# The Dead Sea and the canals

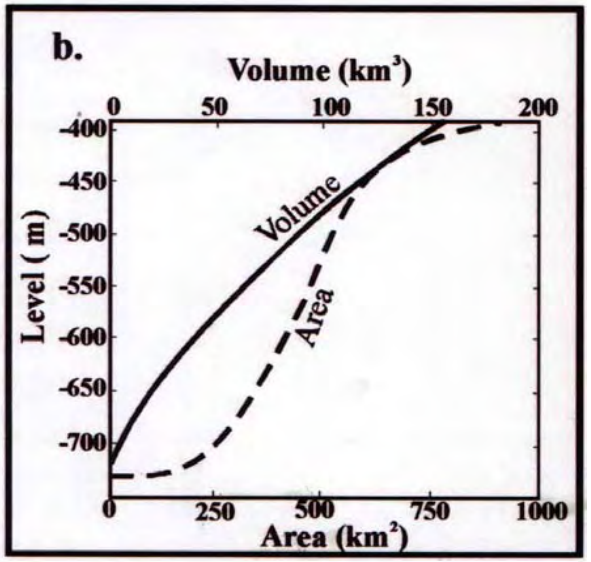
Geological Survey of Israel

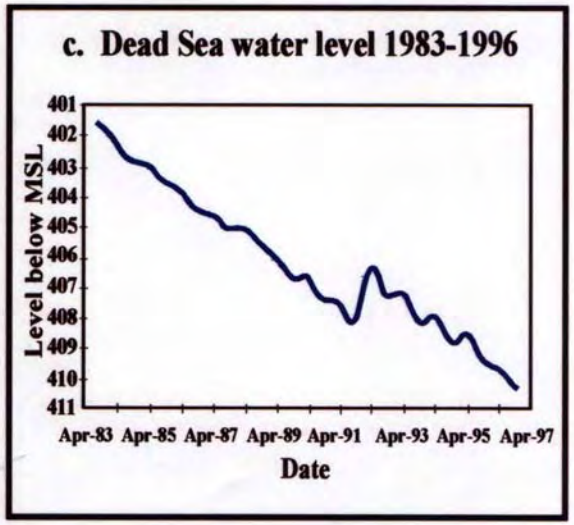
M. Beyth

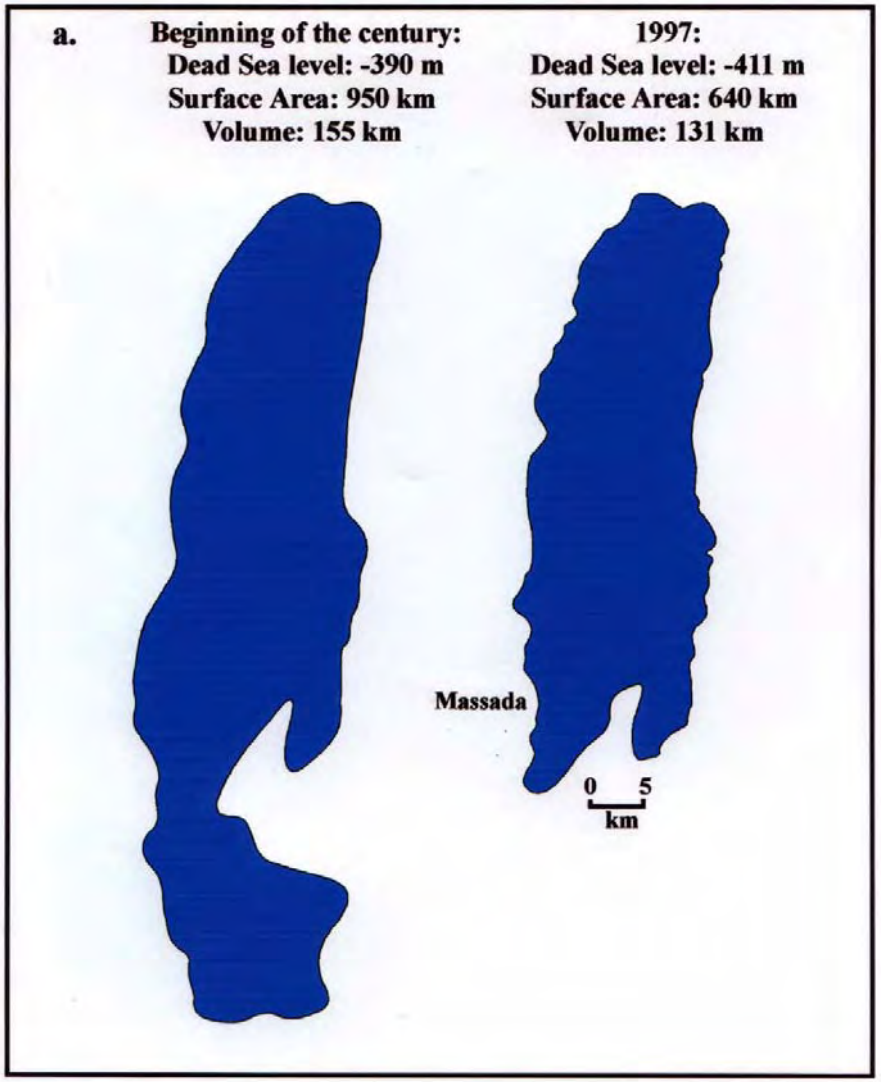
Head of the Israeli team for the TOR

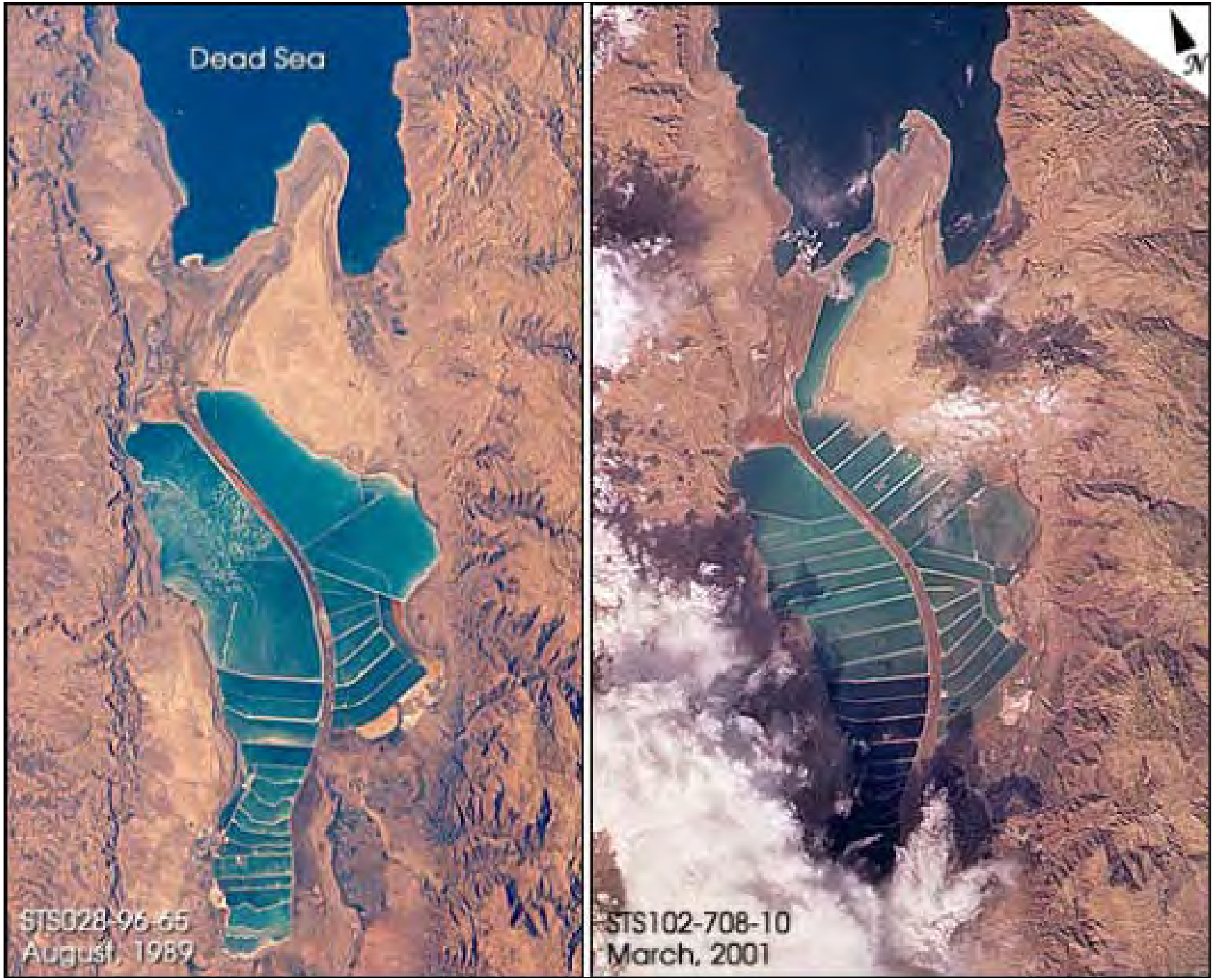
*Gavriely, Yechiely, Ablson, Crouvi. Baer and Lenzki

# Dead Sea Water levels



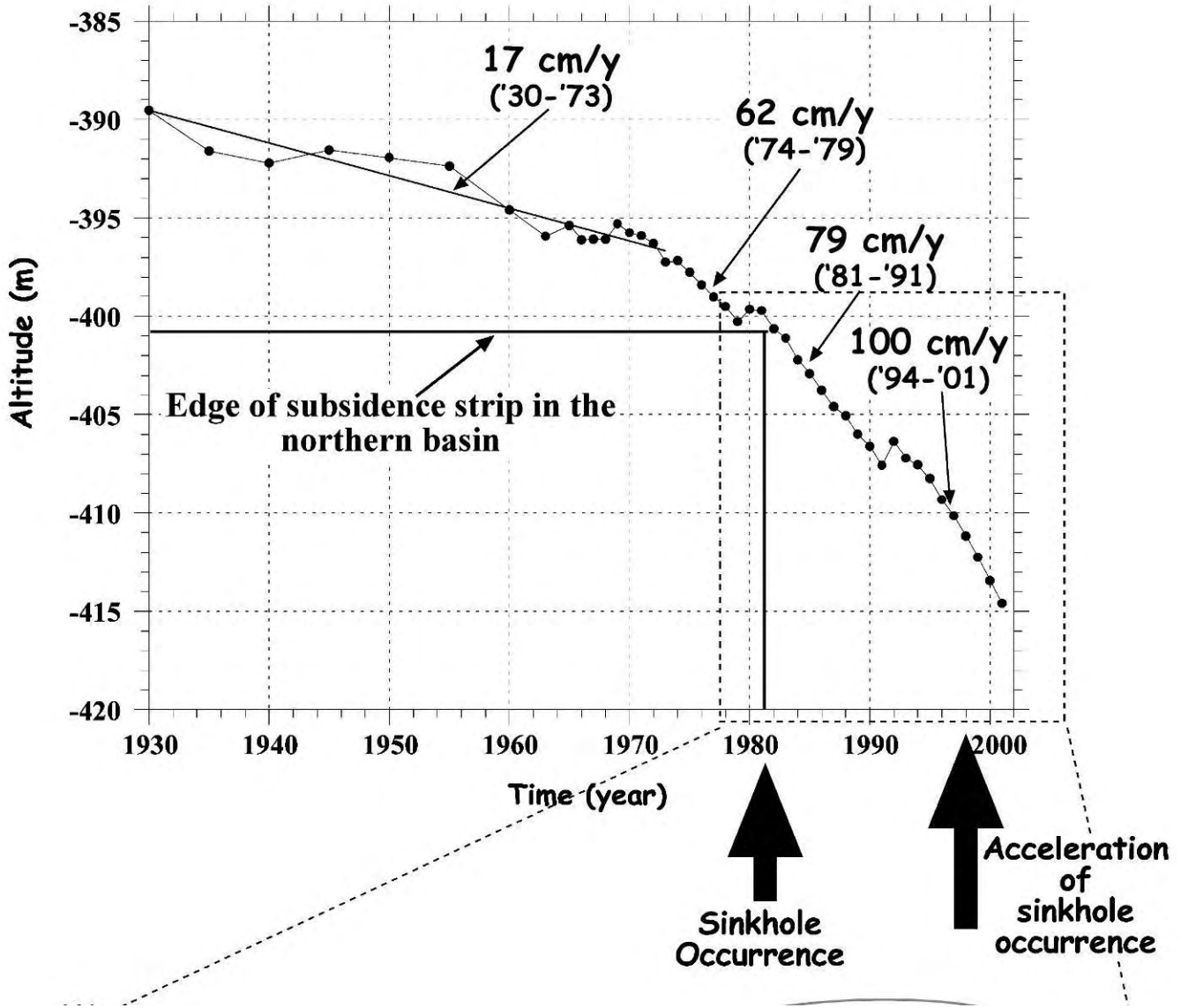




Dead Sea
STS028-96-65
August, 1989
N
STS102-708-10
March, 2001


# Dead Sea Drainage Basin

# Dead sea level drop




October 5, 2000


October 5, 2000


October 5, 2000


October 5, 2000


October 5, 2000


October 5, 2000
August 6, 2001


October 5, 2000
August 6, 2001


October 5, 2000
August 6, 2001


October 5, 2000
August 6, 2001


October 5, 2000
August 6, 2001

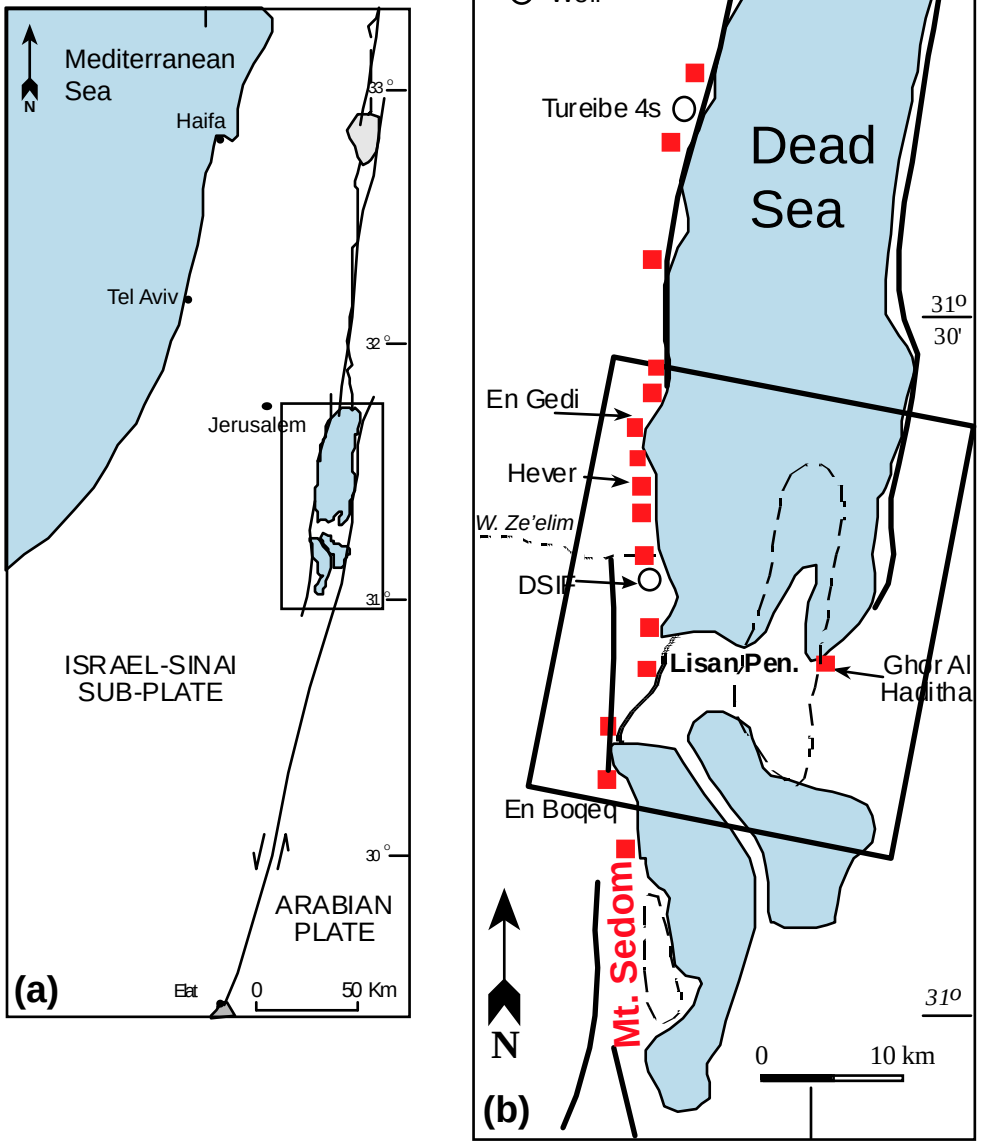

August 6, 2001


August 6, 2001

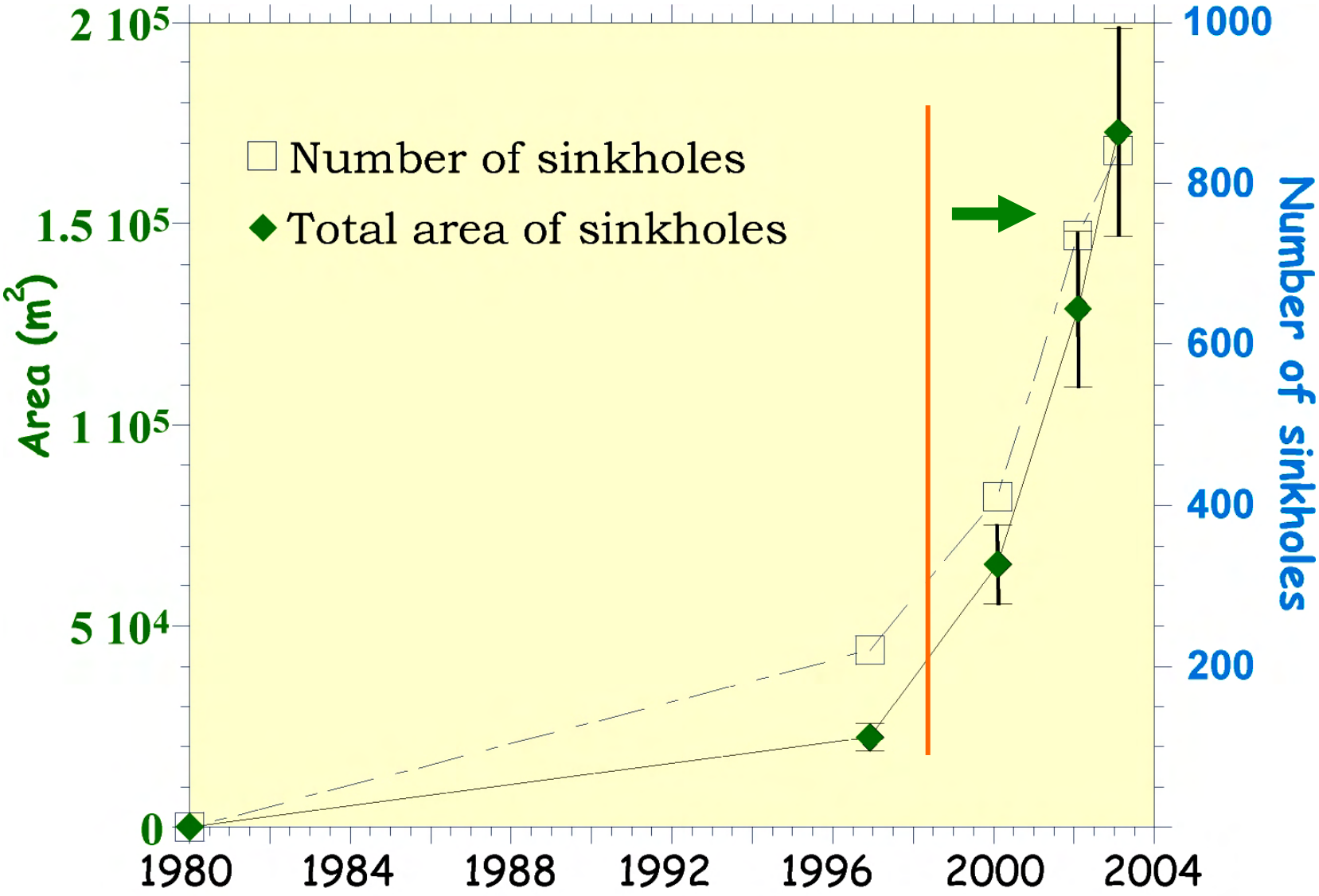

August 6, 2001


August 6, 2001

# Zones of sinkholes



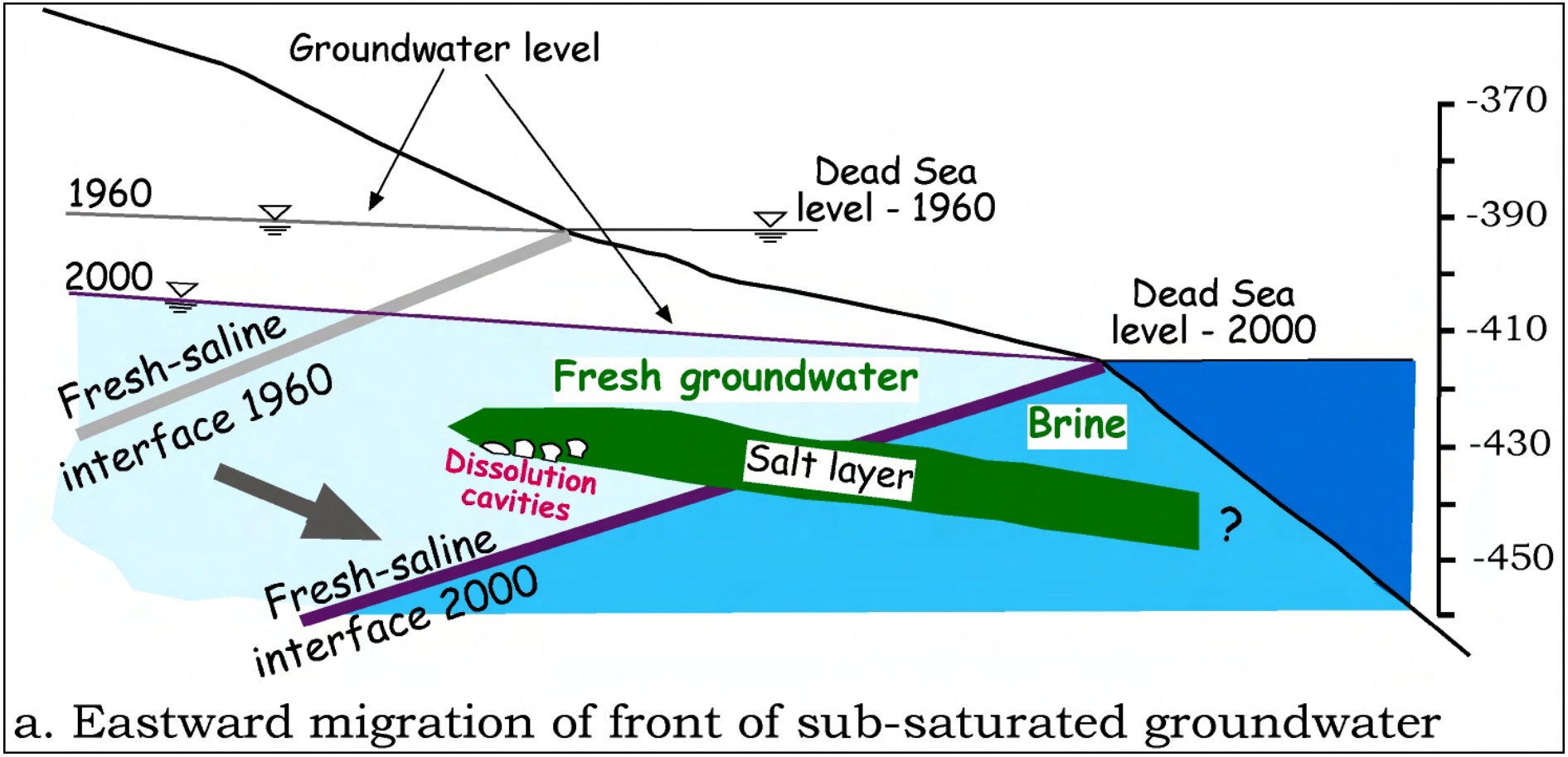
Approx. 300 new sinkholes annually



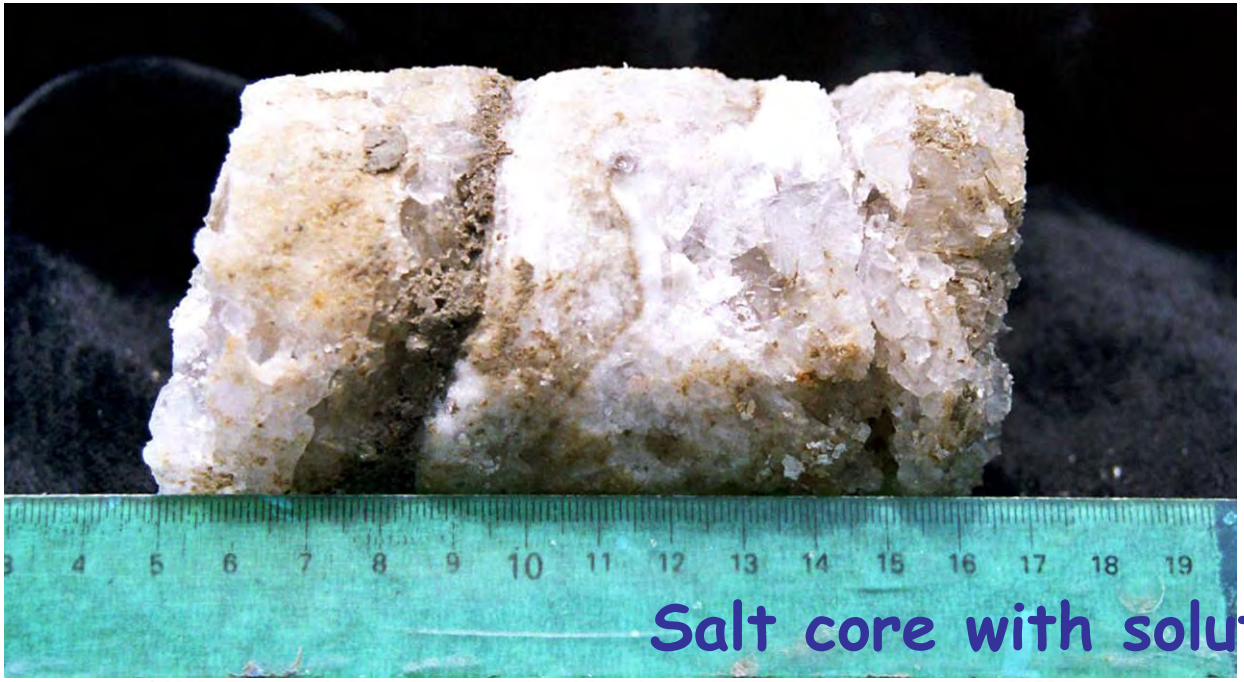
| Saturation (halite) | Na/Cl (eq/eq) | Salinity (Cl g/l) | Lithology | | Depth (m) |
|---|---|---|---|---|---|
| | | | gravel | | 10 |
| -1.66 | 0.38 | 72 | | | |
| -1.34 | 0.34 | 97 | clay | | 20 |
| -0.30 | 0.35 | 186 | | | |
| +0.01 | 0.50 | 200 | **10,000 yr** salt | | 30 |
| -0.01 | 0.41 | 208 | | | |
| | | | **16,200 yr** clay | | 40 |
| | | | | | 50 |
| -0.03 | 0.30 | 220 | gravel | | 60 |
| | | | | | 70 |
| | | | clay | | |
| | | | gravel | | 80 |

Dead Sea : Cl = 225 g/l; Na/Cl = 0.25; Saturation = 0.00

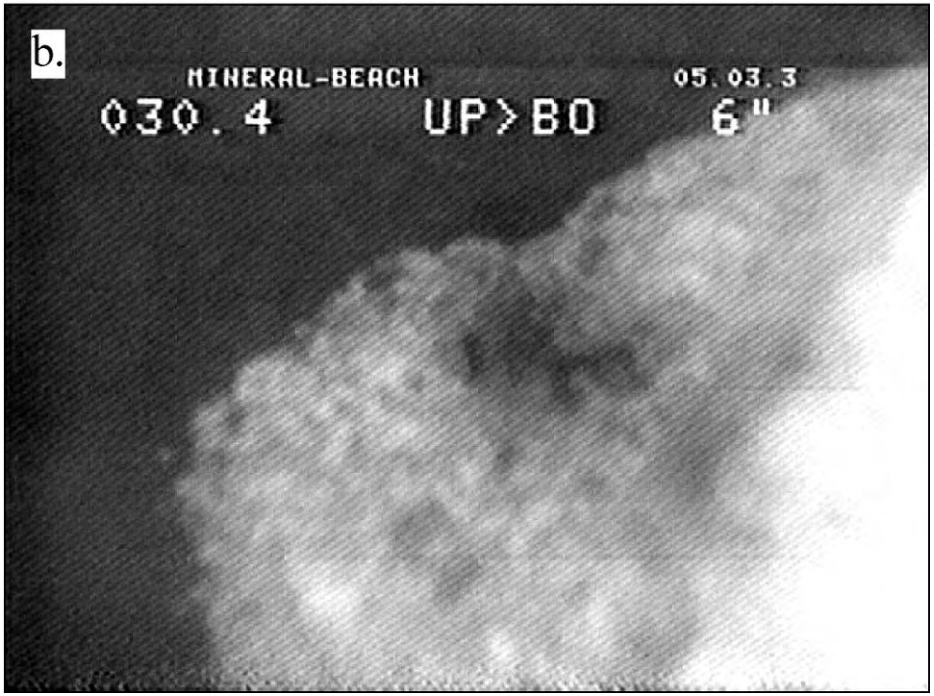
# Sedimentary profile along the Dead sea shore




a. Eastward migration of front of sub-saturated groundwater

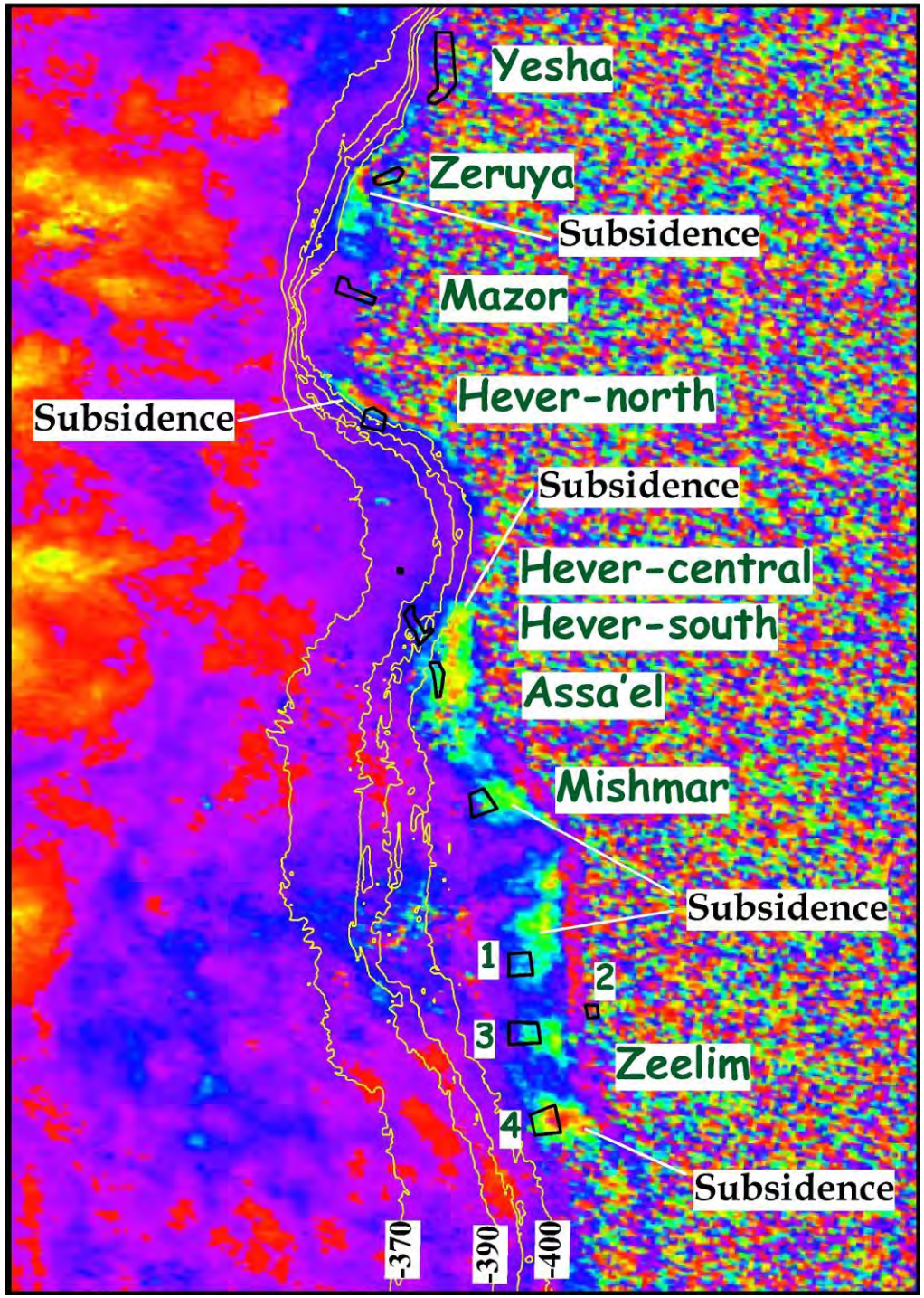



Salt core with solution cavities

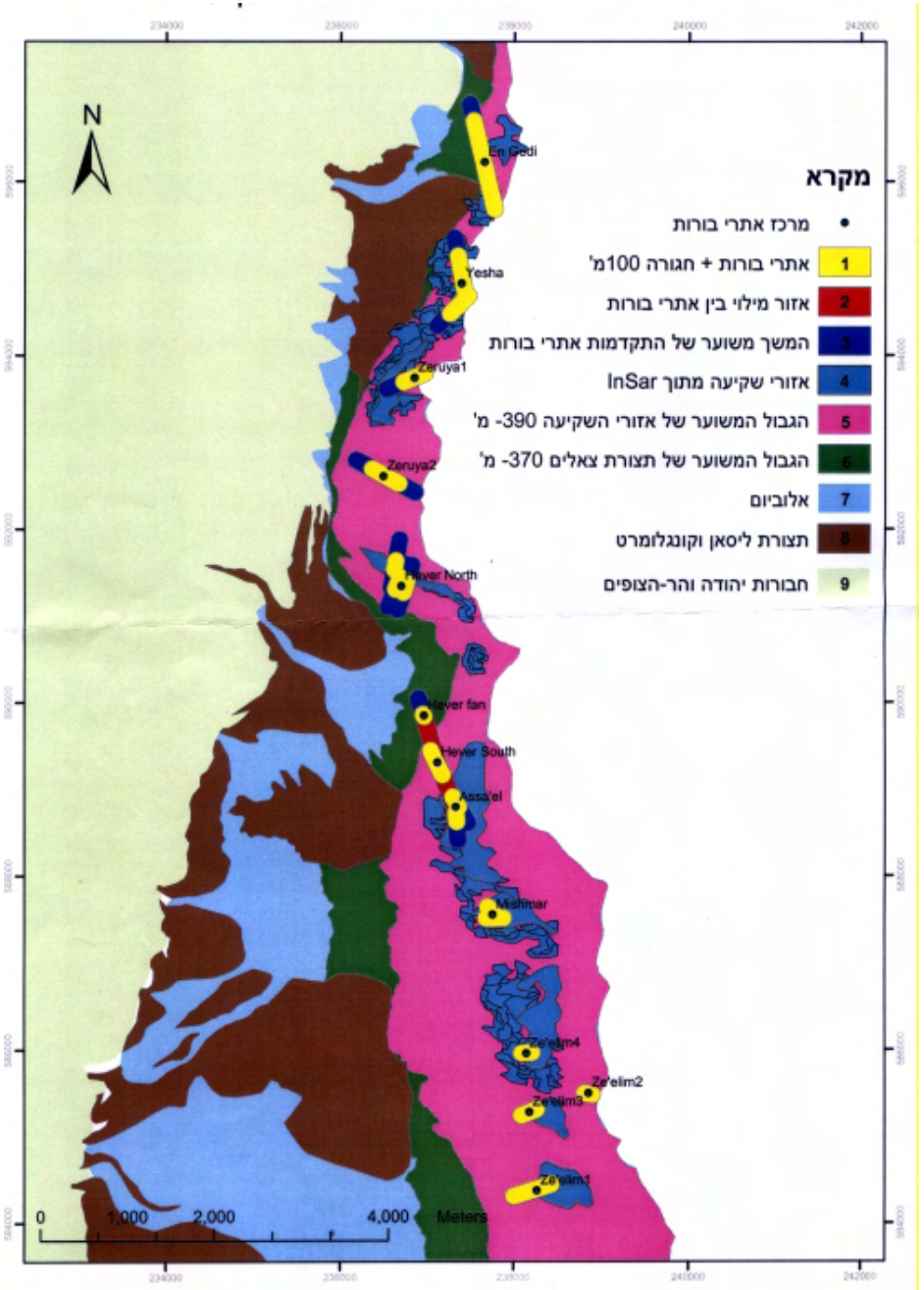


**Radar images**

**Baer G.**



# Hazard map


N
מקרא
מרכז אתרי בורות
אתרי בורות + חגורה 100מ'
1
אזור מילוי בין אתרי בורות
2
המשך משוער של התקדמות אתרי בורות
3
אזורי שקיעה מתוך InSar
4
הגבול המשוער של אזורי השקיעה 390- מ'
5
הגבול המשוער של תצורת צאלים 370- מ'
6
אלוביום
7
תצורת ליסאן וקונגלומרט
8
חבורות יהודה והר-הצופים
9
En Gedi
Yesha
Zeruya1
Zeruya2
Hever North
Hever fan
Hever South
Assa'el
Mishmar
Ze'elim4
Ze'elim2
Ze'elim3
Ze'elim1
0
1,000
2,000
4,000
Meters

**Bridge destruction by floods**

# Is the Red-Dead Canal a solution?

– What are the goals

– Ecologic and economic considerations

– R& D for the various influx scenarios

– National and regional policy

# The history of the idea

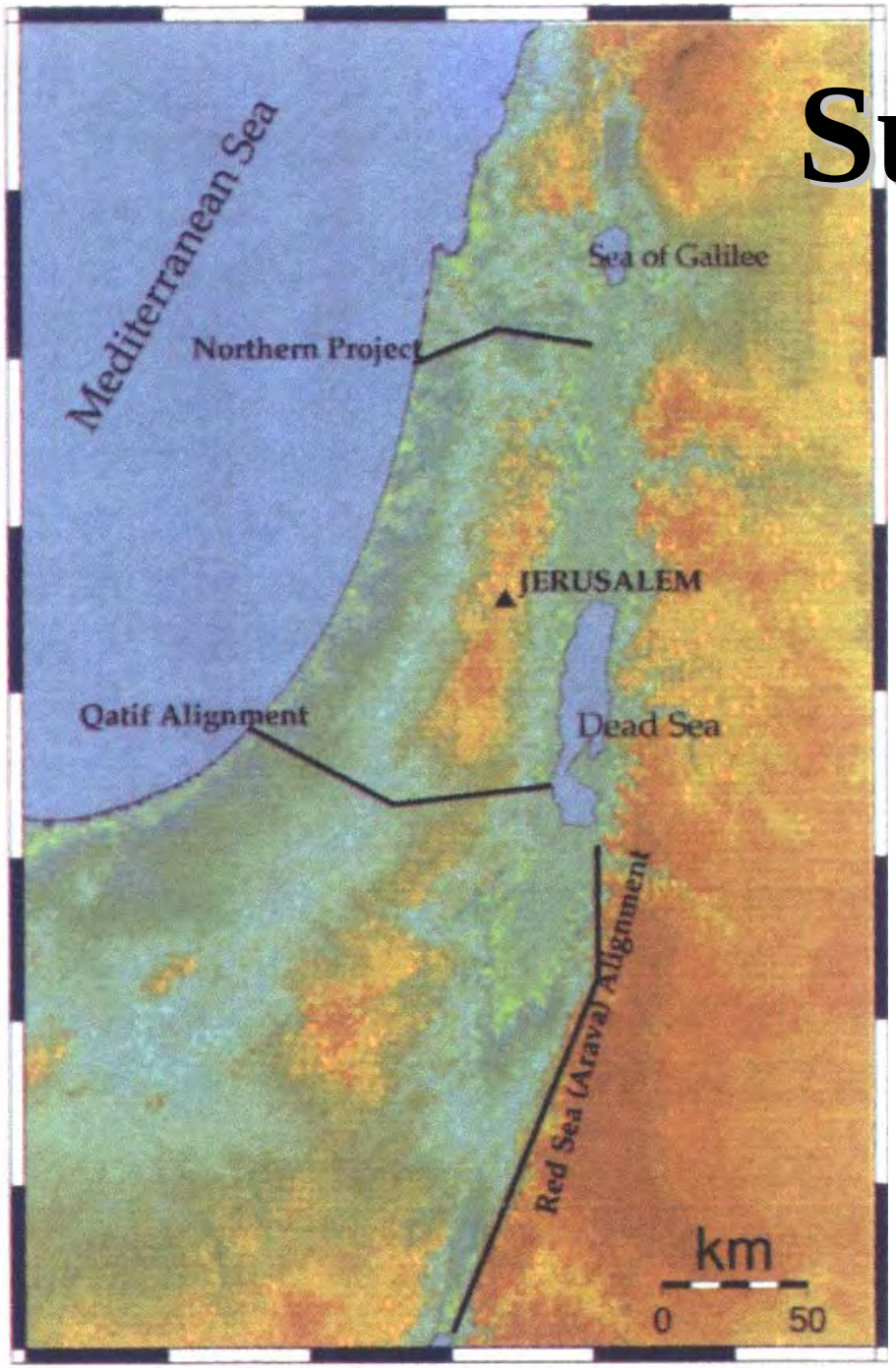
Pre-1973 energy crisis

Post-1973

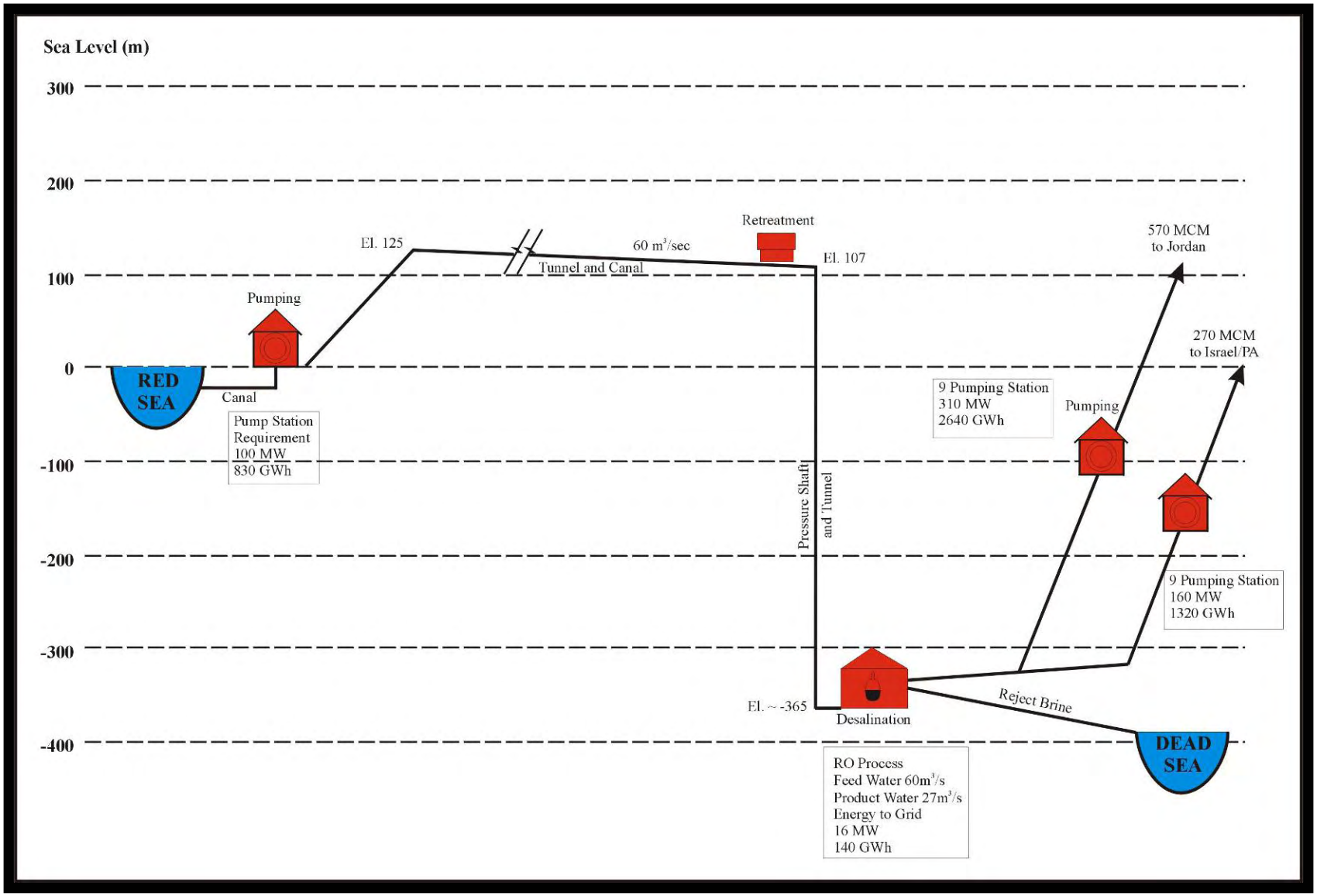
JRV-Jordan Israel Peace talks

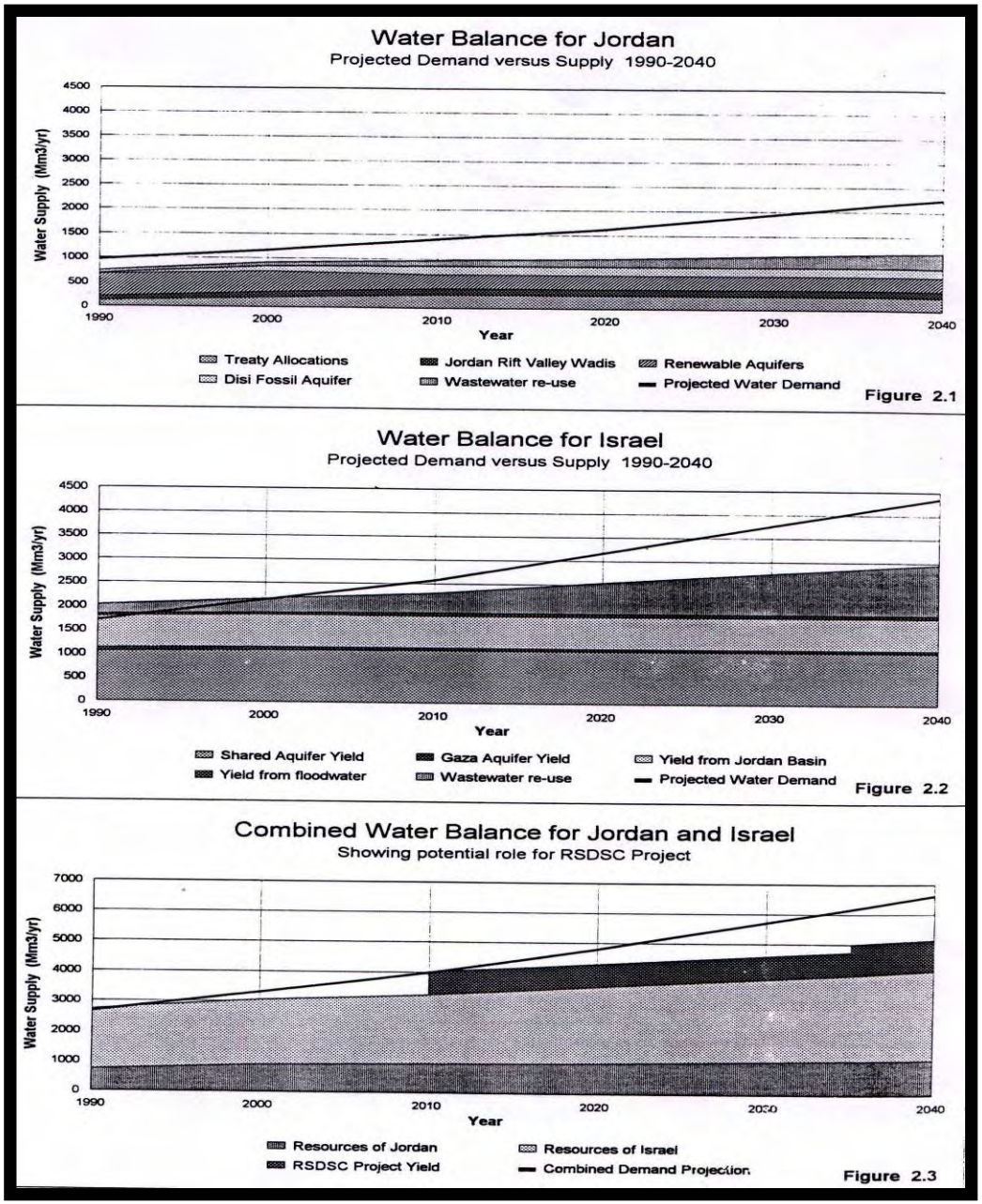
Ecology and Environment and Harza Group

# Suggested Canals



# Major canal elements






# Regional Water balance (Harza Group)

# The present feasibility Study

## The TOR: Study of the Environmental, Technical and Economical Feasibility of the Red-Sea Dead-Sea Canal (RSDSC)

Jordan, Israel, PA and World Bank

# The goals of the project

Save the Dead Sea

Desalination -2/3 for Jordan -1/3 for PA

Peace project

# The goals of the feasibility Study

Pre-feasibility study

Financial framework for the project

Environmental feasibility

# The four major elements of the Study

Red Sea

Conduit

Desalination

Management of the Dead Sea

# Implementation of Study

- Prime contractor – International
- Sub-contractors - Regional

# Time table

4 months to define gapes of knowledge

20 months to close the gapes

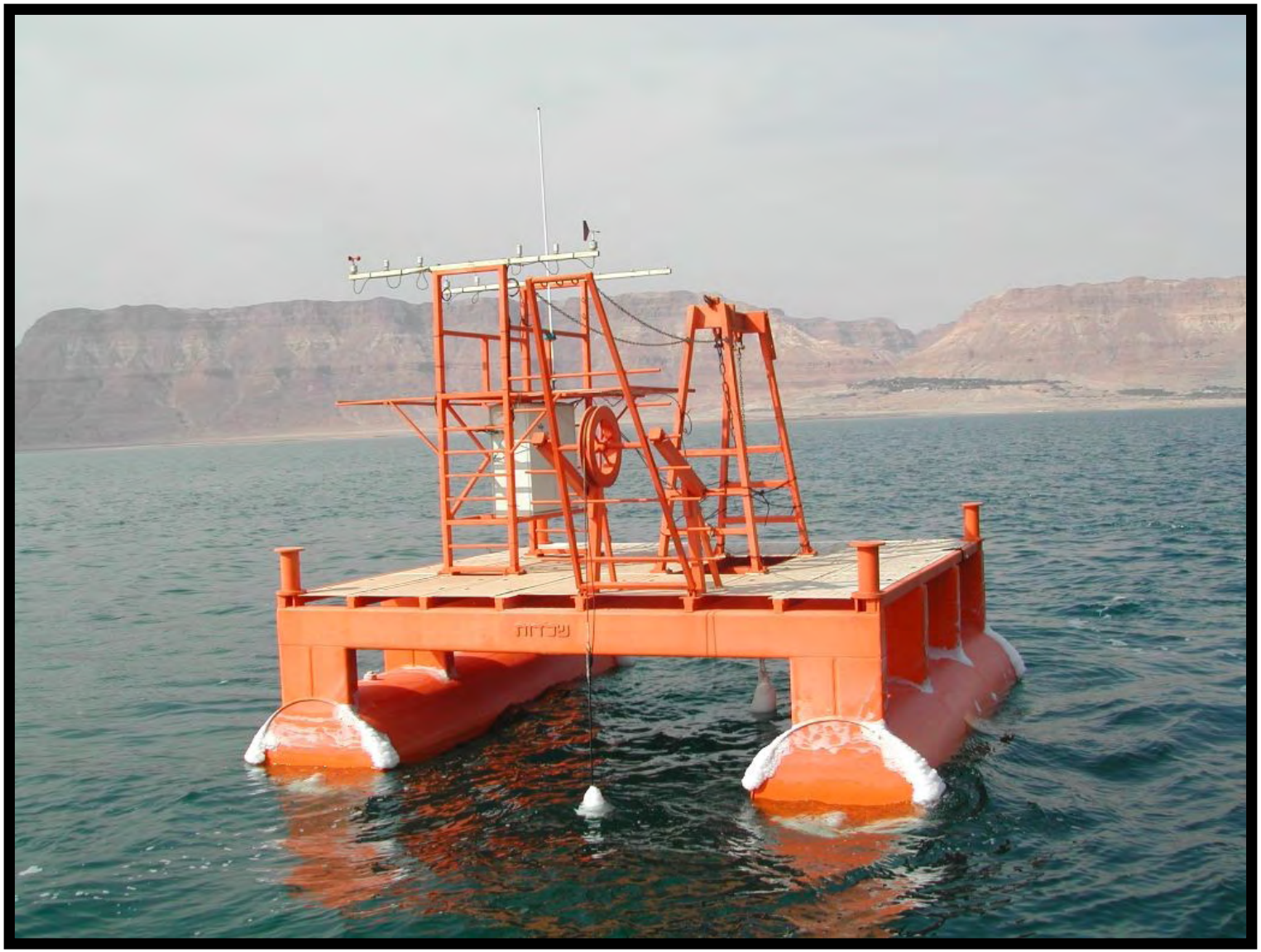
6 months integration of data

# Calculated parameters*

- Evaporation rate 1.15 m\year
- Halite crystallization 0.1 m\year
- Water influx 265-330 $m^3$\year
- Water deficit 850 $m^3$\year

*Lenzki and Gavrieli

# Meterological data collection



# The beauty of mineralization in the sinkholes


- **Eli Raz,  Ein Gedi**


1 7 2003


25 9 2002


19 10


2 9 2002


26 11 2003

# World Bank TOR Approach

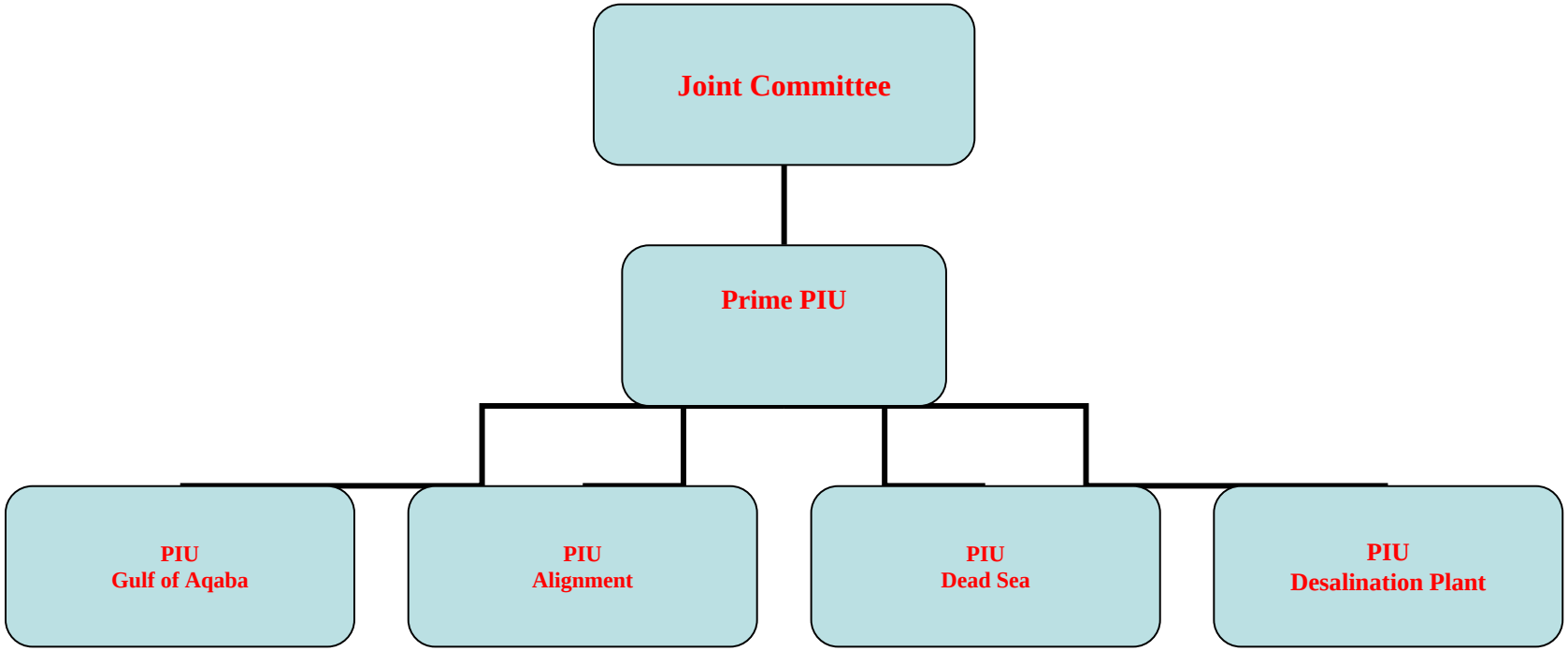
- Separates between the feasibility of the project and its environmental and social impacts
  - a “feasibility study” that reviews the benefits of the Project and an “environmental and social assessment” that reviews the negative aspects thereof
- The RSDSC is likely to have both environmental benefits and environmental costs

# Objectives of Study

- Investigate the feasibility of the RSDSC as a solution to the decline of the Dead Sea

- Create a tool for the stakeholders to determine whether the construction of the RSDSC is feasible taking into account **all** relevant aspects including the environmental, economic, financial, technical, technological, and the ecological ones

- Determine if the RSDSC is environmentally feasible and investigate the traditional cost-benefit aspects of the RSDSC


Joint Committee
Prime PIU
PIU
Gulf of Aqaba
PIU
Alignment
PIU
Dead Sea
PIU
Desalination Plant