

KARTOTRAK

FOR CONTAMINATED SITE CHARACTERIZATION



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Geovariances

Where no one has gone before

WHO WE ARE



Leader in geostatistics

Independent software vendor

Committed to providing **independent expertise** to the industry

Created in
1986

3 offices
France
Australia
Brazil

45
geoscientists
developers
sales/admin

500+
client
companies

Turnover
5+ M€

COMPLETE SOLUTION BASED ON GEOSTATISTICS



Software

technical
support included



Consulting

mentoring &
tech. assistance



Training

software use &
methodologies

OUR SOFTWARE SOLUTIONS

Comprehensive and
expert geostatistics
software solution

iSatis

1500+
licenses
worldwide

Industry-related software
solutions based on Geovariances
new development platform



Geostatistical libraries

HALLIBURTON
Landmark Software
& Services

 **DATAMINE**

CONSULTING SERVICES



**Last
2 years**

150+

studies / assistance
worldwide

High quality studies accomplished
by highly skilled consultants

- Sampling optimization
- Data QC and analysis
- Mapping and risk analysis
- Assessment of contaminated land volumes
and masses and related uncertainties

TRAINING SERVICES



**Last
2 years**

550+

Geoscientists
trained worldwide

Our training offering helps you gain your **autonomy**:

- dedicated to **software use / geostatistics**
- **public / private** sessions
- **classroom / web-based** training
- **standard / customized** content
- for **beginners / advanced** users /
awareness of project leaders

OUR REFERENCES IN SITES & SOILS



Geovariances

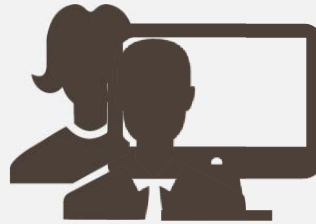
Born out of a
decade's
partnership
with CEA

The logo features a stylized 3D cube with a green top face and an orange front face. The orange face has a white crosshair pattern. To the right of the cube, the word "kartotrak" is written in a bold, lowercase, sans-serif font. A white orbital ring with a small black dot at its center is positioned around the letter 'o' in "kartotrak".

kartotrak

Integrated software solution for
contaminated sites and soils characterization

2011
1st release



50
licenses



30
client companies

FOR WHAT



1. **Acquire** data in real time
2. **Integrate and view** all data, boreholes, topography, buildings, roads, etc.
3. **Prepare** sampling plans
4. **Map** the contamination in 2D or 3D
5. **Identify** areas to excavate or to remediate in situ
6. **Estimate** the contaminated land volumes or masses according to the regulatory level of risk

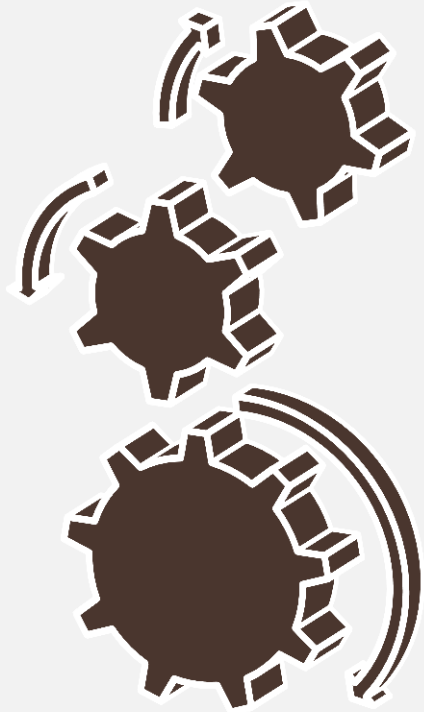
FOR WHO



Everyone involved in site characterization or remediation projects

- Industrials / site owners
- Safety authorities
- Consultancy firms

HOW IT WORKS



Simplified and optimized workflow
from in-situ characterization
to final control after remediation

based on :

- GIS components
- Geostatistical analysis and processing of data
- A real-time data acquisition module

WHY GEOSTATISTICS

To account for pollutant spatial continuity in order to:

- **Predict its level** at unsampled locations
- Quantify the **estimation uncertainty** at these locations

Geostatistics has also been applied for 50+ years for mineral resource estimation, oil reservoir modeling, hydrogeology, etc.



Geostatistics has been applied
for soil characterization
for **15+ years**

KEY ADVANTAGES

User-friendly



Smart, intuitive,
modern user interface

Fast



Powerful
technology,
fast learning curve

Secure



All-in-one streamlined
workflow, a guide for
users, focus on most
useful parameters only

KEY ADVANTAGES

Tried-and-tested geostatistics derived from well-proven key algorithms

Double expertise: CEA + Geovariances

Field-tested software solution:

- Research centers (CEA)
- Power plants (EDF)
- Industrial sites (Areva, Engie, Solvay, Total, etc.)
- Experimental sites (IRSN)

30 YEARS

software dvpt
& geostats
R&D



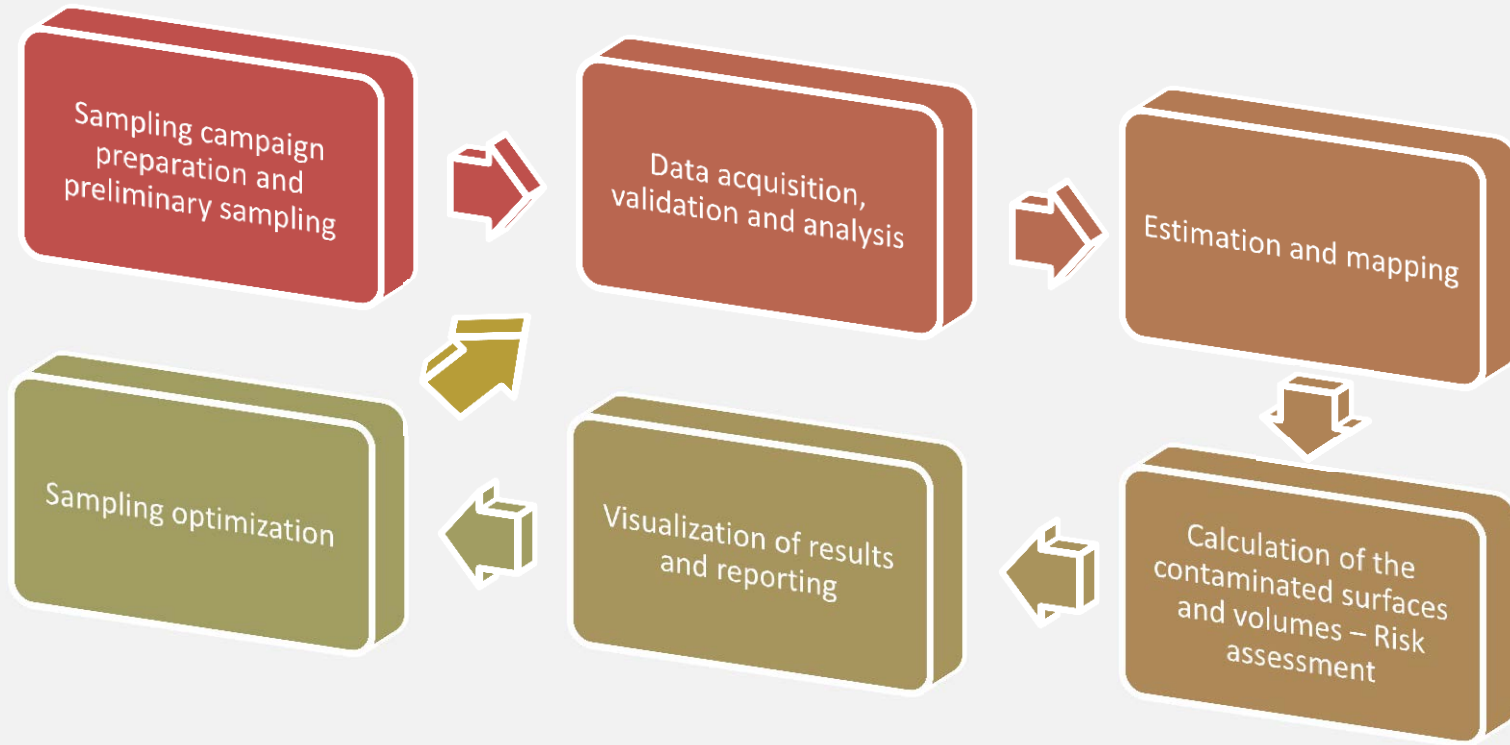
Probability map of exceeding
10 mSv/h at Fukushima Daiichi
nuclear power station

KARTOTRAK

DETAILED FEATURES

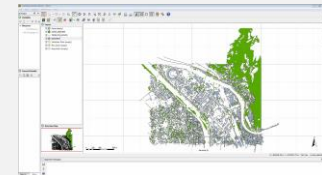
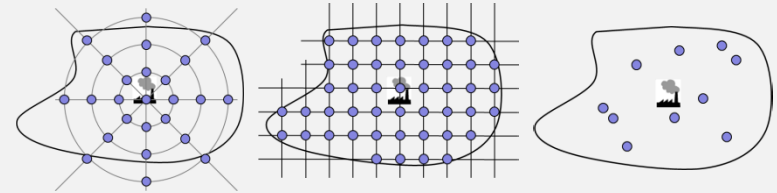
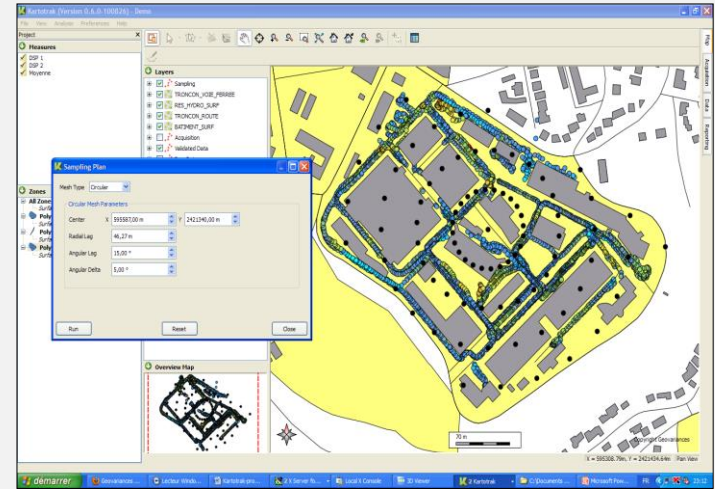


KARTOTRAK, A USER-FRIENDLY & COMPREHENSIVE SOFTWARE SOLUTION



PREPARATION OF THE SAMPLING CAMPAIGN

- Interactive delineation of the **target area**
- Taking into account the **environmental context**
- Definition of the **preliminary sampling plan**
- **Optimization** according to evaluation objectives



DATA LOADING AND MANAGEMENT

- Storage of **any kind of data**, 2D (surfaces) or 3D (boreholes)
- Data **integration**:
 - Real-time data acquisition
 - File import (.csv)
- A 3-level database



Karttrak (Version 2012-120613) - 3D Tutorial

3D Project

Boreholes Variables

- Measures
 - THC
 - Litho
 - Contact
- Zones & Results
 - Zone
 - Surface x: 42122.8 m²
 - Topo: Topography Bottom: Bottom
- Contacts & Surfaces
 - Topography

New Boreholes

Topo	x (m)	y (m)	z (m)	Borehole	Length (m)
1	619060.63	2279000.38	28.60	A7	5
2	619045.62	2279000.39	28.23	A8	4.5
3	619030.61	2279000.42	29.14	A9	4.5
4	619015.60	2279000.42	27.48	A10	4.5
5	619060.61	2278985.37	28.56	B7	5
6	619045.60	2278985.39	29.02	B8	4.5
7	619030.60	2278985.40	29.17	B9	4.5
8	619015.59	2278985.42	27.24	B10	4.5
9	619060.61	2278970.36	28.04	C7	5

Validated Boreholes

Topo	x (m)	y (m)	z (m)	Borehole	Length (m)
1	619060.63	2279000.38	28.60	A7	5
2	619045.62	2279000.39	28.23	A8	4.5
3	619030.61	2279000.42	29.14	A9	4.5
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7	619030.60	2278985.40	29.17	B9	4.5
8	619015.59	2278985.42	27.24	B10	4.5
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Boreholes Validation

Boreholes

Minimum Distance Between Two Boreholes: 1.00 m

Detection Limits

Measure	Replacement Value
1 THC	Detection Limit

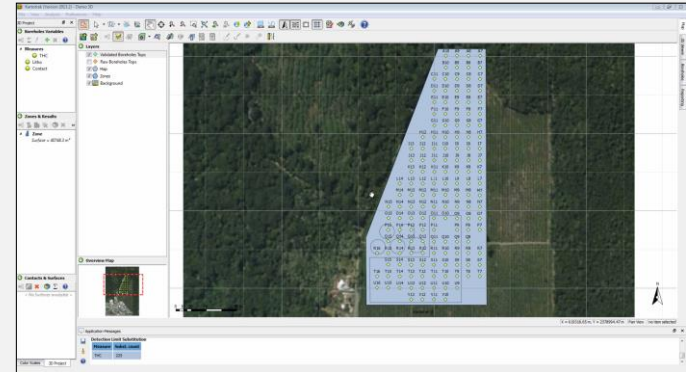
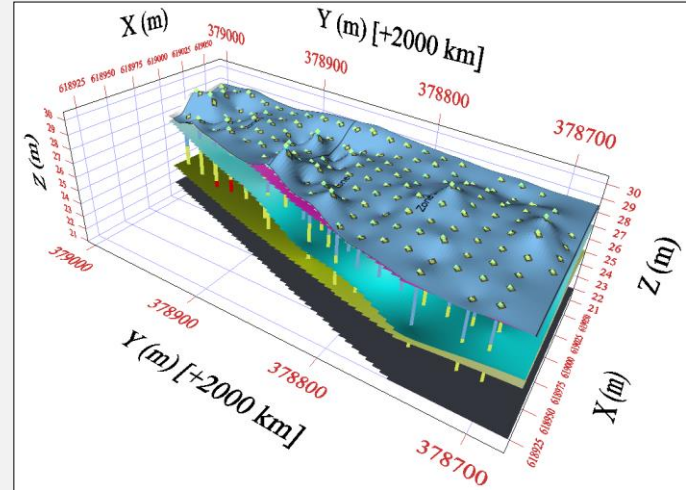
Stop on First Error

Application Messages

Buttons: Load..., Delete Boreholes, Delete All, Save to File..., Validate...

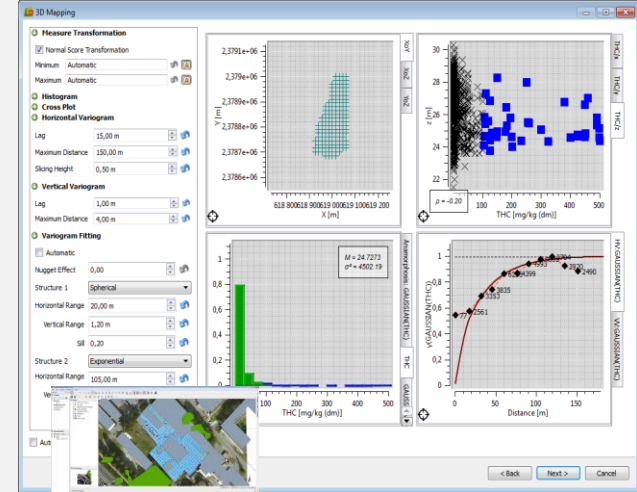
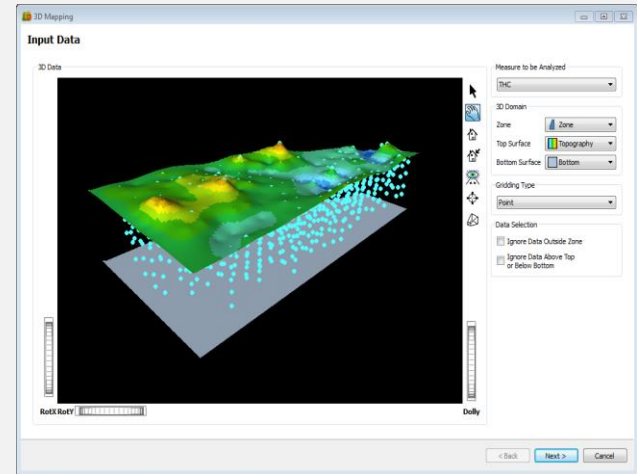
DEFINITION OF LITHOLOGICAL SURFACES

- **Interpolation** from:
 - boreholes samples
 - external files
- **Lithology** is taken into account during characterization



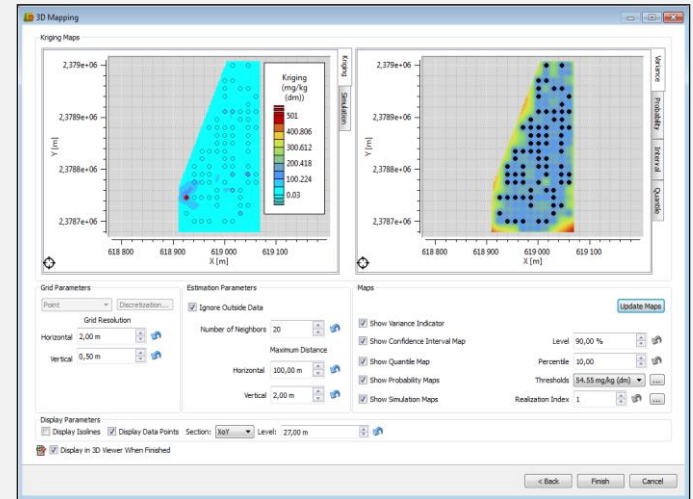
STATISTICAL AND SPATIAL ANALYSIS

- Instant **statistics**
 - Dynamic link between all the graphical displays
- outliers identification



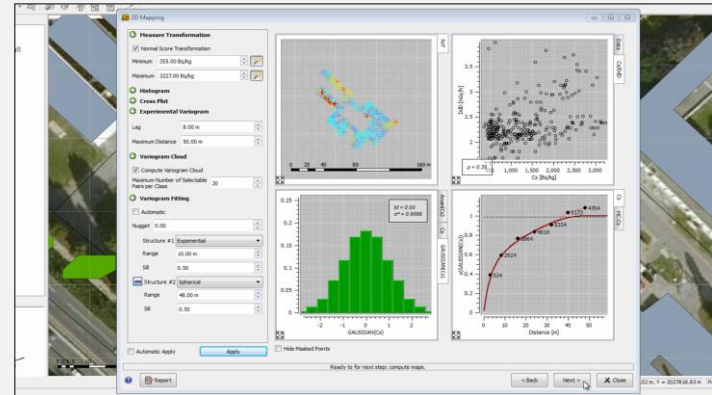
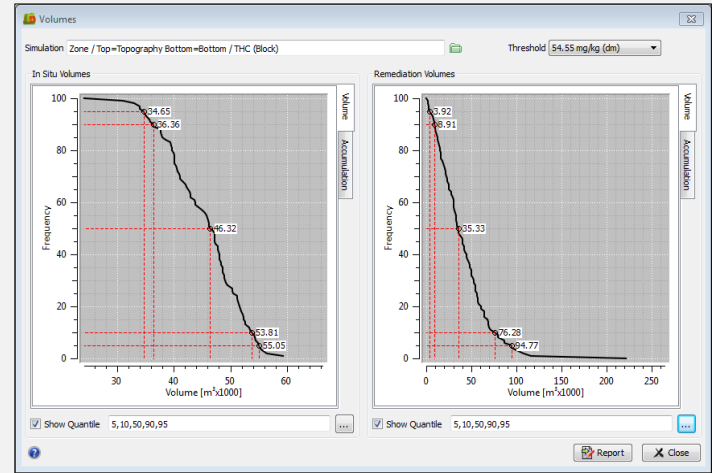
ESTIMATION AND MAPPING

- **Contamination map**
 - Robust algorithm (kriging)
 - Identification of critical areas
- **Variance map**
 - Precision of interpolated maps
 - Help for sampling optimization



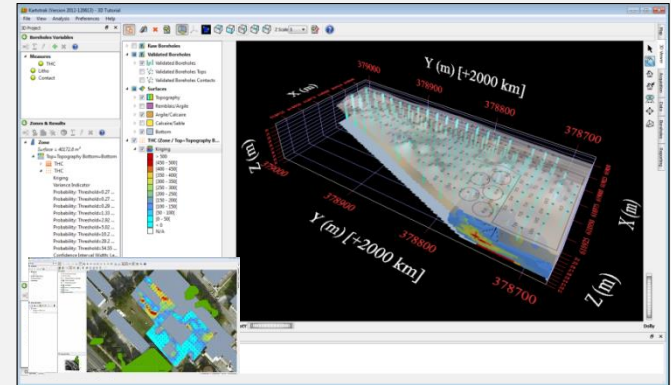
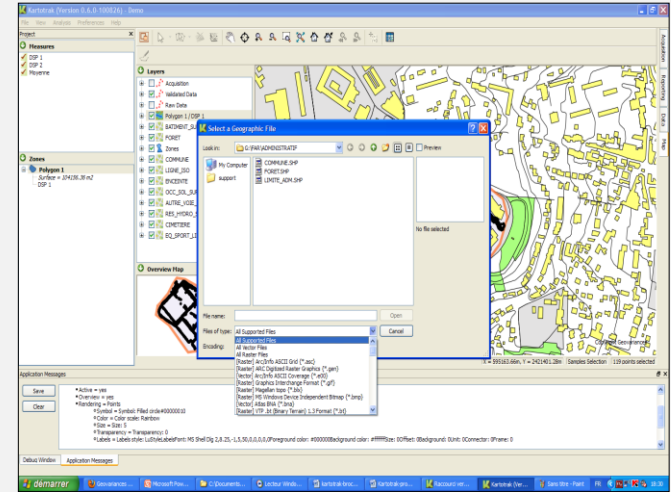
RISK ANALYSIS

- Probability map of exceeding a remediation threshold
 - Soil / waste classification
- Confidence interval
- Quantile map
- Geostatistical simulations
 - Evaluation of **contaminated surfaces and volumes**



RESULTS VISUALIZATION

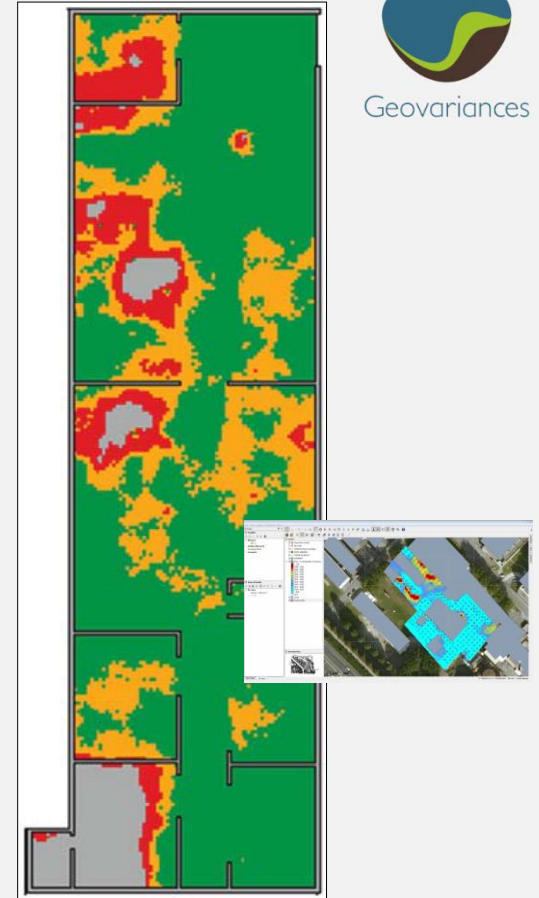
- Software based on **2D GIS components** and a **3D viewer**
- Contamination put into the **environmental context**
- Producing a **2D/3D model** of the contamination including neighbouring sites



SAMPLING OPTIMIZATION

Localization of **additional samples** using an optimization criterion to reduce:

- Geometrical uncertainties
- Uncertainties based on a confidence interval
- « False negative risk » areas





Geovariances

TO SUMMARIZE

KARTOTRAK BENEFITS



1. **Value** your input data, whatever its quality or its quantity
2. **Put** the contamination into its **environmental context**
3. **Optimize and adapt sampling plans** to your remediation objectives
4. **Avoid** unnecessary remediation
5. **Base** your decision-making process on reliable figures
6. **Get** the cross-sections you need for your remediation plans



SELLING MODEL

Perpetual license + maintenance

One-year, two-year and three-year subscriptions (including maintenance)



Geovariances
Where no one has gone before

THANK YOU
FOR YOUR ATTENTION



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