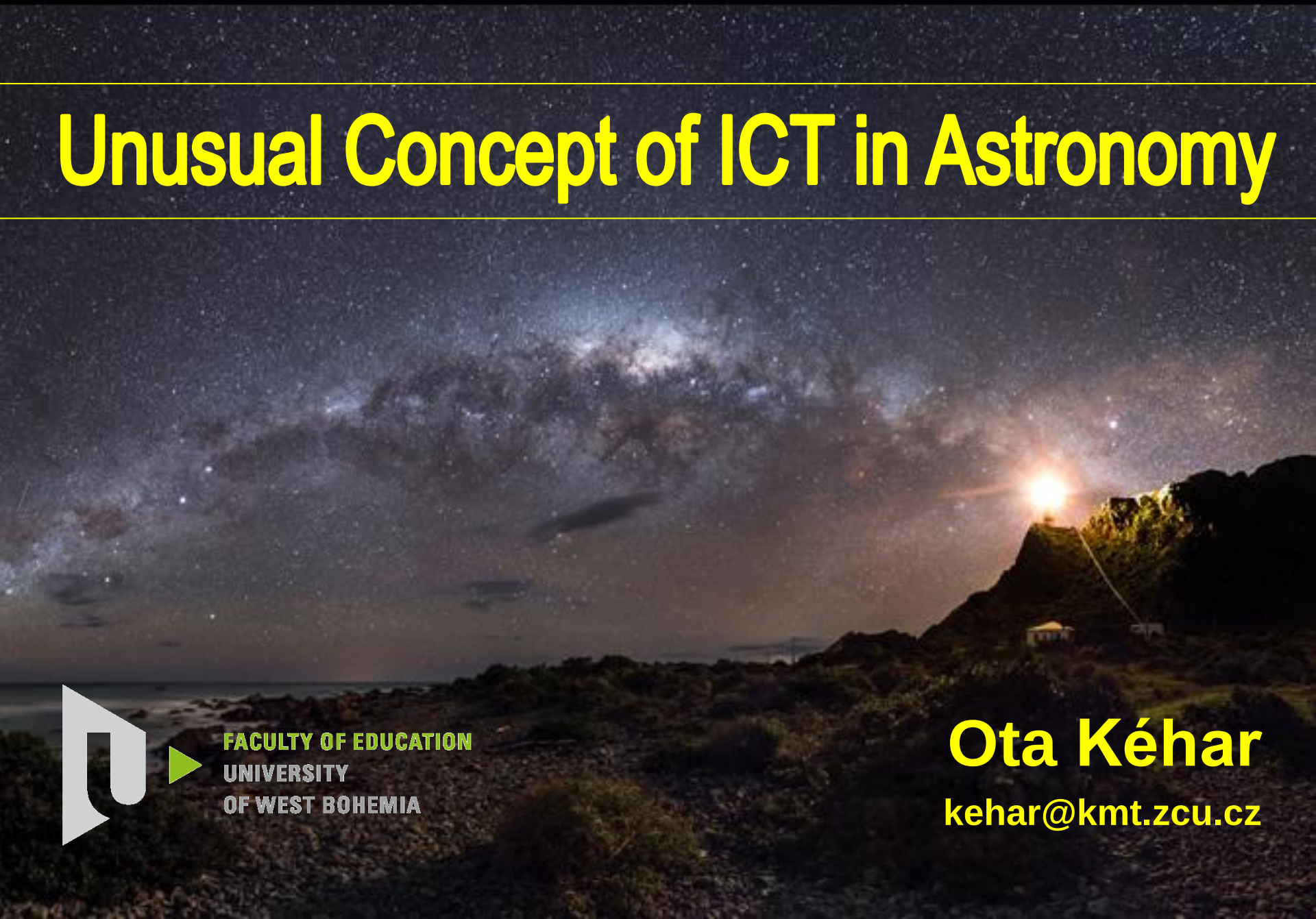
Information and Communication Technologies in Education, Rožnov pod Radhoštěm, September 15-17, 2015

Unusual Concept of ICT in Astronomy



FACULTY OF EDUCATION
UNIVERSITY
OF WEST BOHEMIA

Ota Kéhar

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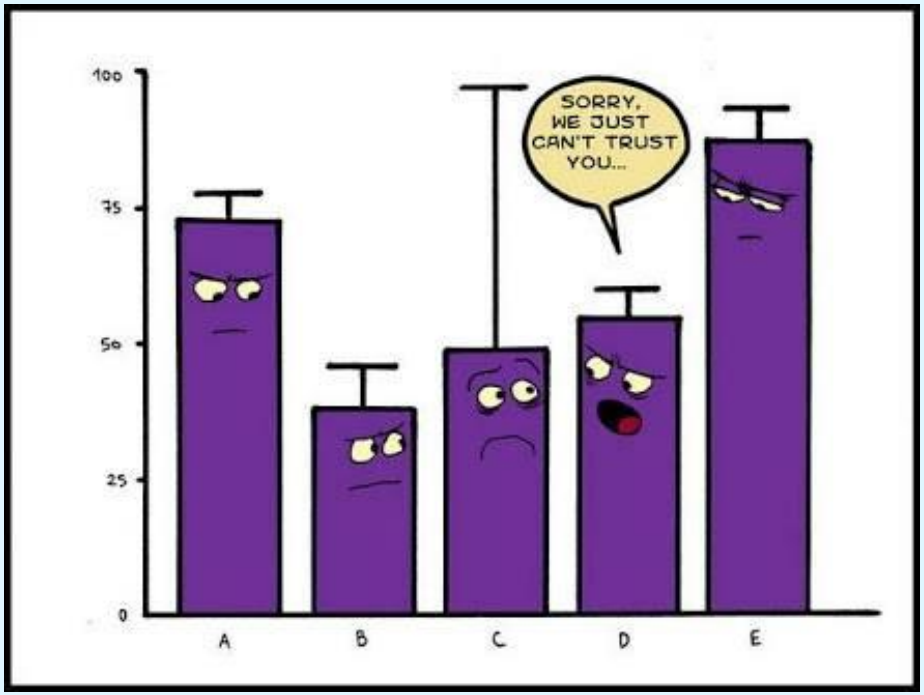
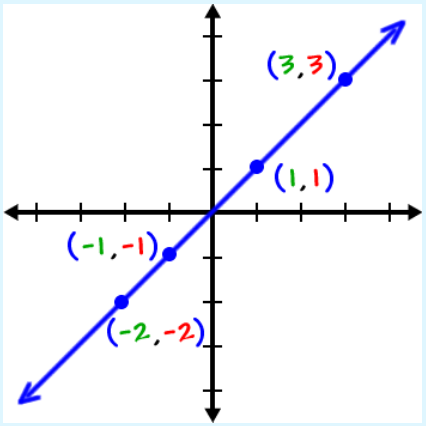
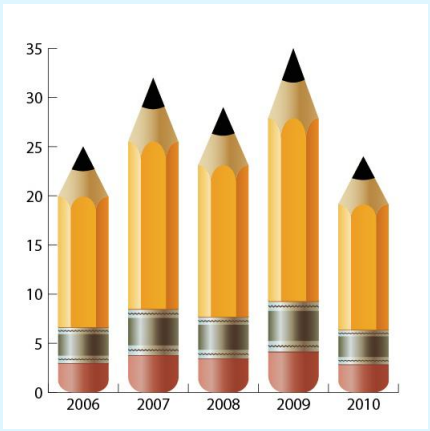
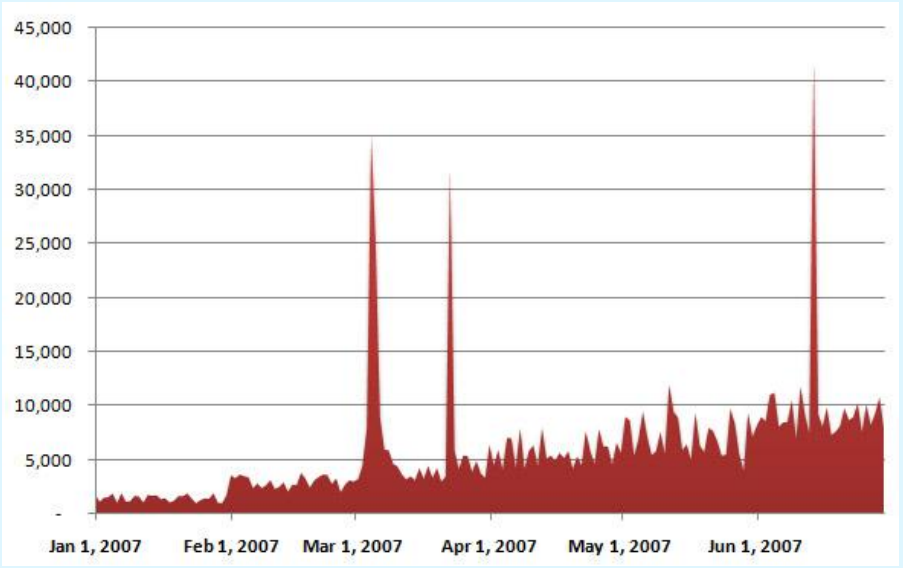
Graphs / plots / diagrams are everywhere…









What Students Should Know About It?

Educational Framework Programme for Grammar Schools

EN

INFORMATION PROCESSING AND PRESENTATION

Expected Outcomes

The pupil shall:

- process and present the outcomes of his/her work while using advanced functions of application software, multimedia technologies and the internet
- apply an algorithmic approach to problem solving

Subject Matter

- **publishing** – forms of documents and their structures, the principles of graphic and typographic modifications in a document, basic aesthetic principles in publishing
- **application software for work with information** – text editors, spreadsheets, graphics editors, databases, presentation software, multimedia, modelling and simulation, data export and import

CS

ZPRACOVÁNÍ A PREZENTACE INFORMACÍ

Očekávané výstupy

žák

- zpracovává a prezentuje výsledky své práce s využitím pokročilých funkcí aplikačního softwaru, multimediálních technologií a internetu
- aplikuje algoritmický přístup k řešení problémů

Učivo

- **publikování** – formy dokumentů a jejich struktura, zásady grafické a typografické úpravy dokumentu, estetické zásady publikování
- **aplikační software pro práci s informacemi** – textové editory, tabulkové kalkulátory, grafické editory, databáze, prezentační software, multimedia, modelování a simulace, export a import dat
- **algoritmizace úloh** – algoritmus, zápis algoritmu, úvod do programování

What are advanced functions of application software?

…, macros, pivot tables, databases, …

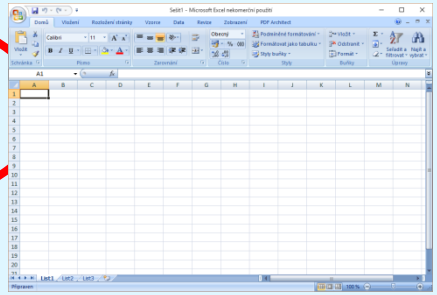
…, functions, adding columns, using formulas, creating graphs, data sorting, …

Students‘ activities

Real Data

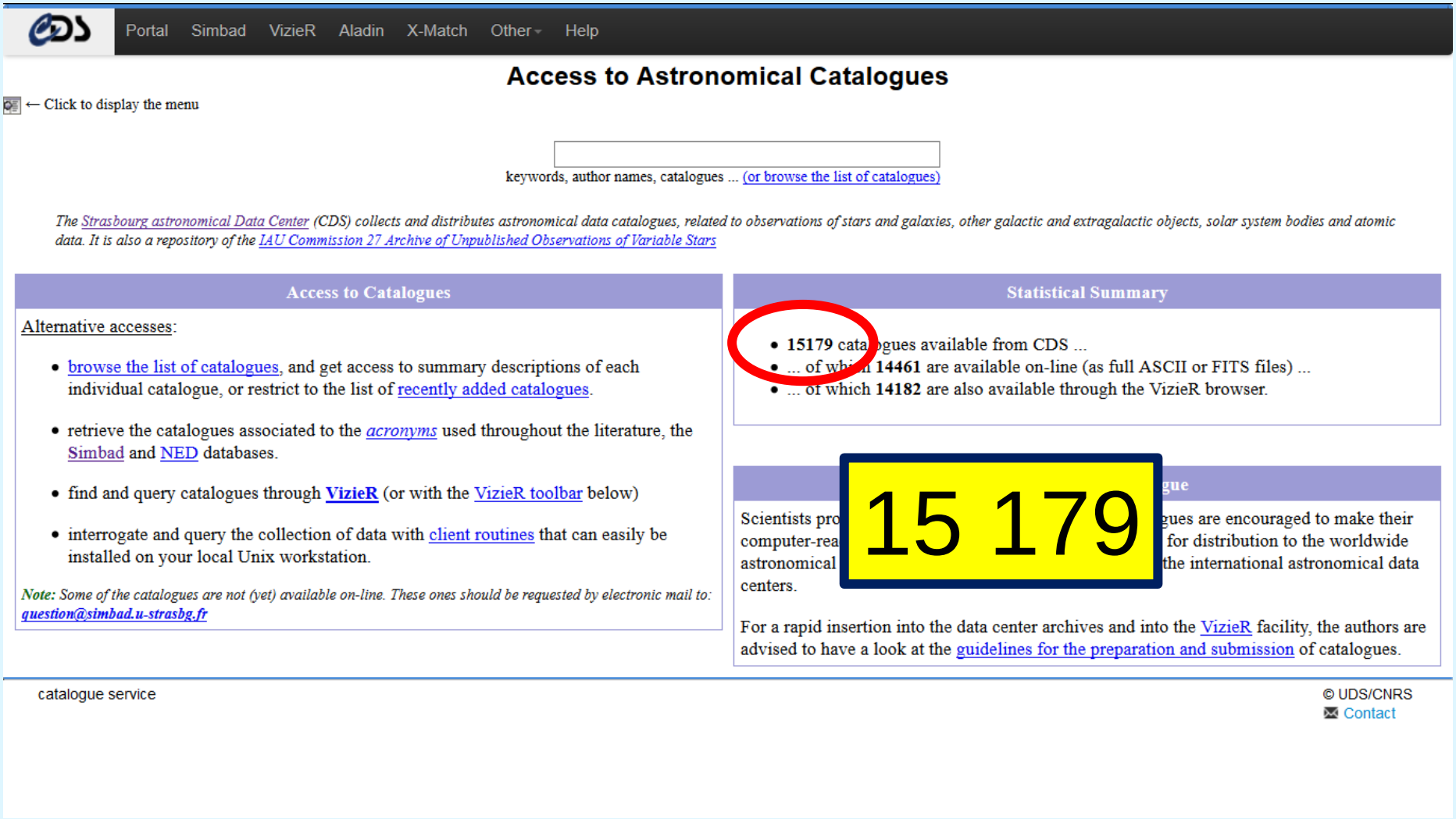
Students

Application software



Graphs Visualization

Where to easily get Real Data?



cdsarc.u-strasbg.fr/viz-bin/Cat

Catalogues on Astronomia web pages

- **MPC** = 439 830 minor planets
  (111 MB, updated monthly)

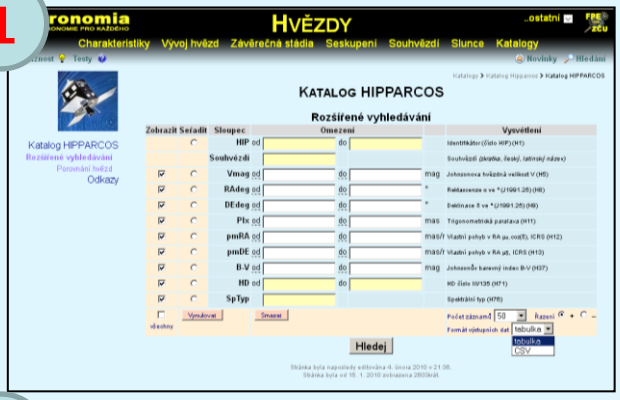
- **HIPPARCOS** = 118 218 stars
  (60 MB, static)
- **SIMBAD** (*) = 118 194 stars
  (29 MB, updated weekly)

- **NGC** = 7840 objects
  (2 MB, 400 MB images, static)
- **Messier** = 110 objects
  (615 MB images)

Two ways how to use data from catalogues of stars…

Raw Real Data Usage

1

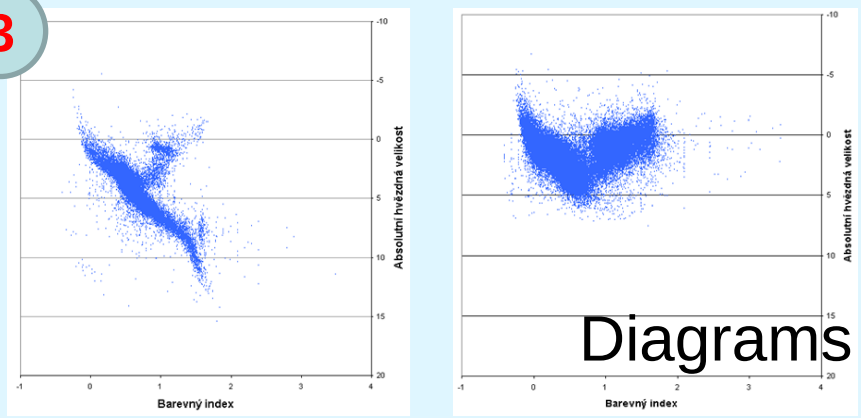


Browser

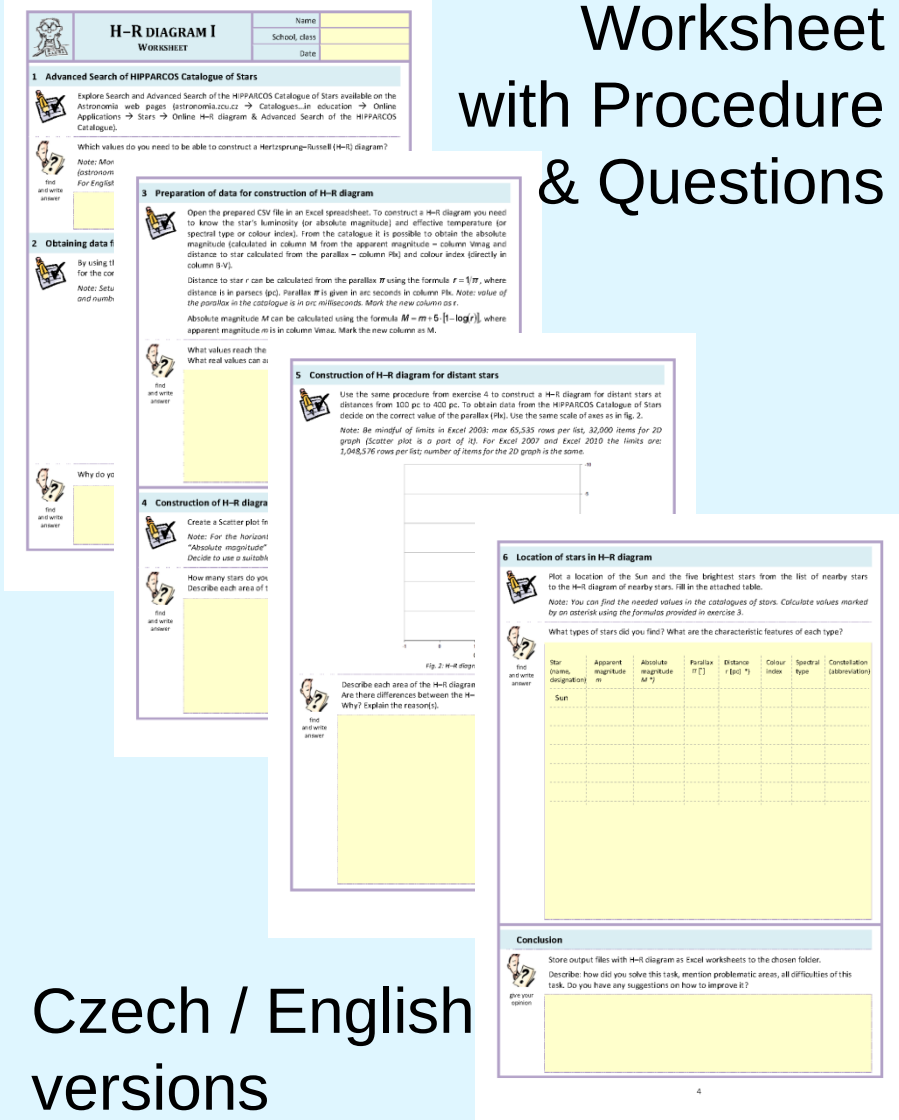
2

Excel Spreadsheet

3



Diagrams

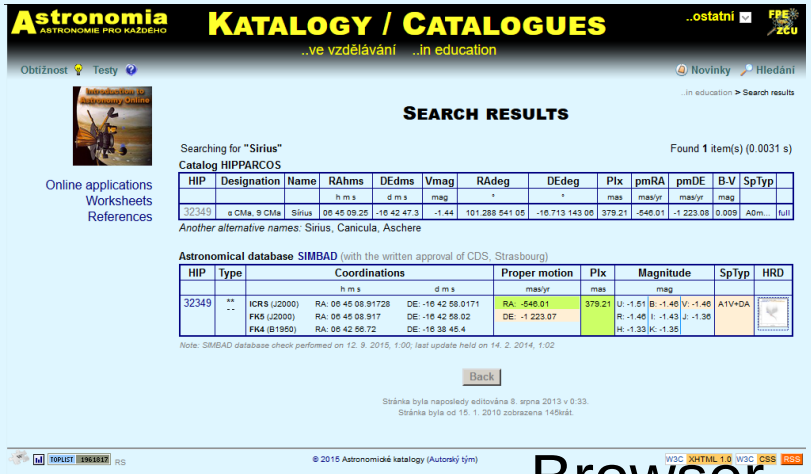


Worksheet with Procedure & Questions

Czech / English versions

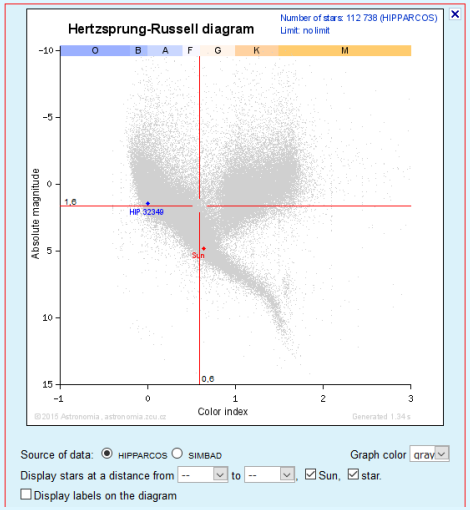
Online Application Real Data Usage

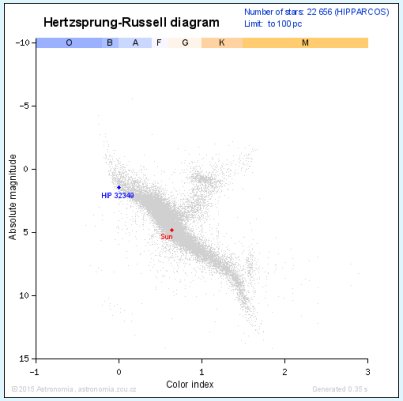
1



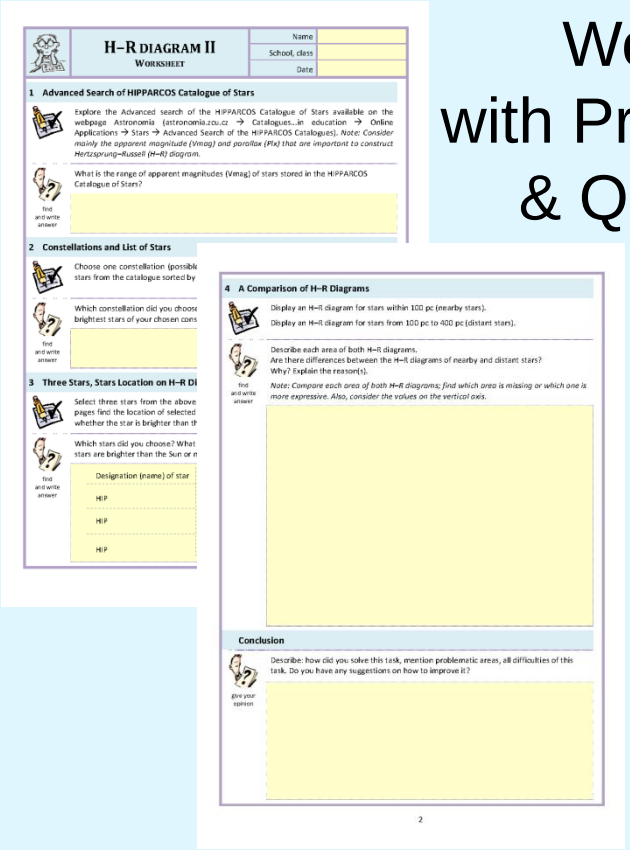
Browser

2





Diagrams in browser

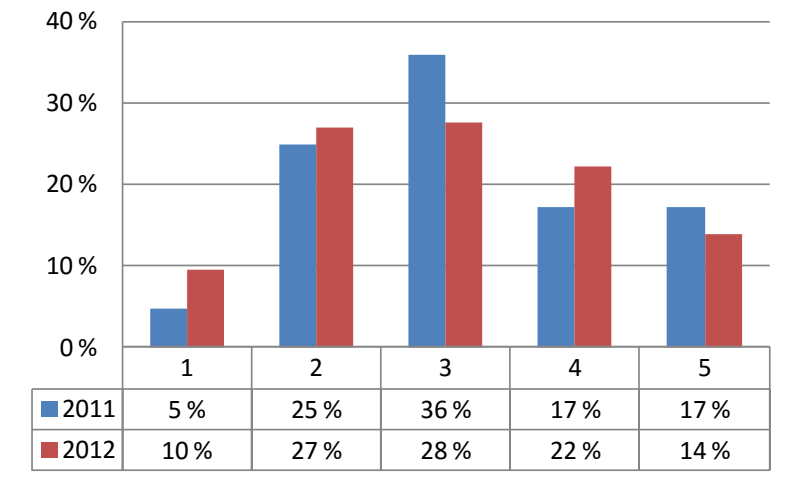


Worksheet with Procedure & Questions

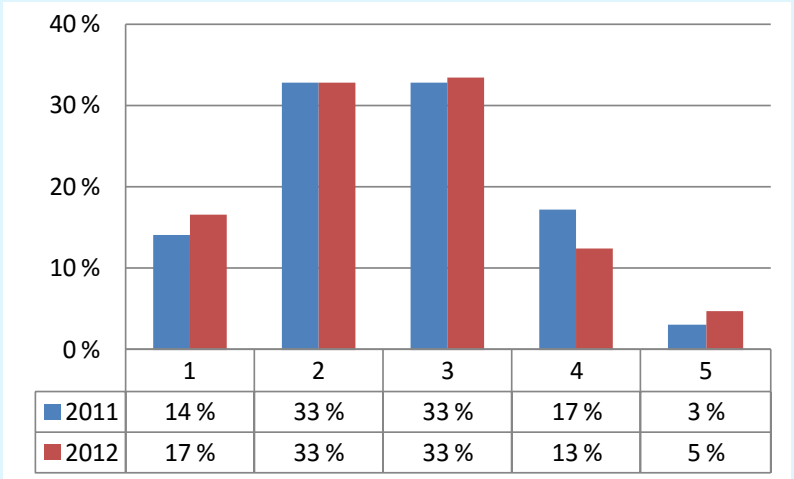
Czech / English versions

Data Analysis & Comparison

complexity (left) / usefulness (right)



	1	2	3	4	5
2011	5 %	25 %	36 %	17 %	17 %
2012	10 %	27 %	28 %	22 %	14 %



	1	2	3	4	5
2011	14 %	33 %	33 %	17 %	3 %
2012	17 %	33 %	33 %	13 %	5 %

Conclusion

- Physics (Astronomy) & ICT together (increase hours)
- Usage of real data from satellites (or ground projects) incl. all errors and limitations
- Comment: "*It is not possible to find answers on Wikipedia*"
- Internet browser and spreadsheets usage
  → improve students skill & reach expected outcomes

Multimedia Textbook Astronomia

Catalogues

Astronomia.zcu.cz

ASTRONOMICKÝ SERVER FAKULTY PEDAGOGICKÉ ZČU V PLZNI

Planety | Galaxie | Hvězdy

Planets | Galaxies | Stars

Astronomical photos

Astronomers

Spacecrafts

Unusual Concept of ICT in Astronomy

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