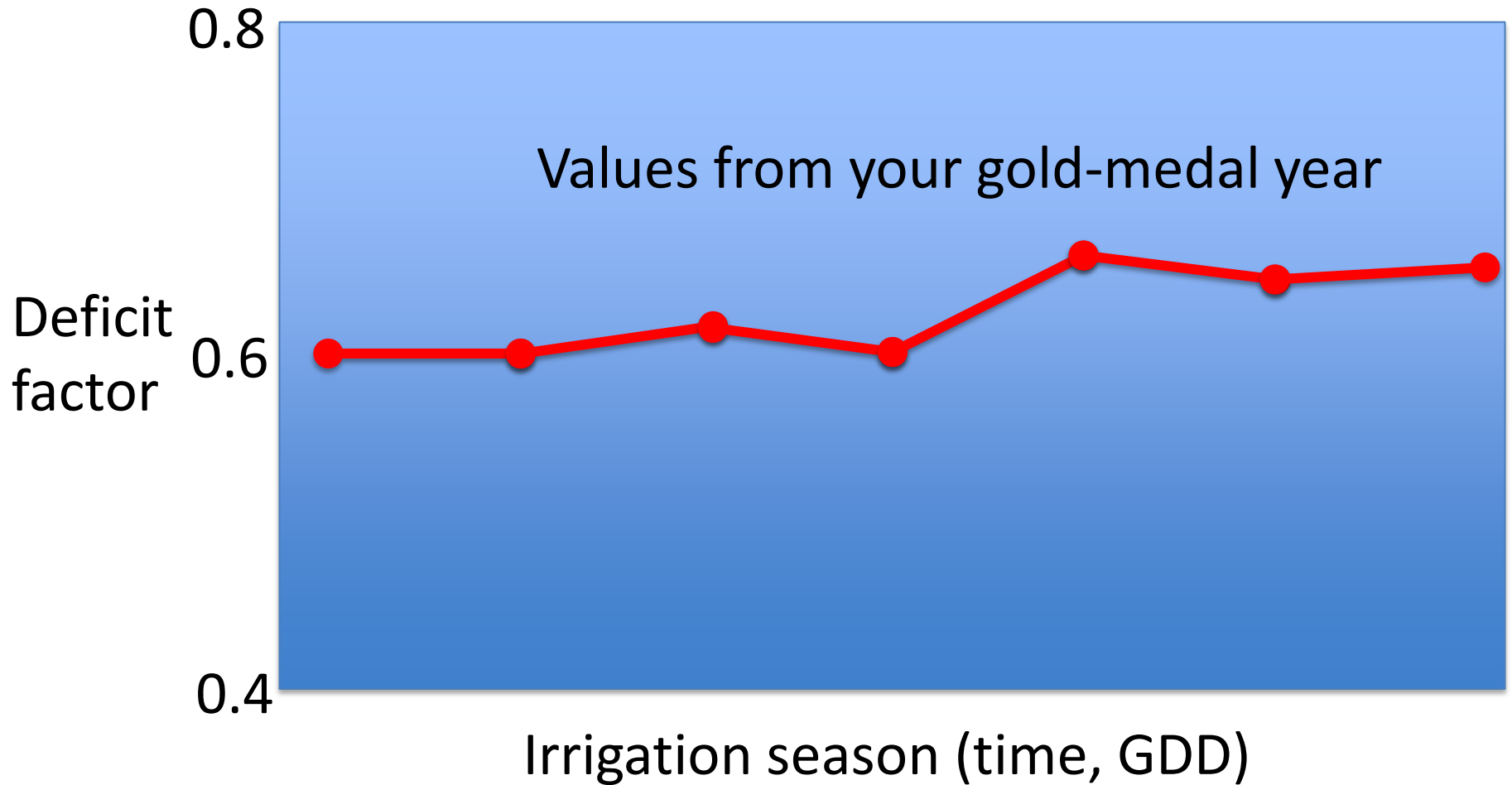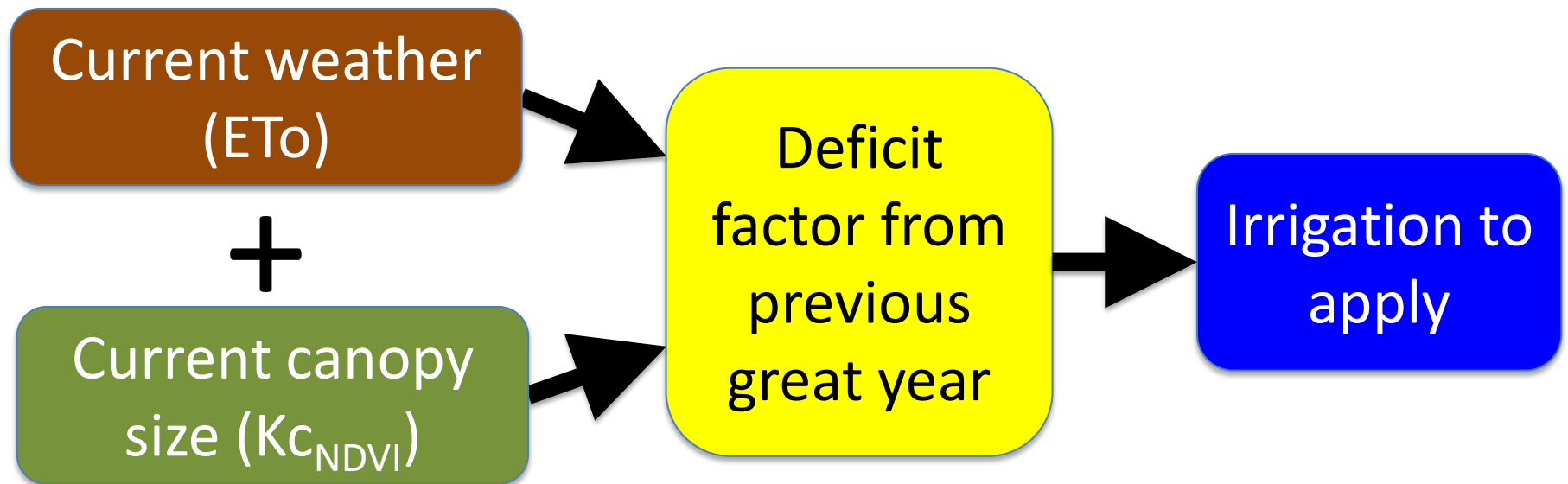
Summary

- Your:
  - Historical irrigation records
  - Observations of past vineyard performance
- Together with free:
  - ETo data
  - Kc_{NDVI} from satellite data
- Can help you repeat the irrigation conditions you achieved in previous "best" seasons

Thanks to:

Paso Robles CIMIS station:

- J. Lohr Winery
- Estrella-El Pomar-Creston Water District

Shandon CIMIS station:

- Sunview Vineyards
- Grapevine Capital Management

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